NSRDS-NBS 59

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NATIONAL STANDARD NSRDS REFERENCE DATA SYSTEM

Selected Specific Rates of Reactions of Transients from Water in Aqueous Solution.

III. Hydroxyl Radical and Perhydroxyl Radical and Their Radical Ions

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[2] Located at Boulder, Colorado 80302.

Selected Specific Rates of Reactions of Transients from Water in Aqueous Solution.

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Foreword

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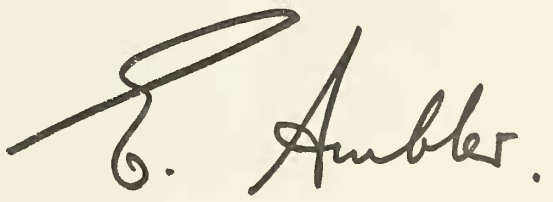
NSRDS receives advice and planning assistance from a Review Committee of the National Research Council of the National Academy of Sciences-National Academy of Engineering. A number of Advisory Panels, each concerned with a single technical area, meet regularly to examine major portions of the program, assign relative priorities, and identify specific key problems in need of further attention. For selected specific topics, the Advisory Panels sponsor subpanels which make detailed studies of users' needs, the present state of knowledge, and existing data resources as a basis for recommending one or more data compilation activities. This assembly of advisory services contributes greatly to the guidance of NSRDS activities.

The System now includes a complex of data centers and other activities in academic institutions and other laboratories. Components of the NSRDS produce compilations of critically evaluated data, reviews of the state of quantitative knowledge in specialized areas, and computations of useful functions derived from standard reference data. The centers and projects also establish criteria for evaluation and compilation of data and recommend improvements in experimental techniques. They are normally associated with research in the relevant field.

The technical scope of NSRDS is indicated by the categories of projects active or being planned: nuclear properties, atomic and molecular properties, solid state properties, thermodynamic and transport properties, chemical kinetics, and colloid and surface properties.

Reliable data on the properties of matter and materials are a major foundation of scientific and technical progress. Such important activities as basic scientific research, industrial quality control, development of new materials for building and other technologies, measuring and correcting environmental pollution depend on quality reference data. In NSRDS, the Bureau's responsibility to support American science, industry, and commerce is vitally fulfilled.



Ernest Ambler, *Acting Director*

Preface

This report is one of a series of data publications on radiation chemistry; the aim of the series is to compile, evaluate, and present the numerical results on processes occurring in systems which have been subjected to ionizing radiation. Various kinds of data are important in radiation chemistry. The quantities which were measured first were the observed radiation yields or G values (molecules formed or destroyed per 100 eV). Various indirect methods based on G values have been used to determine yields of transient species and relative rates of reactions. The spectral properties (optical, electron spin resonance) of transients have provided a direct method for their identification, and rates of the very fast reactions of transients which occur in irradiated systems have been measured directly by spectroscopic methods. Conductivity and luminescence methods have also provided a means of measuring properties of transients and their kinetics. Some reactions which occur in irradiated systems have also been studied by other methods, such as photochemistry, electric discharge, ultrasonics, chemical initiation, electron impact, etc. The emphasis in these publications is on the data of radiation chemistry, but where other pertinent data exist, they are included.

The data of radiation chemistry are voluminous; thousands of systems have been investigated. As a result there are certain collections, *e.g.* rate constants of particular types of reactions or certain properties of transients, for which tabulations of the data are considered essential, but for which critical assessment of each value is impossible. On the other hand, certain systems and properties have been studied so extensively that critical examination of these data is desirable and timely. Authors of this series of data publications have been asked to evaluate the extent to which the data can be critically assessed, to describe their criteria for evaluation, and to designate preferred values whenever possible.

Contents

Selected Specific Rates of Reactions of Transients from Water in Aqueous Solution. III. Hydroxyl Radical and Perhydroxyl Radical and their Radical Ions

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Rates of reactions of OH and HO_2 with organic and inorganic molecules, ions and transients in aqueous solution have been tabulated, as well as the rates for the corresponding radical ions in aqueous solution (O^- and O_2^-). Most of the rates have been obtained by radiation chemistry methods, both pulsed and steady-state; data from photochemistry and thermal methods are also included. Rates for over one thousand reactions are listed.

Key words: Aqueous solution; chemical kinetics; data compilation; hydroxyl radical; oxide radical ion; perhydroxyl radical; radiation chemistry; rates; superoxide ion.

1. Introduction

The short-lived products of water radiolysis for low LET radiation (cobalt-60 gamma rays, X-rays, and electrons with energies of about 30 keV and above) are e_{aq}^-, H and OH. In the presence of oxygen, hydrated electrons and hydrogen atoms are converted to other short-lived species, O_2^- and HO_2. The pK_a's of OH and HO_2 are 11.9 (65-0386, 66-0424) and 4.88 (70-0304), respectively; *i.e.*, O^- and O_2^- can be produced from the equilibria:

$$OH \rightleftharpoons H^+ + O^-$$
$$HO_2 \rightleftharpoons H^+ + O_2^-$$

Thus, by adjusting only pH and the concentration of O_2 in water, one can produce e_{aq}^-, H, OH, HO_2, O_2^- and O^-. All of these species have been characterized and their reactions with hundreds of inorganic and organic compounds have been studied. In the previous compilations, NSRDS-NBS 43 and Supplement (73-0030, 75-0002) and NSRDS-NBS 51 (75-0001), the specific rate constants for e_{aq}^- and H have been collected. The present compilation is an extension of the series and covers the specific rates for the reactions of OH, HO_2, O^-, and O_2^-. The literature is covered up to the latter part of 1975.

Methods

The majority of the data in this compilation are from investigations in radiation chemistry. However, data from photochemistry, Fenton's reaction, and other methods are also included. The rate constants of short-lived species are measured by *steady-state* and *pulse techniques*. The *steady-state* investigations yield ratios of rate constants which are deduced from an assumed mechanism. Values of specific rates

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from steady-state investigations may be as accurate as those measured by other methods. However, in many cases, the mechanisms are complex and the values measured with steady-state techniques must be accepted with caution. By *pulse techniques*, it is possible to study a reaction directly if one can either measure disappearance of a reactant (*decay kinetics*, d.k.) or formation of a product (*product buildup kinetics*, p.b.k.) during the course of a reaction by methods such as optical spectroscopy, electrical conductivity, etc. Unfortunately, due to experimental difficulties, such investigations are possible for only a few of the reactions compiled in these tables. The specific rates for other reactions have been measured by *competition kinetics* (c.k.) using pulse techniques.

In the present compilation an attempt was made to be as comprehensive as possible and include measurements of the rates of the same reaction by various methods, as well as measurements by the same method by different authors; values superseded by later measurements by the same authors have been omitted. Certain relative values are omitted if the standard reactions were not well characterized or if the relative values were in wide disagreement with values measured by several other methods. Examples of such data are those which have been obtained using the decolorization of organic dyes by OH or the oxidation of hydroxylaminedisulfonate ion by OH as the standard reactions.

Extended sections on radiation chemical, photochemical and chemical methods of generating OH and O^-, and on the methods for rate determination, and the mechanisms for the reactions are found in NSRDS-NBS 46 (73-0299). The reader is also referred to that review for an analysis of complications which may occur in various systems.

Arrangement of Tables

In order to provide for internal consistency in the tables, values for rates of a number of competing reactions have been chosen to convert the rate ratios into relative rates. Those values are listed in table 1 and have been taken, whenever possible, from the review of Dorfman and Adams, NSRDS-NBS 46 (73-0299), where a critical analysis of the hydroxyl radical rate data has been made and "most reliable values" selected for a number of reactions; some of the values have been taken from an earlier paper on standardization of OH rate data by Willson, Greenstock, Adams, Wageman and Dorfman (71-0578). Many of the values chosen are the most recent directly determined rates; the references to those determinations are cited in the last column of table 1.

Reactions of OH with other transient species from water are listed in table 2. The reactions of inorganic solutes with OH are listed in table 3 in alphabetical order by main element. The reactions of organic solutes with OH are listed in table 4 in alphabetical order by name. In most cases IUPAC nomenclature has been used. The reactions of O^- and $HO_2(O_2^-)$ are listed by the same arrangement in tables 5 and 6, respectively.

The format of the tables is similar to previous parts of this series. Reactions are included in column 2 when products or mechanism have been studied. When several reactions are given, the reactions are labelled (I), (II), etc. and the rates in columns 4 and 5 are labelled (I), (II), k_I, k_{II}, etc.; if the rate in column 4 or 5 is not so labelled the value represents the sum of the rates for all contributing reactions. Reactions are second order and the rates have the units $dm^3mol^{-1}s^{-1}$ unless otherwise specified in the tables. Values for radical combination and disproportionation rates (entries 3.3, 4.5, 5.4 and 5.35) are for k (and not $2k$ as usually determined) unless it was not clear which was reported, in which case the value is the one given by the authors. Values of k which have been directly measured are given with the error limits as reported by the authors. The ratios of rate constants in the *Ratio* column are given in the form k/k_X where k_X symbolizes the rate of the competing reaction of the same short-lived species with X. In the *Comments* column ratios may be given as k/k_X or k_X/k_Y where k, k_X, and k_Y are rates of the same short-lived species with the reactant in column 2, X, and Y, respectively. For some of the entries only a ratio is given, but in most cases relative rates have been calculated from the ratios and are listed under the k column. The values of k obtained from ratios are designated as relative (rel.) and have been calculated by using the rates in table 1 (or, in a few cases, using a rate given under *Comments*). At the end of each entry for solutes which have been used in competition studies a list of entry numbers is given in which ratios involving that solute are reported.

Columns are included identifying the source of the radical and the method of measurement; other

information is given under *Comments*, such as activation energy, frequency factor, equilibrium constant, deuterium isotope effect (k_H/k_D). Temperature is 20-25°C, or assumed to be at room temperature, unless otherwise specified.

Abbreviations which have been used are tabulated at the end of this section. References are designated by number as assigned by the Radiation Chemistry Data Center; the first two digits of the number specify the year. The references are given at the end of the tables. A formula index for the solutes refers to entry numbers in the various tables and includes references to the tables of e^-_{aq} and H reactions already published.

Abbreviations and Symbols

A	frequency factor
abs.	absorption
abstr.	abstraction
acac	acetylacetone
ala	alanine
anal.	analysis
approx.	approximate
β–r.	beta radiolysis
bicarb	bicarbonate ion
biol.	biological
bisulf	bisulfate ion
BzO^-	benzoate ion
calcd.	calculated
carb	carbonate ion
chem.	chemical analysis
c.k.	competition kinetics
concn.	concentration
condy.	electrical conductivity
cor.	corrected
cyst	cysteamine
d.k.	decay kinetics
detd.	determined
E_a	activation energy
ϵ	extinction coefficient (in cm^2mol^{-1} or $M^{-1}cm^{-1}$)
EDTA	ethylenediaminetetraacetate
en	ethylenediamine
e–r.	electron radiolysis
esr	esr spectroscopy
est.	estimated
Et	ethyl
EtOH	ethanol
Fenton	Fenton's reaction ($Fe^{2+} + H_2O_2$)
ferro	ferrocyanide ion
formn.	formation
f.phot.	flash photolysis
G	radiation yield (per 100 eV)
γ–r.	gamma radiolysis
gly	glycine
hydr	hydrogen
3HX	3–hexenedioate ion
ident.	identification
k	specific rate (in $dm^3mol^{-1}s^{-1}$ unless otherwise specified)
K	equilibrium constant
lum.	luminescence
M	mol/dm^3
Me	methyl
MeOH	methanol
μ	ionic strength
math.	mathematical
meas.	measured
mol.wt.	molecular weight
nat	natural pH
NB	nitrobenzene
obs.	observed
opt.	optical spectroscopy
oxy	oxygen
PA^-	phenylacetate ion
p.b.k.	product buildup kinetics
perox	hydrogen peroxide
PhH	benzene
phot.	photolysis
pK_a	negative logarithm of the acid dissociation constant, *e.g.*, where $AH + H_2O \rightleftharpoons A^- + H_3O^+$
$PNBA^-$	*p*–nitrobenzoate ion
pol.	polarography
p.r.	pulse radiolysis
2–PrOH	2–propanol
py	pyridine
r.	radiolysis
rel.	relative
RNO	*p*–nitroso–*N*,*N*–dimethylaniline
soln.	solution
therm.	thermal
thym	thymine
TNM	tetranitromethane
trac.	tracer techniques
unpubl.	unpublished
visc.	viscosimetry
X–r.	X–radiolysis

TABLE 1. Values of k used for normalizing relative rates

Reactant[a]	Reaction	k($dm^3 mol^{-1} s^{-1}$)	Comment	Ref.[f]
OH Reactions				
bicarb (3.20)	$OH + HCO_3^- \rightarrow OH^- + HCO_3$ or $H_2O + CO_3^-$	3.6×10^7	b	73–1031
carb (3.21)	$OH + CO_3^{2-} \rightarrow OH^- + CO_3^-$	3.65×10^8	b,c	70–0247
CNS^- (3.25)	$OH + CNS^- \rightarrow CNSOH^-$	1.1×10^{10}	b,c,d	72–0122
Fe^{2+} (3.52)	$OH + Fe^{2+} \rightarrow OH^- + Fe^{3+}$	2.3×10^8	b	72–0354
ferro (3.54)	$OH + Fe(CN)_6^{4-} \rightarrow OH^- + Fe(CN)_6^{3-}$	9.3×10^9	b,c	73–1039
I^- (3.66)	$OH + I^- \rightarrow OH^- + I$	1.2×10^{10}	b	72–0122
PhH (3.186)	$OH + C_6H_6 \rightarrow C_6H_6OH$	7.8×10^9	b,c	68–0304
BzO^- (3.191)	$OH + C_6H_5COO^- \rightarrow (OH)C_6H_5COO^-$	5.7×10^9	b,c	71–0578
EtOH (3.358)	$OH + CH_3CH_2OH \rightarrow H_2O + CH_3CHOH$	1.85×10^9	c,d	—
$HCOO^-$ (3.384)	$OH + HCOO^- \rightarrow H_2O + COO^-$	3.5×10^9	d	—
MeOH (3.511)	$OH + CH_3OH \rightarrow H_2O + CH_2OH$	9×10^8	c,d	—
NB (3.565)	$OH + C_6H_5NO_2 \rightarrow (OH)C_6H_5NO_2$	3.2×10^9	b,c	68–0304
$PNBA^-$ (3.567)	$OH + p\text{-}NO_2C_6H_4COO^- \rightarrow (OH)p\text{-}NO_2C_6H_4COO^-$	2.6×10^9	b,c	68–0304
RNO (3.582)	$OH + p\text{-}NOC_6H_4N(CH_3)_2 \rightarrow$ products	1.25×10^{10}	b,c	69–0156
PA^- (3.611)	$OH + C_6H_5CH_2COO^- \rightarrow (OH)C_6H_5CH_2COO^-$	7.9×10^9	b,c	68–0304
2–PrOH (3.637)	$OH + (CH_3)_2CHOH \rightarrow H_2O + (CH_3)_2COH$	2.2×10^9	d	—
thym (3.711)	$OH + C_5H_6N_2O_2 \rightarrow C_5H_6N_2O_2{\cdot}OH$ (6–addn.)	5.4×10^9	d	g
O^- Reactions				
oxy (4.29)	$O^- + O_2 \rightarrow O_3^-$	3.6×10^9	b,c	69–0379
EtOH (4.65)	$O^- + CH_3CH_2OH \rightarrow OH^- + C_2H_4OH$	1.1×10^9	b,c	70–0080
3HX (4.75)	$O^- + {}^-O_2CCH_2CH{=}CHCH_2CO_2^- \rightarrow OH^- + {}^-O_2CCH_2CHCHCHCO_2^-$	6.5×10^8	b	75–1003
MeOH (4.80)	$O^- + CH_3OH \rightarrow OH^- + CH_2OH$	5.8×10^8	b,c	70–0080
2–PrOH (4.95)	$O^- + CH_3CHOHCH_3 \rightarrow OH^- + (CH_3)_2COH$	1.5×10^9	e	—

[a]Number in parentheses indicates the number of the reaction in the following tables.

[b]Most recently reported directly determined rate.

[c]Cited by Dorfman and Adams in NSRDS–NBS 46 (73–0299) as "most reliable values – values of which the accuracy (within the stated experimental uncertainty or lacking such a statement, within ± 30%) seems least open to question"; more than one such value is cited in NSRDS–NBS 46 for some reactions.

[d]Mean value of measured rates with $k(OH + EtOH) = 1.85 \times 10^9 dm^3 mol^{-1} s^{-1}$ as a secondary reference standard: Willson, Greenstock, Adams, Wageman and Dorfman (71–0578).

[e]Mean value of relative rates normalized for values listed in this table for competing reactions.

[f]Reference for the most recently reported directly measured rate.

[g]Recent directly determined rates are 5.1×10^9 at natural pH (71–0578) and 5.5×10^9 at pH 9 (72–0047).

TABLE 2. Reactions of OH with transients from water

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.1	e^-_{aq} $OH + e^-_{aq} \rightarrow OH^-$	basic	3×10^{10}	—	—	—	*See* 1.7, 1.8, NSRDS–NBS 43.	73–0030
3.2	H $OH + H \rightarrow H_2O$	acid	$\sim 2 \times 10^{10}$	—	—	—	*See* 2.3, NSRDS–NBS 51.	75–0001
3.3	OH $OH + OH \rightarrow H_2O_2$	7	$(4 \pm 1) \times 10^9$ (rel.)	$k/(k_{perox})^2 = 1.9 \times 10^{-6}$ mol•s/dm^3	p.r.	chem.	assumed $k_{perox} = 4.5 \times 10^7$; obs. intensity effect on H_2O_2 and O_2 concn.	62–0052
		0.4	6×10^9 (rel.)	$k/k_H = 0.5$	p.r.	chem.	obs. $G(H_2)$; data fitting based on mechanism; assumed $2k(H + H) = k(H + OH) = 1.2 \times 10^{10}$.	63–0043
		3	6×10^9 (rel.)	—	p.r.	chem.	obs. $G(H_2)$ and $G(O_2)$ in H_2O_2 soln.; data fitting based on mechanism; assumed $k(H + OH) = 3.2 \times 10^{10}$; $k(H + H) = 1.3 \times 10^{10}$.	64–0092
		3.7	$(5.2 \pm 0.7) \times 10^9$	—	p.r.	opt.	d.k.; ϵ(260 nm) = 370 cm^{2}mol^{-1}.	65–0010
		~7	5.5×10^9 (rel.)	$k/k_{ferro} = 0.59$	p.r.	opt.	c.k.; obs. $Fe(CN)_6^{3-}$ at 420 nm; data fitting based on mechanism.	66–0424
		7	$(5.2 \pm 0.5) \times 10^9$	—	p.r.	opt.	d.k.; ϵ(200–250 nm) = 450–530 cm^{2}mol^{-1}; cor. for H and OH^-.	69–0083
			For other ratios see: 3.5, 3.6, 3.7, 3.12, 3.26, 3.82.					
3.4	O^- $OH + O^- \rightarrow HO_2^-$	>12	$\leq 2.6 \times 10^{10}$ (rel.)	—	p.r.	opt.	c.k. with $Fe(CN)_6^{4-}$; pK_a(OH) = 11.9 ± 0.2; est. based on numerous assumptions.	66–0424
3.5	HO_2 (I) $OH + HO_2 \rightarrow H_2O_3$ (II) $OH + HO_2 \rightarrow H_2O + O_2$	7	$\sim 3 \times 10^9$ (rel.)	$k \cdot k(H + H_2O_2)/k_{perox}k(H + HO_2) = 74$	p.r.	chem.	assumed $k(H + H_2O_2) = k(H + HO_2)$ and $k_{perox} = 4.7 \times 10^7$.	62–0052
		>2	6×10^9 (rel.)	$k/k_{OH} = 1$	p.r.	chem.	obs. $G(H_2O_2)$; data fitting based on mechanism; assumed $k_{OH} = 6 \times 10^9$.	63–0043
		2–3		$k_I/k_{II} \cong 2.3$	*e*–r.	opt.	obs. $G(H_2O_3)$.	63–0075
		0.8	1.4×10^{10} (rel.)	$k/k_{Fe^{2+}} = 60$	p.r.	chem.	obs. $G(Fe^{3+})$ at $\sim 10^{22}$ eVg^{-1}s^{-1}.	64–0049
		3	1.5×10^{10} (rel.)	—	p.r.	chem.	obs. $G(H_2)$ and $G(H_2O_2)$; data fitting based on mechanism; assumed $k_{OH} = 6 \times 10^9$; $k(H + H) = 1.3 \times 10^{10}$.	64–0092

TABLE 2. Reactions of OH with transients from water – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.5 cont.		0.46–6.75	7.1×10^9 (rel.)	$k/k_{OH} = 1.18$	p.r.	chem.	obs. $G(H_2O_2)$; best fit; $pK_a(HO_2) = 4.45 \pm 0.10$; assumed $k_{OH} = 6 \times 10^9$.	68–0014
3.6	$H_2O_2^+$ $OH + H_2O_2^+ \rightarrow H_3O^+ + O_2$	0.46–1.51	1.27×10^{10} (rel.)	$k/k_{OH} = 2.12$	p.r.	chem.	data fitting; $pk(H_2O^+ \rightleftharpoons H^+ + HO_2) = 1.2 \pm 0.3$; assumed $k_{OH} = 6 \times 10^9$.	68–0014
3.7	O_2^- $OH + O_2^- \rightarrow OH^- + O_2$	2.74–6.75	1.01×10^{10} (rel.)	$k/k_{OH} = 1.68$	p.r.	chem.	obs. $G(H_2O_2)$; data fitting; $pK(HO_2 \rightleftharpoons H^+ + O_2^-) = 4.45 \pm 0.10$; assumed $k_{OH} = 6 \times 10^9$.	68–0014
		7	$(8.0 \pm 1) \times 10^9$	—	e–r.	condy.	—	69–0547

TABLE 3. Reactions of OH with inorganic solutes

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.8	Ag^+	7	$(1.50 \pm 0.10) \times 10^{10}$	—	p.r.	opt.	p.b.k.	68–0436
	$OH + Ag^+ \rightarrow Ag^{2+} + OH^-$	~5	$(6.3 \pm 1.2) \times 10^9$ (rel.)	$k/k_{MeOH} = 7 \pm 1$	p.r.	condy.	c.k.; 2–fold increase in H^+ did not change rate; may be $OH + Ag^+ \rightarrow AgOH^+$.	70–0512
3.9	AsO_2^-	10.7	8.4×10^9(rel.)	$k/k_{carb} = 23$	p.r.	opt.	c.k.	65–0190
		9	7.6×10^9 (rel.)	$k/k_{RNO} = 0.607$	γ–r.	opt.	c.k.	65–0356
3.10	$Au(CN)_2^-$	7	$(4.7 \pm 0.8) \times 10^9$	—	p.r.	opt.	p.b.k. at 330 nm.	68–0302
	$OH + Au(CN)_2^- \rightarrow Au(II) + OH^-$	2	5×10^9 (rel.)	$k/k_{MeOH} = 5.5$	p.r.	opt.	c.k.	68–0302
3.11	BH_4^-	11–12.83	1.2×10^{10}	—	p.r.	opt.	p.b.k. at 400 or 280 nm.	70–1046
	$BH_4^- + OH \rightarrow BH_4 + OH^-$							
3.12	Br^-	—	1×10^9 (rel.)	$k/k_{EtOH} = 0.6$	γ–r.	chem.	c.k.	62–0053
	(I) $OH + Br^- \rightleftharpoons BrOH^-$	2.2	—	$k/k_{hydr} = 830$	γ–r.	chem.	obs. $G(H_2O_2)$.	63–0076
		~11	5.8×10^8 (rel.)	$k/k_{carb} = 1.6$	p.r.	opt.	c.k.	64–0131
	$BrOH^- \rightleftharpoons Br + OH^-$ $Br + Br^- \rightleftharpoons Br_2^-$ $BrOH^- + Br^- \rightleftharpoons Br_2^- + OH^-$	0.8	1.6×10^{10} (rel.)	$k/k_{OH} = 2.5$	p.r.	calcd.	obs. $G(H_2O_2)$; math. anal.; assume $k_{OH} = 6.4 \times 10^9$; method approx.	64–0294
		7, 10.5	1.1×10^9 (rel.)	$k/k_{BzO^-} = 0.20$	γ–r.	trac.	c.k.; meas. $^{14}CO_2$.	65–0099
		—	5×10^8 (rel.)	$k/k_{ferro} = 0.054$	phot.	—	c.k.	65–0247
		9	1.1×10^9 (rel.)	$k/k_{RNO} = 0.089$	γ–r.	opt.	c.k.	65–0356
		7	1×10^9	—	p.r.	opt.	p.b.k. at 360 nm.	65–0382
		2	5×10^9	—	p.r.	opt.	p.b.k.; it is proposed that reaction may be $OH + (Br^- — H^+)_{aq} \rightarrow Br + H_2O$.	65–0382
		7	3.9×10^9 (rel.)	$k/k_{MeOH} = 4.4 \pm 0.5$	γ–r.	chem.	c.k. in NO–MeOH–KBr soln.	66–0118
		6	1.2×10^9 (rel.)	$k/k_{EtOH} = 0.645$	γ–r.	—	c.k.; obs. $G(H_2O_2)$.	66–0423
		9	1.1×10^9 (rel.)	$k/k_{EtOH} = 0.58$	γ–r.	opt.	c.k. with RNO.	66–0423
		5–9	$(1.2 \pm 0.15) \times 10^9$	—	p.r.	opt.	p.b.k. at 365 nm; k constant at this pH range but increases at low pH and decreases at higher pH.	66–0425
		~6	1×10^9 (rel.)	$k/k_{EtOH} = 0.56 \pm 0.04$	γ–r.	chem.	c.k.	66–0621, 67–0131
		2.7	6.5×10^9 (rel.)	$k/k_{EtOH} = 3.5 \pm 0.4$	γ–r.	chem.	c.k.	66–0621, 67–0131
		1.3	1×10^{10} (rel.)	$k/k_{EtOH} = 5.6 \pm 0.4$	γ–r.	chem.	c.k.	66–0621, 67–0131
		~6	1.1×10^9 (rel.)	$k/k_{MeOH} = 1.2 \pm 0.1$	γ–r.	chem.	c.k.	66–0621, 67–0131
		2.7	8.1×10^9 (rel.)	$k/k_{MeOH} = 9.0 \pm 0.9$	γ–r.	chem.	c.k.	66–0621, 67–0131
		1.3	1.1×10^{10} (rel.)	$k/k_{MeOH} = 12 \pm 1$	γ–r.	chem.	c.k.	66–0621, 67–0131
		2	3.1×10^{10} (rel.)	$k/k_{RNO} = 2.5$	Fenton	opt.	c.k.	67–0555
		5.5	1.2×10^9 (rel.)	$k/k_{NB} = 0.38$	r.	opt.	c.k.; obs. *o*–nitrophenol formn.	68–0494

TABLE 3. Reactions of OH with inorganic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.12 cont.		5.5	2.2×10^9 (rel.)	$k/k_{PhH} = 0.28$	γ–r.	opt.	c.k. with Safranine T.	69–0279
		3.0	5.0×10^9 (rel.)	$k/k_{PhH} = 0.64$	γ–r.	opt.	c.k. with Safranine T.	69–0279
		2.0	1.0×10^{10} (rel.)	$k/k_{PhH} = 1.3$	γ–r.	opt.	c.k. with Safranine T.	69–0279
		1–2, 6.98	4.3×10^9 (rel.)	$k/k_{2\text{-PrOH}} = 1.94$	γ–r.	chem.	c.k.; obs. G(acetone).	68–0602
		12–13	$(8.9 \pm 1.7) \times 10^8$ (rel.)	—	f.phot.	opt.	c.k.; effect on decay of O_3^- at 430 nm.	69–7340
		—	1.2×10^9 (rel.)	$k/k_{EtOH} = 0.64$	p.r.	opt.	c.k.; N_2O–satd.; ratio = 4 in O_2–satd. 1.0 M Br^- soln.	71–0137
		9	1.75×10^9 (rel.)	$k/k_{RNO} = 0.14$	γ–r.	opt.	c.k.; E_a = −6.2 ± 0.9 kcal/mol (−26 kJ/mol) (−8 to 23°C).	71–0469
		1–7	$(1.06 \pm 0.08) \times 10^{10}$ (I)	—	p.r.	opt.	p.b.k. at 360 nm (Br_2^-).	72–0018
		9–11.5	—	—	p.r.	opt.	p.b.k. at 365 nm (Br_2^-); K_1 = $(2.86 \pm 1.4) \times 10^3 dm^3/mol$.	72–0148
			For other ratios see: 3.32, 3.110, 3.394, 3.627.					
3.13	$OD + Br^- \rightarrow OD^- + Br$	1.3	7.95×10^9 (rel.)	$k/k_{EtOH} = 4.3 \pm 0.4$	γ–r.	chem.	c.k. in D_2O; obs. $G(D_2O_2^-)$.	68–0015
		6	6.8×10^8 (rel.)	$k/k_{EtOH} = 0.37 \pm 0.04$	γ–r.	chem.	c.k. in D_2O.	68–0015
3.14	BrO^- $OH + BrO^- \rightarrow BrO + OH^-$	11–13	4.5×10^9 (rel.)	—	p.r.	opt.	c.k.; rel. to $k(OH + CO_3^{2-}) = 4.2 \times 10^8$, more than two rate constants involved in analysis.	68–0153
		12–13	$(1.4 \pm 0.8) \times 10^9$ (rel.)	—	f.phot.	opt.	c.k.; effect on decay of O_3^- at 430 nm.	69–7340
3.15	BrO_2^- $OH + BrO_2^- \rightarrow BrO_2 + OH^-$	13	1.9×10^9 (rel.)	—	p.r.	opt.	c.k.; relative to $k(OH + CO_3^{2-}) = 4.2 \times 10^8$; more than two rate constants involved in analysis; assume $k(OH + BrO_2^-) = k(O^- + BrO_2^-)$.	68–0153
		12–13	$(1.4 \pm 0.8) \times 10^9$ (rel.)	—	f.phot.	opt.	c.k.; effect on decay of O_3^- at 430 nm.	69–7340
3.16	BrO_3^- $OH + BrO_3^- \rightarrow BrO_3 + OH^-$	12–13	$(3.9 \pm 2.3) \times 10^6$ (rel.)	—	f.phot.	opt.	c.k.; effect on decay of O_3^- at 410 nm.	69–7340
3.17	BrO_4^-	—	$< 10^7$	—	p.r.	opt.	d.k. (OH).	73–0106
3.18	CO $OH + CO \rightarrow COOH$	0.4–0.7	$(4.6 - 5.8) \times 10^8$ (rel.)	$k/k_{Fe^{2+}} = 2–2.5$	Fenton	chem.	c.k.	57–0014
		~1	8.7×10^8 (rel.)	$k/k_{Fe^{2+}} = 3.79$	Fenton	chem.	c.k.	57–0014
		~1	8.3×10^8 (rel.)	$k/k_{Fe^{2+}} = 3.6 \pm 0.5$	γ–r.	chem.	c.k.	63–0014
		7	—	$k/k_{perox} = 13.0$	phot.	chem.	c.k.	63–7005
		—	—	$k/k_{perox} = 72$	phot.	chem.	c.k.	69–7045

TABLE 3. Reactions of OH with inorganic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.19	CO_2 $OH + CO_2 \rightarrow HCO_3$	4	$< 10^6$	—	p.r.	opt.	no abs. at 600 nm.	65–0384
3.20	HCO_3^-	6.5	1×10^7	—	p.r.	opt.	p.b.k. at 600 nm.	65–0384
	$OH + HCO_3^- \rightarrow$	8.4	1.5×10^7	—	p.r.	opt.	p.b.k. at 600 nm.	66–0139
	$H_2O + CO_3^-$ or $HCO_3 + OH^-$	nat.	$(4.9 \pm 0.6) \times 10^7$ $(7.9 \pm 1) \times 10^7$	—	p.r.	opt.	p.b.k.; 3.3 x 10^{-3} M HCO_3^-; authors have no interpretation which value is correct.	69–0052
		—	$(4.9 \pm 0.5) \times 10^7$	—	p.r.	opt.	p.b.k.	69–0379
		—	$(3.6 \pm 0.3) \times 10^7$	—	p.r.	opt.	p.b.k. at 578 nm; c.k. with 2–PrOH gave 3.8×10^7.	73–1031
			For other ratios see: 3.57, 3.64, 3.384.					
3.21	CO_3^{2-}	11	3.8×10^8 (rel.)	$k/k_{1^-} = 0.029 \pm 0.003$	p.r.	opt.	c.k.	65–0010
	$OH + CO_3^{2-} \rightarrow$							
	$OH^- + CO_3^-$	11	3.5×10^8	—	p.r.	opt.	p.b.k. at 580 nm.	65–0010
		10.5	$\sim 4.5 \times 10^8$ (rel.)	$k/k_{BzO^-} = \sim 0.08$	γ–r.	trac.	c.k.; meas. $^{14}CO_2$.	65–0099
		—	2×10^8	—	p.r.	opt.	p.b.k.; O_2–satd. soln.; competing reactions may interfere.	66–0001
		<11.6	4.2×10^8	—	p.r.	opt.	p.b.k.; k is pH dependent; calcn. is indirect.	66–0139
		10.6	$(4.0 \pm 0.2) \times 10^8$	—	p.r.	opt.	p.b.k. at 600 nm.	69–0379
		11	4.7×10^8 (rel.)	—	f.phot.	opt.	c.k.; soln. contains NO_3^- and ethanol; rel. to k(OH + EtOH) = 2×10^9 and $k(O^- + C_2H_5OH) = 1 \times 10^9$.	69–7218
		11	3.65×10^8	—	p.r.	opt.	p.b.k.	70–0247
			For other ratios see: 3.9, 3.12, 3.14, 3.15, 3.25, 3.29, 3.30, 3.63, 3.66, 3.82, 3.92, 3.93, 3.94, 3.95, 3.96, 3.97, 3.104, 3.105, 3.108, 3.109, 3.116, 3.143, 3.225, 3.351, 3.358, 3.369, 3.384, 3.403, 3.459, 3.511, 3.586, 3.615, 3.636, 3.696, 3.697, 3.698, 3.745.					
3.22	C_2N_2 $OH + (CN)_2 \rightarrow$ CNCNOH	—	$\leq 10^7$	—	p.r.	opt.	kinetic anal. of abs. spectra of transients in N_2O soln. (OH and $C_2N_2^-$).	71–0038
3.23	CN^-	9	4.5×10^9 (rel.)	$k/k_{RNO} = 0.36$	γ–r.	opt.	c.k.	65–0356
3.24	HCN	—	$\leq 7 \times 10^7$ (rel.)	$k/k_{HCOO^-} \leq 0.02$	γ–r.	chem.	c.k.	73–0364
3.25	CNS^-	—	5.8×10^9 (rel.)	$k/k_{carb} = 16$	p.r.	opt.	c.k.	64–0131
	$OH + CNS^- \rightarrow$	7	6.6×10^9	—	p.r.	opt.	p.b.k. at 500 nm.	65–0190
	$CNSOH^-$	2,7	1.2×10^{10} (rel.)	$k/k_{carb} = 33$	p.r.	opt.	c.k.	65–0190
	$CNSOH^- \rightleftharpoons CNS + OH^-$	2–2.2	9.7×10^9 (rel.)	$k/k_{thym} = 1.80 \pm 0.25$	γ–r.	opt.	c.k.	67–0461
	$CNS^- + CNS \rightleftharpoons (CNS)_2^-$	5–5.5	1×10^{10} (rel.)	$k/k_{thym} = 1.95 \pm 0.30$	γ–r.	opt.	c.k.	67–0461
		9	1.2×10^{10} (rel.)	$k/k_{RNO} = 0.95$	γ–r.	opt.	c.k.	67–0555
		2–12	$(7.5 \pm 0.5) \times 10^9$	—	p.r.	opt.	p.b.k. at 500 nm.	68–0316

TABLE 3. Reactions of OH with inorganic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.25 cont.		2–7	2.8×10^{10}	—	p.r.	opt.	p.b.k. $(CNS)_2^-$; earlier papers assumed CNS is absorbing species; for mechansim study see also 72–0126.	68–0375
		5.5	1.2×10^{10} (rel.)	$k/k_{NB} = 3.6$	r.	opt.	c.k.; obs. *o*–nitrophenol formn.	68–0494
		7	6.7×10^9 (rel.)	$k/k_{EtOH} = 3.6$	f.phot.	chem.	c.k.; soln. contains NO_3^-.	69–7218
		—	1×10^{10} (rel.)	$k/k_{EtOH} = 5.5$ $k/k_{MeOH} = 11.6$	p.r.	opt.	c.k.; N_2O–satd.; ratios 6.4 and 13.4 resp., in O_2–satd. soln. contg. 0.2 *M* thiocyanate.	71–0137
		—	$(1.08 \pm 0.10) \times 10^{10}$	—	p.r.	opt.	p.b.k. $(CNS)_2^-$ at 475 nm.	72–0122
			For other ratios see: 3.33, 3.34, 3.37, 3.66, 3.71, 3.74, 3.75, 3.76, 3.77, 3.86, 3.87, 3.102, 3.103, 3.107, 3.110, 3.117, 3.121, 3.124, 3.125, 3.126, 3.129, 3.130, 3.131, 3.135, 3.138, 3.139, 3.140, 3.142, 3.143, 3.146, 3.147, 3.148, 3.151, 3.153, 3.155, 3.156, 3.157, 3.159, 3.163, 3.168, 3.169, 3.170, 3.171, 3.177, 3.178, 3.179, 3.181, 3.186, 3.191, 3.193, 3.197, 3.198, 3.202, 3.212, 3.219, 3.222, 3.223, 3.224, 3.225, 3.226, 3.227, 3.229, 3.230, 3.231, 3.232, 3.233, 3.234, 3.235, 3.237, 3.240, 3.241, 3.243, 3.245, 3.247, 3.256, 3.262, 3.263, 3.264, 3.266, 3.269, 3.270, 3.285, 3.288, 3.289, 3.290, 3.292, 3.293, 3.295, 3.296, 3.297, 3.298, 3.300, 3.311, 3.312, 3.318, 3.323, 3.328, 3.329, 3.330, 3.331, 3.332, 3.336, 3.338, 3.339, 3.342, 3.357, 3.358, 3.361, 3.362, 3.363, 3.364, 3.366, 3.369, 3.372, 3.375, 3.381, 3.383, 3.385, 3.390, 3.396, 3.397, 3.398, 3.402, 3.403, 3.404, 3.405, 3.406, 3.407, 3.410, 3.411, 3.412, 3.413, 3.415, 3.416, 3.417, 3.418, 3.421, 3.433, 3.434. 3.442, 3.443, 3.444–6, 3.451, 3.453, 3.459, 3.473, 3.479, 3.480, 3.481, 3.483, 3.486, 3.487, 3.488, 3.489, 3.491, 3.493–3.495, 3.498, 3.503, 3.506, 3.508, 3.509a, 3.510, 3.511, 3.513, 3.520, 3.521. 3.522, 3.523, 3.524, 3.527, 3.528, 3.532, 3.535, 3.538, 3.543, 3.544, 3.545, 3.546, 3.547, 3.548, 3.554, 3.565, 3.573, 3.578, 3.580, 3.581, 3.592, 3.593, 3.594, 3.600, 3.602, 3.603, 3.604, 3.605, 3.606, 3.607, 3.613, 3.614, 3.616, 3.618, 3.621, 3.624, 3.628, 3.629, 3.630, 3.631, 3.634, 3.636, 3.637, 3.640, 3.645, 3.646, 3.649, 3.650, 3.656, 3.657, 3.659, 3.664, 3.665, 3.669, 3.670, 3.673, 3.674, 3.696, 3.703, 3.705, 3.706, 3.707, 3.709, 3.710, 3.711, 3.717, 3.718, 3.719, 3.723, 3.724, 3.726, 3.727, 3.730, 3.735, 3.737, 3.740, 3.743, 3.744, 3.746, 3.747, 3.748, 3.750, 3.751.				
3.25a	Cd^{2+}	—	$< 5 \times 10^5$	—	p.r.	opt.	c.k. with Cu^{2+}.	75–1027
3.25b	Cd^+ $OH + Cd^+ \rightarrow OH^- + Cd^{2+}$	—	2×10^{10}	—	p.r.	opt., condy.	d.k. at 300 nm; Cd^+ from $e_{aq}^- + Cd^{2+}$.	75–1064
3.26	Ce^{3+} $OH + Ce^{3+} \rightarrow Ce^{4+} + OH^-$	0.4–2	—	$k/k_{bisulf} = 900 \pm 300$	p.r.	—	c.k.	60–0099
		0.8	3.2×10^8 (rel.)	$k/k_{OH} = 4 \times 10^{-2}$	p.r.	calcd.	math. anal.; assume $k_{OH} = 8.1 \times 10^8$; method approx.	64–0294
		0	—	$k/k_{HCOOH} = 1.9 \pm 0.2$	γ–r.	chem.	c.k.; 4 *M* H_2SO_4.	69–0634
		2.6–2.95	2.9×10^8 (rel.)	$k/k_{EtOH} = 0.154$	p.r.	opt.	c.k.	71–0137

TABLE 3. Reactions of OH with inorganic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.26 cont.		0.8	—	k/k_{bisulf} [HSO_4^-] = 930 ± 110 M^{-1}	γ–r.	chem.	c.k.; computer fitting based on mechanism; supercedes 57–0003.	72–0094
		4 M H_2SO_4	—	= 30 ± 3 M^{-1}				
		For other ratios see: 3.118.						
3.27	Cl^- (I) $OH + Cl^- \rightleftharpoons ClOH^-$ (II) $ClOH^- + H^+ \rightleftharpoons Cl + H_2O$ (III) $Cl + Cl^- \rightleftharpoons Cl_2^-$	1–2.5	8.9×10^7 to 6.4×10^8 (rel.)	k/k_{MeOH} = 0.099 to 0.715	p.r.	opt.	c.k.; k decreases with pH and is μ dependent; meas. abs. of Cl_2^- at 365 nm.	64–0149
		1–2.7	6.7×10^7 to 1.6×10^9 (rel.)	k/k_{ferro} = 0.00725 to 0.169	p.r.	opt.	c.k.; k decreases with pH and is μ dependent.	64–0149
		1–3	$(1.16$ to $2.16) \times 10^{10}$ $dm^6mol^{-2}s^{-1}$	—	p.r.	opt.	p.b.k.; k includes $[H^+]$; not cor. for μ.	64–0149
		0–3	$(0.32$ to $1.84) \times 10^{10}$ $dm^6mol^{-2}s^{-1}$	—	p.r.	opt.	p.b.k.; k includes $[H^+]$; μ = 0.012–1.	64–0149
		~1–3	$1.0 \times 10^{10} dm^6mol^{-2}s^{-1}$ (rel.)	k/k_{thym} = 1.9 ± 0.3 dm^3mol^{-1}	γ–r.	chem.	c.k.; k defined for $OH + H^+ + Cl^- \rightarrow Cl + H_2O$.	65–0133
		9	$< 1.25 \times 10^6$ (rel.)	$k/k_{RNO} < 10^{-4}$	γ–r.	opt.	c.k.	65–0356
		2	5.2×10^8 (rel.)	k/k_{RNO} = 0.042	Fenton	opt.	c.k.	67–0555
		~0.1	4.8×10^9 (rel.)	k/k_{RNO} = 0.381	Fenton	opt.	c.k.	67–0555
		0.8–3.4	$(1.5 \pm 0.3) \times 10^{10}$ $dm^6mol^{-2}s^{-1}$	—	p.r.	opt.	p.b.k.; k refers to $OH + Cl^- + H_3O^+ \rightarrow Cl + 2H_2O$.	68–0313
		1.1	3.5×10^7 (rel.)	k/k_{MeOH} = 0.039	γ–r.	chem.	c.k.; based on $k_{2\text{-PrOH}}/k_{MeOH}$ = 3.0.	69–0647
		1.1	3.7×10^7 (rel.)	k/k_{EtOH} = 0.020	γ–r.	chem.	c.k.; based on $k_{2\text{-PrOH}}/k_{EtOH}$ = 1.61.	69–0647
		1	7×10^8 (rel.)	k/k_{thym} = 0.13	Fenton	esr	c.k.; k/k_{perox} = 9.5; pH dependent; also with Ti(III)–H_2O_2.	69–5278
		1.3	2×10^8 (rel.)	k/k_{MeOH} = 0.24 ± 0.04	γ–r.	chem.	c.k.	71–0931
		6	$< 10^6$	$k/k_{MeOH} < 0.001$	γ–r.	chem.	c.k.	71–0931
		~2	$(4.3 \pm 0.4) \times 10^9$ (I) $(2.1 \pm 0.7) \times 10^{10}$ (II) 2.1×10^{10} (III)	—	p.r.	opt.	d.k. at 240 nm as well as p.b.k. at 340 nm (Cl_2^-); $K_I = 0.70 \pm 0.13 M^{-1}$; $K_{II} = 1.6 \times 10^7$; $K_{III} = 1.9 \times 10^5 M^{-1}$.	73–1039
		~2	1.9×10^{10} $dm^6mol^{-2}s^{-1}$	—	p.r.	opt.	p.b.k. at 350 nm (Cl_2^-); k refers to $OH + Cl^- + H_3O^+$.	73–1089
		For other ratios see: 3.291, 3.594.						
3.28	$OD + Cl^- + D_3O^+ \rightarrow 2D_2O + Cl$	~2	1.6×10^{10} $dm^6mol^{-2}s^{-1}$	—	p.r.	opt.	p.b.k. (see above) k_H/k_D = 1.17.	73–1089
3.29	ClO^-	—	$\leq 2 \times 10^8$	—	f.phot.	opt.	estd.	71–7236
	$OH + ClO^- \rightarrow ClO + OH^-$	11	8.2×10^9 (rel.)	k/k_{carb} = 22.5	p.r.	opt.	c.k.	72–0301
3.30	ClO_2^- $OH + ClO_2^- \rightarrow ClO_2 + OH^-$	—	$(1.3 \pm 0.4) \times 10^9$	—	f.phot.	opt.	d.k. at 360 nm; assume k(OH + OH) = 5×10^9; best fit.	71–7236
		11	5.7×10^9 (rel.)	k/k_{carb} = 15.7	p.r.	opt.	c.k.	72–0301

TABLE 3. Reactions of OH with inorganic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.31	ClO_3^-	11	$< 10^6$ (rel.)	—	p.r.	opt.	no effect on CO_3^- formn. in carbonate soln.	72–0301
		—	$\leq 4 \times 10^5$	—	f.phot.	opt.	estd.	71–7236
3.32	ClO_2	5.8–6.0	—	$k/k_{Br^-} \cong 1$	γ–r.	chem.	c.k. in 2–6 M ClO_4^-; based on an assumed mechanism.	67–0019
	$OH + ClO_2 \rightarrow HClO_3$ or $\rightarrow H^+ + ClO_3^-$	—	—	$k/k_{perox} > 200$ $k/k_{hydr} > 100$	γ–r.	chem.	c.k. assumed values.	67–0028
3.32a	Co^{2+}	—	$\sim 2 \times 10^6$	—	p.r.	opt.	c.k. with Cu^{2+}.	75–1027
3.33	$Co(NH_3)_6^{3+}$	—	$\leq 1.1 \times 10^8$ (rel.)	$k/k_{CNS^-} \leq 10^{-2}$	p.r.	opt.	c.k.	71–0282
3.34	$Co(BzO^-)(NH_3)_5^{2+}$	—	$(3.3 - 3.8) \times 10^9$ (rel.)	$k/k_{CNS^-} = 0.3 - 0.35$	p.r.	opt.	c.k.; O_2–satd.	71–0282
		—	$(6.3–6.7) \times 10^9$	—	p.r.	opt.	p.b.k. at 345 nm.	71–0282
3.34a	$Co(NH_3)_5py^{3+}$	5.2	6.5×10^8	—	p.r.	opt.	p.b.k. at 320 nm.	75–1088
3.35	$Co(CN)_5NO^{3-}$	—	1.2×10^8 (rel.)	$k/k_{RNO} = 0.0094$	γ–r.	opt.	c.k.; depends on $k_{CN^-}/k_{RNO} = 0.42$.	71–0407
3.36	$Co(acac)_3^{3+}$	1–7	4.8×10^9 (rel.)	$k/k_{EtOH} = 2.6$	r.	chem.	c.k.	70–0094
3.37	Cr(II) $OH + Cr(II) \rightarrow OH^- + Cr(III)$	1	4.8×10^9 (rel.)	$k/k_{CNS^-} = 0.44$	p.r.	opt.	c.k.	72–0240
3.38	Cr^{3+} $OH + Cr^{3+} \rightarrow Cr^{4+} + OH^-$	0.4–1.4	—	$k/k_{hydr} = 0.0082$	γ–r.	chem.	c.k.; assume $k_{bisulf}/k_{hydr} = 0.0039$.	63–0197
		0.4–1	—	$k/k_{hydr} = 7 \pm 2$	γ–r.	chem.	c.k.; $k_{bisulf}/k_{hydr} = 0.011$.	65–0052
			(Unexplained discrepancy in the above data.)					
3.39	$Cr(CN)_5NO^{3-}$	—	7.9×10^9 (rel.)	$k/k_{RNO} = 0.63$	γ–r.	opt.	c.k.; assumed $k(OH + CN^-) = 3.0 \times 10^9$.	69–0531
		—	7×10^9 (rel.)	$k/k_{RNO} = 0.56$	γ–r.	opt.	c.k.; depends on $k_{CN^-}/k_{RNO} = 0.42$.	71–0407
3.40	Cr(V) $OH + Cr(V) \rightarrow OH^- + Cr(VI)$	—	5×10^{10}	—	γ–r.	est.	reoxidation of transient from e^-_{aq} or H reaction with chromate.	73–0186
3.41	Cu^{2+} $OH + Cu^{2+} \rightarrow$	7	3.5×10^8	—	p.r.	opt.	p.b.k. at 313 nm.	65–0044, 65–0394
	$Cu^{3+} + OH^-$ or $\rightarrow Cu(OH)^{2+} +$	—	3.6×10^8 (rel.)	$k/k_{EtOH} = 0.196$	p.r.	opt.	c.k.; meas. Cu^{3+} at 313 nm.	65–0394
	$Cu(OH)_2^+$	—	3.5×10^8 (rel.)	$k/k_{MeOH} = 0.385$	p.r.	opt.	c.k.; meas. Cu^{3+} at 313 nm.	65–0394
		~5	3×10^8 (rel.)	$k/k_{t\text{-}BuOH} = 0.67 \pm 0.07$	p.r.	condy.	c.k.; assume $k_{MeOH}/k_{t\text{-}BuOH} = 2$.	70–0512
		3–6	$(3.1 \pm 0.3) \times 10^8$	—	p.r.	opt.	p.b.k. at 300 nm.	71–0174
		5.7	$(3.1 \pm 0.6) \times 10^8$	—	p.r.	opt.	p.b.k. at 300 nm.	71–0775
3.42	$Cu(en)_2^{2+}$	6.5	$(3.0 \pm 0.6) \times 10^9$	—	p.r.	opt.	p.b.k.	71–0775
	$OH + Cu(en)_2^{2+} \rightarrow$	10.2	$(5.0 \pm 1.0) \times 10^9$	—				
	$OH^- + Cu(en)_2^{3+}$	11.2	$(8.0 \pm 2.0) \times 10^9$	—				
3.43	$Cu(gly)_2^{2+}$ $OH + Cu(gly)_2^{2+} \rightarrow OH^- + Cu(gly)_2^{3+}$	6.1	$(1.5 \pm 0.3) \times 10^9$	—	p.r.	opt.	p.b.k.	71–0775
3.44	$Cu(ala)_2^{2+}$ (see 3.43)	6.3	$(1.4 \pm 0.3) \times 10^9$	—	p.r.	opt.	p.b.k.	71–0775
3.45	$Cu(\beta\text{–ala})_2^{2+}$ (see 3.43)	5.8	$(1.2 \pm 0.2) \times 10^9$	—	p.r.	opt.	p.b.k.	71–0775
3.46	$Cu(CH_3CH_2CH(NH_3^+)COO^-)_2^{2+}$ (see 3.43)	6.1	$(2.0 \pm 0.4) \times 10^9$	—	p.r.	opt.	p.b.k.	71–0775

TABLE 3. Reactions of OH with inorganic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.47	$Cu(CH_3CH(NH_3^+)CH_2COO^-)_2^{2+}$							
	(see 3.43)	6.0	$(1.2 \pm 0.2) \times 10^9$	—	p.r.	opt.	p.b.k.	71–0775
3.48	$Cu(NH_3^+CH_2CH_2CH_2COO^-)_2^{2+}$							
	(see 3.43)	4.8	$(1.1 \pm 0.2) \times 10^9$	—	p.r.	opt.	p.b.k.	71–0775
3.49	$Cu((CH_3)_2C(NH_3^+)COO^-)_2^{2+}$							
	(see 3.43)	6.2	$(1.8 \pm 0.4) \times 10^9$	—	p.r.	opt.	p.b.k.	71–0775
3.50	$Cu(EDTA)^{2-}$	~7	4×10^9 (rel.)	$k/k_{MeOH} = 4.4$	X–r.	chem.	c.k.	73–0078
3.51	Eu^{2+}	—	9×10^8	—	p.r.	opt.	d.k. (Eu^{2+}).	71–0311
	$OH + Eu^{2+} \rightarrow OH^- + Eu^{3+}$	2	$(1.3 \pm 0.2) \times 10^9$	—	p.r.	opt.	d.k.; transient Eu(II) formed in Eu(III) soln.	73–1084
3.52	Fe^{2+}	1.2–1.9	—	$k/k_{perox} = (2.99 \pm 0.2) \times 10^{-2}$	Fenton	chem.	c.k.; $E_a(OH + H_2O_2) - E_a(OH + Fe^{2+}) = 3.5$ kcal/mol(14.6 kJ/mol).	51–9004
	$OH + Fe^{2+} \rightarrow Fe^{3+} + OH^-$	0.4	—	$k/k_H = 6.2 \times 10^{-3}$	p.r.	c.k.	obs. $G(H_2)$ and $G(Fe^{3+})$; math. anal.	60–0099
		0.3	$> 10^8$	—	p.r.	opt.	p.b.k. at 305 nm; (Fe^{3+}).	64–0090
		0.4	1.7×10^9 (rel.)	$k/k_{EtOH} \cong 0.9$	p.r.	opt.	c.k.	64–0242
		0.8	1.2×10^9 (rel.)	$k/k_{PhH} = 0.15$	γ–r., e–r.	chem.	c.k.	66–0645, 67–0504
		3.5	$(5 \pm 1) \times 10^8$	—	p.r.	opt.	p.b.k.; reported reaction is $OH + Fe_{aq}^{2+} \rightarrow Fe(OH)^{2+}$.	66–0716
		2	5×10^8 (rel.)	$k/k_{RNO} = 0.04$	Fenton	opt.	c.k.	67–0555
		4.5–6.2	3.4×10^8 (rel.)	$k/k_{EtOH} = 0.183$	p.r.	opt.	c.k.	71–0137
		1	$(2.3 \pm 0.2) \times 10^8$	—	p.r.	opt.	p.b.k. at 240 nm; no temp. dependence 17–67°C.	72–0354
			For other ratios see: 3.5, 3.18, 3.56, 3.58, 3.59, 3.60, 3.77, 3.114, 3.123, 3.131, 3.149, 3.150, 3.185, 3.186, 3.190, 3.192, 3.221, 3.224, 3.239, 3.245, 3.251, 3.307, 3.320, 3.326, 3.358, 3.360, 3.365, 3.369, 3.371, 3.382, 3.404, 3.409, 3.451, 3.486, 3.491, 3.511, 3.522, 3.531, 3.546, 3.565, 3.612, 3.620, 3.636, 3.637, 3.638, 3.639, 3.642, 3.656, 3.680, 3.693, 3.694, 3.704, 3.724.				
3.53	$OD + Fe^{2+} \rightarrow OD^- + Fe^{3+}$	1	$(9.4 \pm 0.8) \times 10^7$	—	p.r.	opt.	p.b.k. at 240 nm; in D_2O.	72–0354
3.54	$Fe(CN)_6^{4-}$	7	$(1.1 \pm 0.2) \times 10^{10}$	—	p.r.	opt.	p.b.k. at 420 nm.	64–0213
	$OH + Fe(CN)_6^{4-} \rightarrow$	7	8.7×10^9 (rel.)	$k/k_{EtOH} = 4.7$	p.r.	opt.	c.k.	65–0007
	$OH^- + Fe(CN)_6^{3-}$	7	2.0×10^{10} (rel.)	$k/k_{I^-} = 1.67 \pm 0.018$	p.r.	opt.	c.k.; meas. abs. of I_2^- at 400 nm.	65–0010
		7, 10.7	1.2×10^{10} (rel.)	$k/k_{BzO^-} = 2.1 \pm 0.4$	γ–r.	trac.	c.k.; meas. $^{14}CO_2$.	65–0099
		9	1.2×10^{10} (rel.)	$k/k_{RNO} = 1$	γ–r.	opt.	c.k.	65–0356
		3–7	$(1.07 \pm 0.10) \times 10^{10}$	—	p.r.	opt.	p.b.k. at 420 nm.	66–0424
		—	1×10^{10} (rel.)	$k/k_{EtOH} = 5.4$	p.r.	opt.	c.k.; N_2O–satd.; ratios 5 and 11.5, resp. in O_2–satd. soln. contg. 0.05 M ferrocyanide.	71–0137
			1.1×10^{10} (rel.)	$k/k_{MeOH} = 12.4$				
		nat.	$(9.3 \pm 0.5) \times 10^9$	—	p.r.	opt.	p.b.k. at 410 nm.	71–0578

TABLE 3. Reactions of OH with inorganic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.54 cont.		0–7	$(1.25 \pm 0.1) \times 10^{10}$	—	p.r.	opt.	p.b.k. at 420 nm; calcd. k(OH + $HFe(CN)_6^{3-}$) = $(9.0 \pm 0.9) \times 10^9$ and k(OH + $H_2Fe(CN)_6^{2-}$) = $(1.7 \pm 0.5) \times 10^9$.	72–0431
		—	$(1.12 \pm 0.17) \times 10^{10}$	—	p.r.	opt.	p.b.k. at 420 nm; c.k. with 2-PrOH gave 8.0×10^9.	73–1031
		—	$(9.3 \pm 0.5) \times 10^9$	—	p.r.	opt.	p.b.k.; μ = 0.002 to 10.	73–1039
			For other ratios see: 3.3, 3.12, 3.27, 3.62, 3.85, 3.128, 3.131, 3.134, 3.143, 3.151, 3.152, 3.168, 3.169, 3.191, 3.225, 3.231, 3.233, 3.310, 3.358, 3.367, 3.369, 3.384, 3.385, 3.394, 3.403, 3.405, 3.406, 3.473–3.473a, 3.506, 3.511, 3.527, 3.545, 3.546, 3.590, 3.614, 3.636, 3.637, 3.664, 3.686, 3.697, 3.711, 3.746.				
3.55	OD + $Fe(CN)_6^{4-} \rightarrow$ $OD^- + Fe(CN)_6^{3-}$	nat	$(9.7 \pm 1.0) \times 10^9$	—	p.r.	opt.	p.b.k. at 420 nm; in D_2O.	72–0354
3.56	Fe^{3+}	acid	$(7.9 \pm 0.5) \times 10^7$ (rel.)	$k/k_{Fe^{2+}} = (3.45 \pm 0.2) \times 10^{-1}$	p.r.	—	c.k.	66–0715
			For other ratio see: 3.358.					
3.57	$Fe(CN)_5NO^{2-}$	—	7.9×10^6 (rel.)	$k/k_{bicarb} = 0.22$	p.r.	opt.	c.k.; meas. abs. of CO_3^- at 600 nm.	69–0052
3.58	Fe(EDTA)$^-$	1	4.8×10^8 (rel.)	$k/k_{Fe^{2+}} = 2.1$	X–r.	chem.	c.k.	71–0202
	OH + Fe(EDTA)$^- \rightarrow$		1.5×10^9 (rel.)	$k/k_{MeOH} = 1.7$				
	H_2O + prod.	6	9.9×10^8 (rel.)	$k/k_{MeOH} = 1.10$	X–r.	chem.	c.k.	75–0159
3.59	H_2	7	—	$k/k_{perox} = 0.94$	γ–r.	chem.	c.k.	52–0004
	OH + $H_2 \rightarrow$	~1	3.4×10^7 (rel.)	$k/k_{Fe^{2+}} = 0.15$	Fenton	chem.	c.k.	57–0014
	H_2O + H	1	2.7×10^7 (rel.)	$k/k_{Fe^{2+}} = 0.116$	Fenton	chem.	c.k.	57–9007
		1.57	3.2×10^7 (rel.)	$k/k_{Fe^{2+}} = 0.14$	γ–r.	chem.	c.k.	58–0004
		2.1	4.0×10^7 (rel.)	$k/k_{Fe^{2+}} = 0.175$	γ–r.	chem.	c.k.	58–0004
		~7	—	$k/k_{perox} = 1.0$	γ–r.	chem.	c.k.	58–0012
		~1	$(3.2 \pm 0.2) \times 10^7$ (rel.)	$k/k_{Fe^{2+}} = 0.14 \pm 0.01$	Fenton	chem.	c.k.; E_a(OH + H_2) – E_a(OH + Fe^{2+}) = 2.7 ± 0.3 kcal/mol (11.3 kJ/mol); A(OH + H_2)/A(OH + Fe^{2+}) = 14 ± 6.	59–0028
		0.4	3.1×10^7 (rel.)	$k/k_{Fe^{2+}} = 0.135$	γ–r	chem.	c.k.	59–0064, 61–0100, 63–0004
		7	—	$k/k_{perox} = 0.93 \pm 0.03$	phot.	chem.	c.k.	62–7001
		2	—	$k/k_{perox} = 0.95$	γ–r.	chem.	c.k.	64–0212
		3	3.5×10^7	—	p.r.	opt.	d.k.	65–0010
		—	$(6.0 \pm 2.0) \times 10^7$	—	p.r.	opt.	d.k. at 260 nm.	66–0426
			For other ratios see: 3.12, 3.32, 3.38, 3.62, 3.82, 3.106, 3.118, 3.121, 3.291.					
3.60	D_2	>2	$(1.2 \pm 0.1) \times 10^7$ (rel.)	$k/k_{Fe^{2+}} = 0.050 \pm 0.005$	Fenton	chem.	c.k.; E_a(OH + D_2) – E_a(OH + Fe^{2+}) = 3.4 ± 0.2 kcal/mol (14.2 kJ/mol); A(OH + D_2)/A(OH + Fe^{2+}) = 16 ± 6.	59–0028
	OH + $D_2 \rightarrow$ DHO + D							
3.61	D_2	alk.	$(1.6 \pm 0.2) \times 10^7$	—	p.r.	opt.	p.b.k. (meas. e_d^- from D + $OD^- \rightleftharpoons e_d^- + D_2O$).	68–0061
	OD + $D_2 \rightarrow$ D_2O + D							
3.62	OH^-	3.5–11	2.9×10^9 (rel.)	$k/k_{I^-} = 0.22$	phot.	chem.	c.k.	62–0057
	OH + $OH^- \rightarrow H_2O$ + O^-	alk.	5.6×10^9 (rel.)	$k/k_{ferro} = 0.6$	p.r.	—	c.k.; estd.	65–0007
		10–14	3.0×10^8 (rel.)	$k/k_{I^-} = 0.025$	γ–r.	chem.	c.k.; pH effect on yields.	65–0219

TABLE 3. Reactions of OH with inorganic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.62 cont.		11	$(1.2 \pm 0.3) \times 10^{10}$ (rel.)	—	p.r.	opt.	c.k. with MeOH and EtOH; soln. contains CO_3^{2-} and HCO_3^-; assume $k(O^- + H_2O) = 1.7 \times 10^6$ and $pK_a(OH) = 11.9$.	70–0511
			For other ratios see: 3.107.					
3.63	HO_2^- $OH + HO_2^- \rightarrow OH^- + HO_2$	13	8.3×10^9	—	p.r.	opt.	p.b.k. at 260 nm; involves various assumptions.	68–0298
		11	$1.4k + k(O^- + H_2O_2) = (8 \pm 0.8) \times 10^9$ (rel.)	—	p.r.	opt.	c.k.; value relative to $k_{carb} = (4 \pm 0.2) \times 10^8$ and $pK_a(OH) = 11.9$; $\mu = 0.4$.	69–0379
		alk.	1.4×10^{10}	—	p.r.	condy.	computer anal.; more than one rate constant involved in calcn.	72–0404
		—	$(5 \pm 1.5) \times 10^9$ (rel.)	—	phot.	opt.	c.k.; calcd. from k/k_{RNO} at pH 7–10.52.	73–7575
3.64	H_2O_2 $OH + H_2O_2 \rightarrow HO_2 + H_2O$	—	$(4.5 \pm 0.4) \times 10^7$	—	p.r.	opt.	Data fitting; G values.	62–0052
		3	1.2×10^7 (rel.)	—	p.r.	opt.	Data fitting; G values; rel. to $k(H + H) = 1.3 \times 10^{10}$.	64–0092
		7	$(2.6 \pm 0.8) \times 10^7$ (rel.)	$k/k_{I^-} = (2.2 \pm 0.7) \times 10^{-3}$	p.r.	opt.	c.k.	65–0010
		—	1.7×10^7 (rel.)	$k/k_{RNO} = 0.00136$	p.r.	opt.	c.k.	69–0156
		8.4	6.5×10^7 (rel.)	$k/k_{bicarb} = 1.8$	p.r.	opt.	c.k.	69–0379
		7	$(1.7 \pm 0.3) \times 10^7$ (rel.)	$k/k_{RNO} = 0.00136$	phot.	opt.	c.k.	73–7575
		6	4.5×10^7 (rel.)	$k/k_{RNO} = 0.0036$	phot.	opt.	c.k.	74–0052
			For other ratios see: 3.3, 3.5, 3.18, 3.32, 3.52, 3.59, 3.77, 3.115, 3.592, 3.711.					
3.65	HgCl $OH + HgCl \rightarrow HgCl^+ + OH^-$ or $Hg(OH)Cl + H^+ + Cl^-$	5.0	$\sim 10^{10}$	—	p.r.	opt.	d.k. at 235 nm; reaction of e^-_{aq} or H with $HgCl_2$ gives HgCl.	73–0043
3.66	I^- (I) $OH + I^- \rightarrow HOI^-$ (II) $HOI^- \rightarrow OH^- + I$ (III) $I + I^- \rightleftharpoons I_2^-$	neut.	$(1.02 \pm 0.13) \times 10^{10}$	—	p.r.	opt.	p.b.k.; I_2^- is meas.; assumed that $OH + I^- \rightarrow OH^- + I$ is rate determining step.	65–0010
		10.5	1.4×10^{10} (rel.)	$k/k_{BzO^-} = 2.37 \pm 0.12$	γ–r.	trac.	c.k.; meas. $G(^{14}CO_2)$.	65–0099
		9	1.4×10^{10} (rel.)	$k/k_{RNO} = 1.14$	γ–r.	opt.	c.k.	65–0356
		—	—	$k/k_{TCOO^-} = 3.8$	γ–r.	trac.	c.k.; obs. ^3HHO.	68–0209
		9	1.2×10^{10} (rel.)	$k/k_{RNO} = 0.96 \pm 0.07$.	γ–r.	opt.	c.k.; O_2–satd.	68–0310
		—	3.4×10^{10}	—	p.r.	opt.	p.b.k.; method is indirect.	68–0375
		7	1.2×10^{10} (rel.)	$k/k_{BzO^-} = 2.1$	γ–r.	chem.	c.k.	68–0494
		5.5	1.2×10^{10} (rel.)	$k/k_{NB} = 3.8$	γ–r.	opt.	c.k.; obs. o–nitrophenol formn.	68–0494

TABLE 3. Reactions of OH with inorganic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.66 cont.		2	1.1×10^{10} (rel.)	$k/k_{PbH} = 1.46$	γ–r.	opt.	c.k. with Safranine T.	69–0279
		3–5.5	7.4×10^{9} (rel.)	$k/k_{PhH} = 0.95$	γ–r.	opt.	c.k. with Safranine T.	69–0279
		0–2	1.6×10^{10} (rel.)	$k/k_{2\text{-PrOH}} = 7.1 \pm 0.2$	γ–r.	chem.	c.k.; obs. G(acetone).	68–0602
		6.98	1.8×10^{10} (rel.)	$k/k_{2\text{-PrOH}} = 8.1 \pm 0.1$	γ–r.	chem.	c.k.; $\mu = 0.1 - 1.1$.	68–0602
		11	6.6×10^{9} (rel.)	$k/k_{carb} = 18$	p.r.	opt.	c.k.	69–0379
		—	2.4×10^{10} (rel.)	$k/k_{CNS^-} = 2.14$	p.r.	opt.	c.k.	70–1226
		—	4.0×10^{10} (rel.)	$k/k_{NB} = 12.6$	p.r.	opt.	c.k.	70–1226
		—	1×10^{10} (rel.)	$k/k_{EtOH} = 5.5$	p.r.	opt.	c.k.; N_2O–satd.; ratio 7 in O_2satd. 0.1 M I^- soln.	71–0137
		9	1.5×10^{10} (rel.)	$k/k_{RNO} = 1.22$	r.	opt.	c.k.; $E_a = 0.7 \pm 0.3$ kcal/mol (2.9 kJ/mol) (265–296 K).	71–0469
		~6	1.4×10^{10} (rel.)	$k/k_{MeOH} = 15.2 \pm 0.9$	γ–r.	chem.	c.k.	71–0931
		—	$(1.21 \pm 0.08) \times 10^{10}$	—	p.r.	opt.	p.b.k. at 385 nm (I_2^-); $k_I = k_{III}$; $k_{II} = (1.2 \pm 1.0) \times 10^8$ s^{-1}.	72–0122
			For other ratios see: 3.21, 3.54, 3.62, 3.64, 3.91, 3.110, 3.128, 3.129, 3.131, 3.186, 3.220, 3.228, 3.343, 3.358, 3.365, 3.371, 3.384, 3.385, 3.394, 3.482, 3.511, 3.592, 3.637, 3.647, 3.711.					
3.67	IO_3^- $OH + IO_3^- \rightarrow IO_3 + OH^-$	12.4–13.6	$(9.2 \pm 0.8) \times 10^8$ (rel.)	—	f.phot.	chem.	d.k. at 430 nm (O_3^-); value is based on $k(O^- + O_2 \rightarrow O_3^-) = 2.5 \times 10^9$.	70–0018
		7	$\leq 5 \times 10^7$ (rel.)	—	p.r.	opt.	c.k. with EtOH and 2–PrOH; obs. decrease in abs. at 360 nm.	72–0017
		6	$(1.1 \pm 0.1) \times 10^7$	—	p.r.	opt.	p.b.k. at 360 nm.	73–0027
3.68	IO_4^- $OH + IO_4^- \rightarrow OH^- + IO_4$	5.6	$(4.5 \pm 0.5) \times 10^8$	—	p.r.	opt.	p.b.k. at 520 nm; computer anal.	71–0274 71–0335
3.69	Mn^{2+} $OH + Mn^{2+} \rightarrow Mn^{3+} + OH^-$	—	$\geq 1.4 \times 10^8$	—	p.r.	opt.	p.b.k. at 450 nm.	65–0395
3.70	$Mn(CN)_5NO^{3-}$	—	4.2×10^9 (rel.)	$k/k_{RNO} = 0.34$	γ–r.	opt.	c.k.; depends on $k_{CN^-}/k_{RNO} = 0.42$.	71–0407
3.70a	$Mo(CN)_8^{4-}$ $OH + Mo(CN)_8^{4-} \rightarrow OH^- + Mo(CN)_8^{3-}$	—	$(5.8 \pm 0.6) \times 10^9$ (rel.)	$k/k_{bicarb} = 16$	p.r.	opt.	c.k.	73–1031
3.71	NH_3 $OH + NH_3 \rightarrow H_2O + NH_2$	—	1.0×10^8	—	p.r.	opt.	d.k. (OH) or p.b.k. at 530 nm (NH_2).	72–0109
		11.3	1.5×10^7 (rel.) 3.6×10^7 (rel.)	$k/k_{CNS^-} = 0.00135$ $k/k_{MeOH} = 0.04$	p.r.	opt.	c.k.; includes $O^- + NH_3$.	72–0460
3.72	NH_2 $OH + NH_2 \rightarrow NH_2OH$	—	9.5×10^9	—	p.r.	chem.	effect of NH_3 concn. on $G(NH_2OH)$.	72–0109
3.73	N_3^-	9	1.1×10^{10} (rel.)	$k/k_{RNO} = 0.86$	γ–r.	opt.	c.k.	65–0356
	$OH + N_3^- \rightarrow N_3 + OH^-$	9.2	1.1×10^{10} (rel.)	$k/k_{B_2O^-} = 2.0$	p.r.	opt.	c.k.; meas. abs of N_3 at 278 nm.	70–0649
3.74	NH_2OH	8	9.5×10^9 (rel.)	$k/k_{CNS^-} = 0.86$	p.r.	opt.	c.k.	71–0493
3.75	NH_3OH^+	4	$\leq 5.0 \times 10^8$ (rel.)	$k/k_{CNS^-} = 0.0455$	p.r.	opt.	c.k.	71–0493

TABLE 3. Reactions of OH with inorganic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.76	NH_2NH_2 $OH + NH_2NH_2 \rightarrow H_2O + N_2H_3$	10	1.4×10^{10} (rel.)	$k/k_{CNS^-} = 1.3$	p.r.	opt.	c.k.	72–0003
3.77	$NH_2NH_3^+$ $OH + NH_2NH_3^+ \rightarrow H_2O + N_2H_4^+$	~1	$\sim 2 \times 10^7$ (rel.)	$k/k_{Fe^{2+}} \cong 0.09$	γ–r.	chem.	c.k.	62–0136
		2		$k/k_{perox} = 1 \pm 0.1$	r.	chem.	calcd. assuming mechanism.	56–7004
		6	1.0×10^9 (rel.)	$k/k_{CNS^-} = 0.091$	p.r.	opt.	c.k.	72–0003
3.78	$NOH(SO_3)_2^{2-}$ $OH + NOH(SO_3)_2^{2-} \rightarrow H_2O + ON(SO_3)_2^{2-}$	8.4–12	5.7×10^8 (rel.)	$k/k_{PhH} = 0.073$	e–r.	esr	obs. buildup of $ON(SO_3^-)_2$; k probably is concn. dependent.	68–0471
		—	4.94×10^8 (rel.)	$k/k_{PhH} = 0.063$	—	—	calcd.	71–0596
3.79	$NO(SO_3)_2^{2-}$ (Fremy's salt)	—	2.6×10^{10}	—	—	—	calcd.	71–0596
3.80	NO $OH + NO \rightarrow NO_2^- + H^+$	7	1.1×10^{10} (rel.)	$k/k_{MeOH} = 12.5$	γ–r.	chem.	c.k. (for product ident. see 70–0228).	66–0118
		7	8.9×10^9 (rel.)	$k/k_{EtOH} = 4.8 \pm 0.6$	γ–r.	chem.	c.k.	66–0118
		7	1.1×10^{10} (rel.)	$k/k_{2\text{-PrOH}} = 4.8 \pm 0.6$	γ–r.	chem.	c.k.	66–0118
		—	—	$k/k_{nitrite} = 1.6 \pm 0.4$	f.phot.	opt.	c.k.	70–7264
		7	1×10^{10}	—	p.r.	opt.	p.b.k. at 220 nm (NO_2^-).	73–0096
3.81	NO_2 $OH + NO_2 \rightarrow HO_2NO$	9	1.3×10^9	—	p.r.	opt.	meas. buildup of abs. at 302 nm in NO_3^- soln.; calcn. involves k(OH + OH) = 0.6×10^{10} and k for $NO_3^{2-} (+ H_2O) \rightarrow NO_2 + 2OH^- = 5.5 \times 10^4 s^{-1}$.	70–0151
3.82	NO_2^-	—	1.2×10^{10} (rel.)	$k/k_{carb} = 32$	p.r.	opt.	c.k.	64–0131
	$OH + NO_2^- \rightarrow NO_2 + OH^-$	—	1.1×10^{10}	$k/k_{OH} = 1.45$	p.r.	calcd.	math. anal. of data from NO_3^- soln.; assume $k_{OH} = 7.6 \times 10^9$.	64–0294
		10.7	6.6×10^9 (rel.)	$k/k_{carb} = 18$	p.r.	opt.	c.k.	65–0190
		9	8.1×10^9 (rel.)	$k/k_{RNO} = 0.65$	γ–r.	opt.	c.k.	65–0356
		—	5.9×10^9 (rel.)	$k/k_{MeOH} = 6.5 \pm 0.8$	γ–r.	chem.	c.k. in NO–MeOH–KNO_2 solns.	66–0118
		—	—	$k/k_{hydr} = 125$	γ–r.	chem.	c.k.	67–0032
		—	—	$k/k_{TCOO^-} = 3.0$	γ–r.	trac.	c.k.; obs. ^{3}HHO.	68–0209
		9	7.1×10^9 (rel.)	$k/k_{RNO} = 0.57 \pm 0.03$	γ–r.	opt.	c.k.	68–0310
		11	7.3×10^9 (rel.)	$k/k_{carb} = 20$	p.r.	opt.	c.k.	69–0379
		acid	1×10^{10} (rel.)	$k/k_{MeOH} = 11.7$	p.r.	condy.	c.k.	70–0254
		alk.	8.5×10^9 (rel.)	$k/k_{MeOH} = 9.4$	p.r.	condy.	c.k.	70–0254
		>12	1×10^{10} (rel.)	$k/k(O^- + O_2) = 4.0 \pm 0.4$	f.phot.	opt.	c.k.; meas. dependence of O_3^- decay rate on OH^- and NO_2^-.	70–7264
		9	1.1×10^{10} (rel.)	$k/k_{RNO} = 0.86$	γ–r.	opt.	c.k.; $E_a = -1.0 \pm 1.0$ kcal/mol (–4.2 kJ/mol) (–8 to 23°C).	71–0469

For other ratios see: 3.80.

TABLE 3. Reactions of OH with inorganic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.83	NO_3^- $OH + NO_3^- \rightarrow OH^- + NO_3$	9	$< 5 \times 10^5$ (rel.)	—	—	—	c.k. with RNO.	66–0843
3.84	HNO_3 (+NO_3^-) $OH + HNO_3 \rightarrow H_2O + NO_3$	~0	—	—	p.r.	opt.	p.b.k. (NO_3) at 635 nm; pseudo–first order rate = $1.5 \times 10^5 s^{-1}$ at 0.1 *M* HNO_3 and $4.2 \times 10^5 s^{-1}$ at 0.4 or 1.0 *M* HNO_3.	67–0002
		~0–1	—	—	p.r.	opt.	p.b.k.; rate of formn. of NO_3 (2 to 12) $\times 10^5 s^{-1}$; first order in H^+ and NO_3^-.	69–0417
		4 *M* HNO_3	—	$k[H^+][NO_3^-]/k_{HCOOH} = 0.21 \pm 0.03$ *M*	γ–r.	chem.	c.k. in Ce(III)–Ce(IV)–HCOOH soln. $k_{Ce(III)}/k_{HCOOH} = 4.1$.	72–0263
			For ratio see: 3.720a					
3.84a	Ni^{2+}	—	$< 5 \times 10^5$	—	p.r.	opt.	c.k. with Cu^{2+}	75–1027
3.85	$Ni(CN)_4^{2-}$ $OH + Ni(CN)_4^{2-} \rightarrow OH^- + Ni(CN)_4^-$	—	$(9.1 \pm 0.5) \times 10^9$ (rel.)	$k/k_{ferro} = 0.98$	p.r.	opt.	c.k.; also p.b.k. at 250 nm.	74–1072
3.86	$Ni(en)_n^{2+}$ $OH + Ni(en)_n^{2+} \rightarrow OH^- + Ni(en)_n^{3+}$	8.0	$(6.0–7.2) \times 10^8$ (rel.)	$k/k_{CNS^-} = 0.055 – 0.065$	p.r.	opt.	c.k.; cor. for OH + en.	72–0461
		8.5	$(4.1–7.2) \times 10^9$ (rel.)	$k/k_{CNS^-} = 0.37–0.65$				
		9.0	$(5.5–6.6) \times 10^9$ (rel.)	$k/k_{CNS^-} = 0.5–0.6$				
		10.0	$(5.5–9.4) \times 10^9$ (rel.)	$k/k_{CNS^-} = 0.5–0.85$				
3.87	$Ni(gly)_n^{2+}$ $OH + Ni(gly)_n^{2+} \rightarrow OH^- + Ni(gly)_n^{3+}$	10.0	$(4.9–7.7) \times 10^9$ (rel.)	$k/k_{CNS^-} = 0.45 – 0.7$	p.r.	opt.	c.k.; cor. for OH + glycine.	72–0461
3.88	$Ni(EDTA)^{2-}$	7	2.8×10^9 (rel.) 2.1×10^9 (rel.)	$k/k_{MeOH} = 3.1$ $k/k_{HCOO^-} = 0.61$	X–r.	chem.	c.k.	72–0173
3.88a	$Os(CN)_6^{4-}$ $OH + Os(CN)_6^{4-} \rightarrow OH^- + Os(CN)_6^{3-}$	—	$(1.03 \pm 0.12) \times 10^{10}$ 8.6×10^9 (rel.) 1.02×10^{10} (rel.)	— $k/k_{2\text{-}PrOH} = 4$ $k/k_{MeOH} = 9.3$	p.r.	opt.	p.b.k. at 330 and 410 nm; also c.k.	73–1031
3.88b	$Os(NH_3)_5N_2^{2+}$ $OH + Os(NH_3)_5N_2^{2+} \rightarrow H_2O + Os(NH_3)_4NH_2N_2^{2+}$	—	1×10^{10}	—	p.r.	opt.	p.b.k. at 380 nm.	75–0309, 75–1099
3.89	$(NaPO_3)_n$	—	$< 5 \times 10^6$	—	p.r.	opt.	no absorbing product formed; $n \cong 50$.	74–0036
3.90	H_3PO_4 $OH + H_3PO_4 \rightarrow H_2O + H_2PO_4$	0.0	2.6×10^6 (rel.)	$k/k_{MeOH} = 0.0028$	p.r.	opt.	c.k.; obs. H_2PO_4 radical at 500 nm.	73–1049
3.91	$H_2PO_4^-$ $OH + H_2PO_4^- \rightarrow H_2PO_4 + OH^-$	~7	$< 1.2 \times 10^7$ (rel.)	$k/k_I - < 0.001$	p.r.	opt.	c.k.; contains HPO_4^{2-} ($pK_a = 7.2$).	65–0010
		3.85–4.0	2.2×10^6 (rel.)	$k/k_{MeOH} = 0.0024$	p.r.	opt.	c.k.; obs. phosphate radical at 500 nm.	73–1049

TABLE 3. Reactions of OH with inorganic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.92	HPO_4^{2-}	—	$< 5 \times 10^6$ (rel.)	$k/k_{carb} < 0.012$	p.r.	opt.	c.k.	70–0302
		9.0–12.3	$(7.9 \pm 0.4) \times 10^5$	—	p.r.	opt.	p.b.k. at 500 nm; also $k = 9 \times 10^5$ by c.k. with MeOH.	73–1049
3.93	PO_4^{3-}	—	$< 10^7$ (rel.)	$k/k_{carb} < 0.025$	p.r.	opt.	c.k.	70–0302
3.94	$P_2O_7^{4-}$	—	$< 4 \times 10^6$ (rel.)	$k/k_{carb} < 0.01$	p.r.	opt.	c.k.	70–0302
		10.3	$(9 \pm 1) \times 10^5$	—	p.r.	opt.	p.b.k. at 590 nm.	73–1049
3.95	$H_2PO_2^-$	10.7	1.7×10^9 (rel.)	$k/k_{carb} = 4.7$	p.r.	opt.	c.k.	65–0190
3.96	PO_3^{3-}	10.7	3.5×10^9 (rel.)	$k/k_{carb} = 9.5$	p.r.	opt.	c.k.	65–0190
3.97	OH + $PdCl_4^{2-} \rightarrow$ Pd(III)	—	$(6.3 \pm 0.3) \times 10^9$ (rel.)	$k/k_{t\text{-BuOH}} = 12$	p.r.	opt.	c.k. in 0.01 *M* NaCl, assume $k_{t\text{-BuOH}} = 5.2 \times 10^8$; $k = 1.2 \times 10^{10}$ in 1*M* NaCl.	74–1087
3.98	Pr^{3+} OH + $Pr^{3+} \rightarrow$ $OH^- + Pr^{4+}$	5.8	2×10^6 (ave.)	—	p.r.	opt.	p.b.k. at 300 nm; also detd. by c.k. with H_2O_2 or CNS^-.	71–0311, 72–0066
		3.5	$\sim 3.5 \times 10^6$	—	p.r.	opt.	p.b.k. at 290 nm.	73–1084
3.99	$PtCl_4^{2-}$ OH + $PtCl_4^{2-} \rightarrow$ Pt(III) + OH^-	~11	$(8 \pm 2) \times 10^9$	—	p.r.	opt.	p.b.k. at 450 nm.	69–0144
3.100	$Pt(CN)_4^{2-}$ OH + $Pt(CN)_4^{2-} \rightarrow$ Pt(III) + OH^-	~2	1.1×10^{10} (rel.)	$k/k_{MeOH} = 12$	p.r.	opt.	c.k.	69–0144
3.100a	$Ru(CN)_6^{4-}$ OH + $Ru(CN)_6^{4-} \rightarrow$ $OH^- + Ru(CN)_6^{3-}$	—	$(5.7 \pm 0.8) \times 10^9$	—	p.r.	opt.	p.b.k. at 330, 355 and 470 nm; c.k. with 2–PrOH gave 4.4×10^9.	73–1031
3.101	$Ru(NH_3)_5N_2^{2+}$ OH + $Ru(NH_3)_5N_2^{2+} \rightarrow OH^- +$ $Ru(NH_3)_5N_2^{3+}$	—	4.8×10^9	—	p.r.	opt.	p.b.k. at 440–44 nm.	71–0234
3.102	H_2S	6	1.9×10^{10} (rel.)	$k/k_{CNS^-} = 1.7$	p.r.	opt.	c.k.	67–0273
	OH + $H_2S \rightarrow$ H_2O + HS	2–5.7	2.2×10^{10} (rel.)	$k/k_{CNS^-} = 2 \pm 0.5$	p.r.	opt.	c.k.	67–0684
		6	1.4×10^{10} (rel.)	$k/k_{MeOH} = 15$	p.r.	opt.	c.k.	67–0684
		5.5	1.5×10^{10} (rel.)	$k/k_{HCOO^-} = 4.4$	p.r.	opt.	c.k.	67–0684
3.103	HS^- OH + $HS^- \rightarrow$ OH^- + SH	—	9×10^9 (rel.)	$k/k_{CNS^-} = 0.82$	p.r.	opt.	c.k.; also with MeOH, formate ion.	67–0273
		10.5	8.4×10^9 (rel.)	$k/k_{MeOH} = 9.3$	p.r.	opt.	c.k.	67–0684
		10.5	9.4×10^9 (rel.)	$k/k_{HCOO^-} = 2.7$	p.r.	opt.	c.k.	67–0684
3.104	HSO_3^-	—	9.5×10^9 (rel.)	$k/k_{carb} = 26$	p.r.	opt.	c.k.	64–0131
3.105	SO_3^{2-}	—	5.5×10^9 (rel.)	$k/k_{carb} = 15$	p.r.	opt.	c.k.	64–0131
3.106	HSO_4^- OH + $HSO_4^- \rightarrow$ HSO_4 + OH^- or	0.8	—	$k/k_{HCOOH} = 0.0026$	γ–r.	chem.	c.k.; rel to $k_{Ce^{3+}}/k_{HCOOH} = 1.7$.	57–0003
	$\rightarrow SO_4^- + H_2O$	0.8	—	$k/k_{hydr} = 0.005$	phot.	chem.	c.k.	62–7001
		0.8	—	$k/k_{HCOOH} = 0.0016$	γ–r.	chem.	c.k.	63–0048
		1	—	$k/k_{HCOOH} = 0.0013$	phot.	chem.	c.k.	63–0048
		0.8	—	$k/k_{HCOOH} = 0.0011$	phot.	chem.	c.k.	63–0048
		0.4	—	$k/k_{HCOOH} = 0.0009$	phot.	chem.	c.k.	63–0048
		0.1–0.8	—	$k/k_{hydr} = 0.0039$	γ–r.	chem.	c.k.	63–0197
		0.4–1	—	$k/k_{hydr} = 0.011$	γ–r.	chem.	c.k.	65–0052
		~7	1.6×10^6 (rel.)	$k/k_{MeOH} = 0.0018$	p.r.	opt.	c.k., reaction is OH + $HSO_4^- \rightarrow H_2O$ + SO_4^- at this pH.	66–0019

TABLE 3. Reactions of OH with inorganic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.106 cont.		~7	6.9×10^5	—	p.r.	opt.	p.b.k.; see above.	66–0019
		0–0.8	—	$k/k_{hydr^-} = 0.01$	γ–r.	chem.	c.k.	66–0029
		0.3–2	1.2×10^6 (rel.)	$k/k_{PhH} = 1.5 \times 10^{-4}$	γ–r.	opt.	c.k. with Safranine T.	69–0279
		4 *M* H_2SO_4	1.5×10^6	—	p.r.	opt.	estd. from d.k. SO_4^-; $0.4k(OH + SO_4^-) + k(H + SO_4^-) = 3.3 \times 10^9$.	73–1030
			For other ratios see: 3.26, 3.385, 3.511, 3.637.					
3.107	$S_2O_3^{2-}$	—	—	$k/k_{OH^-} = 1.2$	γ–r.	chem.	c.k.	71–0927
	$OH + S_2O_3^{2-} \rightarrow S_2O_3^- + OH^-$		1.2×10^9 (rel.)	$k/k_{MeOH} = 1.3$				
			3×10^9 (rel.)	$k/k_{EtOH} = 1.9$				
			1.6×10^9 (rel.)	$k/k_{2\text{–PrOH}} = 0.8$				
		—	$(8 \pm 1.5) \times 10^9$ (rel.)	$k/k_{CNS^-} = 0.78$	p.r.	opt.	c.k.	73–1027
3.108	HSO_5^-	—	3.5×10^8 (rel.)	$k/k_{carb} = 0.97$	p.r.	opt.	c.k.	69–0158
	$OH + HSO_5^- \rightarrow SO_5^- + H_2O$ or $\rightarrow HSO_5 + OH^-$							
3.109	$S_2O_8^{2-}$	—	$< 10^6$	—	p.r.	—	reaction not obs.; c.k. with CO_3^{2-}.	69–0158
3.110	H_2Se	1.0	$(1.0 \pm 0.3) \times 10^{10}$ (rel.)	—	p.r.	opt.	c.k.; rel. to $k(OH + CNS^-) = 6.6 \times 10^9$, $k(OH + I^-) = 7.0 \times 10^9$, $k(OH + Br^-) = 5.0 \times 10^9$.	69–0564
	$OH + H_2Se \rightarrow HSe + H_2O$							
3.111	HSe^-	8.5–11.5	$(5.5 \pm 0.1) \times 10^9$ (rel.)	—	p.r.	opt.	c.k.; meas. $H_2Se_2^-$ at 410 nm; rel. to $k(OH + 2\text{–PrOH}) = 1.3 \times 10^9$, $k(OH + HCOO^-) = 2.5 \times 10^9$.	69–0564
	$OH + HSe^- \rightarrow HSe + OH^-$							
3.112	SeO_3^{2-}	7	2.7×10^9	—	p.r.	opt.	p.b.k. at 435 nm.	65–0190
		7	4.6×10^9 (rel.)	$k/k_{EtOH} = 2.46$	p.r.	opt.	c.k.	65–0190
		7	4.9×10^9 (rel.)	$k/k_{MeOH} = 5.42$	p.r.	opt.	c.k.	65–0190
3.113	Sm^{2+}	—	6×10^9	—	p.r.	opt.	d.k. (Sm^{2+}).	71–0311
	$OH + Sm^{2+} \rightarrow OH^- + Sm^{3+}$	3–6	$(6.2 \pm 0.8) \times 10^9$	—	p.r.	opt.	d.k. (Sm^{2+} formed in Sm^{3+} soln.)	73–1084
3.114	Sn^{2+}	0.8	$(1.6 \pm 0.2) \times 10^9$ (rel.)	$k/k_{Fe^{2+}} = 7 \pm 0.7$	γ–r.	chem.	c.k.	59–0007
	$Sn^{2+} + OH \rightarrow Sn^{3+} + OH^-$							
3.115	$H_2TeO_3 + HTeO_3^-$	0.4		$k/k_{perox} = 0.71$	γ–r.	chem.	c.k.; prelim. value.	67–0553
	$OH + Te(IV) \rightarrow Te(V)$	0.4		$k/k_{perox} = 0.11$	γ–r.	chem.	c.k.	68–0356
3.116	TeO_3^{2-}	10.7	3.5×10^9 (rel.)	$k/k_{carb} = 9.5$	p.r.	opt.	c.k.	65–0190
3.117	Ti^{3+}	~1	1.2×10^9 (rel.)	$k/k_{CNS^-} = 0.11$	p.r.	opt.	c.k.	72–0240
	$OH + Ti^{3+} \rightarrow OH^- + Ti^{4+}$							
3.117a	$TiO(C_2O_4)_2^{2-}$	—	—	$k/k_{Br^-} = 13$	γ–r.	chem.	c.k.	74–0521
	$OH + TiO(C_2O_4)_2^{2-} \rightarrow TiO(C_2O_4) + CO_2 + CO_2^- + OH^-$							
3.118	Tl^+	0.4	—	$k/k_{Ce^{3+}} = 38$	γ–r.	chem.	c.k.	56–0004
	$OH + Tl^+ (+ H^+) \rightarrow$	0.8	—	$k/k_{Ce^{3+}} = 42$	phot.	chem.	c.k.	57–7001
	$Tl^{2+} + H_2O$	0.8	—	$k/k_{hydr} = 218 \pm 60$	γ–r.	chem.	c.k.	66–0029
		6.5	$(7.6 \pm 1) \times 10^9$	—	p.r.	opt.	p.b.k. at 260 nm.	66–0097

TABLE 3. Reactions of OH with inorganic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.118 cont.		1	$(1.0 \pm 0.1) \times 10^{10}$	—	p.r.	opt.	p.b.k.; cor. for $H + Tl^{2+}$, $OH + Tl^{2+}$, OH + H, etc.	74–1017
			For other ratios see: 3.294.					
3.119	Tm(II) $OH + Tm(II) \rightarrow OH^- + Tm(III)$	3–6	$(7 \pm 1) \times 10^9$	—	p.r.	opt.	d.k. of Tm(II) formed in Tm(III) soln.	73–1084
3.120	U(IV)	—	$\sim 2 \times 10^9$	—	γ–r.	chem.	estd. by c.k. with $C_2O_4^{2-}$; U(IV) formed in UO_2^{2+} soln.	71–0542
3.121	VO^{2+} $OH + VO^{2+} \rightarrow VO_2^+ + H^+$	acid	—	$k/k_{hydr} = 11 \pm 3$	γ–r.	chem.	c.k.	66–0029
		~1	2.5×10^8 (rel.)	$k/k_{CNS^-} = 0.023$	p.r.	opt.	c.k.	72–0240
3.122	Yb^{2+}	—	3×10^9	—	p.r.	opt.	d.k. (Yb^{2+}).	71–0311
	$OH + Yb^{2+} \rightarrow OH^- + Yb^{3+}$	2	$(3.2 \pm 0.3) \times 10^9$	—	p.r.	opt.	d.k. (Yb^{2+} formed on p.r. of Yb^{3+} soln.).	73–1084
3.122a	Zn^{2+} $OH + Zn^{2+} \rightarrow OH^- + Zn^{3+}$	—	$< 5 \times 10^5$	—	p.r.	opt.	c.k. with Cu^{2+}.	75–1027

TABLE 4. Reactions of OH with organic solutes

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.123	acetaldehyde	1	5×10^8 (rel.)	$k/k_{Fe^{2+}} = 2.2$	Fenton	chem.	c.k.	49–0002
3.124	acetamide	9	1.3×10^7 (rel.)	$k/k_{EtOH} = 0.0071$	γ–r.	opt.	c.k. with RNO.	66–0423
	(I) $OH + CH_3CONH_2 \rightarrow H_2O + CH_2CONH_2$	5.5	1.9×10^8 (rel.)	$k/k_{CNS^-} = 0.017$	p.r.	opt.	c.k.	70–0098
	(II) $OH + CH_3CONH_2 \rightarrow H_2O + CH_3CONH$	—	1.9×10^8 (rel.)	$k/k_{CNS^-} = 0.017$	p.r.	opt.	c.k.; $k_{II} = 9.5 \times 10^7$ by anal. of transient spectra.	71–0645
3.125	2–acetamido–2–deoxy–D–galactose	—	1.6×10^9 (rel.)	$k/k_{CNS^-} = 0.147$	p.r.	opt.	c.k.	70–3081
3.126	2–acetamido–2–deoxy–D–glucose	—	3.1×10^9 (rel.)	$k/k_{CNS^-} = 0.279$	p.r.	opt.	c.k.	70–3081
3.127	acetanilide	9	5×10^9 (rel.)	$k/k_{EtOH} = 2.73$	γ–r.	opt.	c.k. with RNO.	66–0441
3.128	acetate ion	10.7	6.3×10^7 (rel.)	$k/k_{BzO^-} = 0.011$	γ–r.	trac.	c.k.; meas. $^{14}CO_2$.	65–0099
		9.0	8.8×10^7 (rel.)	$k/k_{RNO} = 0.007$	γ–r.	opt.	c.k.	65–0356
		9	7.2×10^7 (rel.)	$k/k_{EtOH} = 0.039$	γ–r.	opt.	c.k. with RNO.	66–0423
		nat.	7.0×10^7 (rel.)	$k/k_{ferro} = 0.0075$	p.r.	opt.	c.k.	71–0578
		—	8.5×10^7	—	p.r.	opt.	p.b.k. at 350 nm.	71–0578
		—	1.2×10^8 (rel.)	$k/k_{I^-} = 0.0092$	p.r.	opt.	c.k.; obs. I_2^-.	73–0020
3.129	acetic acid	1.0	1.8×10^7 (rel.)	$k/k_{I^-} = (1.4 \pm 0.2) \times 10^{-3}$	p.r.	opt.	c.k.	65–0010
		1	$(9.2 \pm 3.8) \times 10^6$	—	p.r.	opt.	d.k. at 260 nm.	65–0010
		1	2.3×10^7 (rel.)	$k/k_{CNS^-} = 0.0021$	p.r.	opt.	c.k.	65–0387
		2–2.2	2.3×10^7 (rel.)	$k/k_{thym} = 0.0043$	γ–r.	opt.	c.k.	67–0461
		1	2×10^7 (rel.)	$k/k_{thym} = 0.0037$	Fenton	esr	c.k.; $k/k_{perox} = 0.27$.	69–5278
		1	1.9×10^7 (rel.)	$k/k_{thym} = 0.0035$	Ti(III) + H_2O_2	esr	c.k.; $k/k_{perox} = 0.25$.	69–5278
		~0	—	$k/k_{acrylamide} = 0.01$	Fenton	pol.	c.k.	72–9162
		1	2.0×10^7 (rel.)	$k/k_{MeOH} = 0.022$	Fenton	chem.	c.k.; $k_{MeOH}/k_{Fe^{2+}} = 4.3$.	73–9341
3.130	acetoin	2.0	8.5×10^8 (rel.)	$k/k_{CNS^-} = 0.077$	p.r.	opt.	c.k.	65–0387
	$OH + CH_3CH(OH)COCH_3 \rightarrow CH_3COHCOCH_3 + H_2O$	—	1.2×10^9 (rel.)	$k/k_{CNS^-} = 0.11$	p.r.	opt.	c.k.	68–0249
3.131	acetone	7	9.0×10^7 (rel.)	$k/k_{I^-} = (7.5 \pm 0.8) \times 10^{-3}$	p.r.	opt.	c.k.	65–0010
		10.7	9.1×10^7 (rel.)	$k/k_{BzO^-} = 0.016$	γ–r.	trac.	c.k.; meas. $^{14}CO_2$.	65–0099
		6–7	9.7×10^7 (rel.)	$k/k_{CNS^-} = 0.0088$	p.r.	opt.	c.k.	65–0387
		9	7.2×10^7 (rel.)	$k/k_{EtOH} = 0.039$	γ–r.	opt.	c.k. with RNO.	66–0423
		0.8	3.8×10^7 (rel.)	$k/k_{Fe^{2+}} = 0.165$	Fenton	chem.	c.k.	66–9002
		2–2.2	7.6×10^7 (rel.)	$k/k_{thym} = 0.014 \pm 0.0015$	γ–r.	opt.	c.k.	67–0461
		9	$\sim 7 \times 10^7$ (rel.)	$k/k_{RNO} \sim 0.0056$	γ–r.	opt.	c.k.	67–0555
		nat.	1.2×10^8 (rel.)	$k/k_{ferro} = 0.0129$	p.r.	opt.	c.k.	71–0578
		1	7.2×10^7 (rel.)	$k/k_{MeOH} = 0.080$	Fenton	chem.	c.k.; $k_{MeOH}/k_{Fe^{2+}} = 4.3$.	73–9341
3.132	acetone–d_6	1	2.3×10^7 (rel.)	$k/k_{MeOH} = 0.026$	Fenton	chem.	c.k.; $k_{MeOH}/k_{Fe^{2+}} = 4.3$.	73–9341
3.133	acetonitrile	9	3.6×10^6 (rel.)	$k/k_{EtOH} = 0.0019$	γ–r.	opt.	c.k. with RNO.	66–0423
		—	7.7×10^6 (rel.)	$k/k_{HCOO^-} = 0.0022$	γ–r.	chem.	c.k.; obs. $G(CO_2)$.	73–0364
		—	2.2×10^7 (rel.)	$k/k_{PNBA^-} = 0.0085$	p.r.	opt.	c.k.	75–1003
3.134	acetophenone	9	4.8×10^9 (rel.)	$k/k_{EtOH} = 2.6$	γ–r.	opt.	c.k. with RNO.	66–0441
	$OH + C_6H_5COCH_3 \rightarrow OHC_6H_5COCH_3$	7	$(6.5 \pm 0.7) \times 10^9$	—	p.r.	opt.	p.b.k. at 372 nm (hydroxyxylo–hexadienyl radical); cor. for (OH + OH) and (H + aromatic).	68–0304

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.134 cont.		nat.	5.2×10^9 (rel.)	$k/k_{ferro} = 0.56$	p.r.	opt.	c.k.	71–0578
		—	5.4×10^9	—	p.r.	opt.	p.b.k. at 372 nm.	71–0578
3.135	*N*–acetylalanine, negative ion	9.2	4.6×10^8 (rel.)	$k/k_{CNS^-} = 0.042$	p.r.	opt.	c.k.	70–0099
3.136	*N*–acetylalanyl–alanylalanine, negative ion	9.0	3.0×10^9	—	p.r.	opt.	p.b.k.	75–1004
3.137	acetylene	2.15	—	$k/k_{HCOOH} = 2.1$	γ–r.	chem.	c.k.	68–0502
3.138	*N*–acetylglucosamine	—	3.1×10^9 (rel.)	$k/k_{CNS^-} = 0.279$	p.r.	opt.	c.k.; unpubl. data of G.O. Phillips and N. Worthington.	68–0352
3.139	*N*–acetylglycine, negative ion	8.7	4.2×10^8 (rel.)	$k/k_{CNS^-} = 0.038$	p.r.	opt.	c.k.	70–0099
3.140	*N*–acetylglycylglycine, negative ion	8.6	7.8×10^8 (rel.)	$k/k_{CNS^-} = 0.071$	p.r.	opt.	c.k.	70–0099
	4–(2–acetylsulfamoyl)phthalanilic acid *See* thalamyd (3.700).							
3.141	acriflavin	—	1.2×10^{10}	—	p.r.	opt.	d.k. at 450 nm (dye) or p.b.k. at 300–400 nm.	70–0241
3.142	acrolein OH + CH_2=CHCHO → adduct	—	7.0×10^9 (rel.)	$k/k_{CNS^-} = 0.64$	p.r.	opt.	c.k.	70–0165
3.143	acrylamide	10.7	3.4×10^9 (rel.)	$k/k_{BzO^-} = 0.59$	γ–r.	trac.	c.k.; meas. $^{14}CO_2$.	65–0099
	OH + CH_2=$CHCONH_2$ → adduct	~6	3.3×10^9 (rel.)	$k/k_{CNS^-} = 0.3 \pm 0.07$	p.r.	opt.	c.k.	67–0171
		7	4.1×10^9 (rel.)	$k/k_{BzO^-} = 0.72$	r.	lum.	c.k.; salicylate detd. at 405 nm.	68–0494
		~12	6.2×10^9 (rel.)	$k/k_{carb} = 17$	p.r.	opt.	c.k. at pH 10.9 and 12.9.	70–0052
		nat.	4.7×10^9 (rel.)	$k/k_{ferro} = 0.505$	p.r.	opt.	c.k.	71–0578
		—	6.8×10^9	—	p.r.	opt.	p.b.k. at 390 nm.	71–0578
	For other ratios see: 3.129, 3.145, 3.247, 3.283, 3.368, 3.452, 3.563.							
3.144	acrylic acid	1	1.4×10^9 (rel.)	$k/k_{MeOH} = 1.58$	Fenton	chem.	c.k.; $k_{MeOH}/k_{Fe^{2+}} = 4.3$.	73–9341
3.145	acrylonitrile	~0	—	$k/k_{acrylamide} = 1.8$	Fenton	pol.	c.k.	72–9162
3.146	adenine	2–2.2	8.8×10^8 (rel.)	$k/k_{CNS^-} = 0.08$	p.r.	opt.	c.k.	65–0388
	OH + $C_5H_3N_4NH_2$ → adduct	5–5.5	3.8×10^9 (rel.)	k/k_{CNS^-} 0.35	p.r.	opt.	c.k.	65–0388
		7.3–7.5	5.1×10^9 (rel.)	$k/k_{CNS^-} = 0.46$	p.r.	opt.	c.k.	65–0388
		7	2.8×10^9 (rel.)	$k/k_{CNS^-} = (0.25 \pm 0.05)$	p.r.	opt.	c.k.; cor. for failure of H_2O_2 to completely scavenge e^-_{aq}.	68–0316
		5.7	$(5.8 \pm 0.3) \times 10^9$	—	p.r.	opt.	p.b.k. at 450 nm.	70–3069
		6–7	5.8×10^9 (rel.)	$k/k_{RNO} = 0.464$	γ–r.	opt.	c.k.; 17°C.	75–0294
3.147	adenosine	2–2.2	1.9×10^9 (rel.)	$k/k_{CNS^-} = 0.17$	p.r.	opt.	c.k.	65–0388
		5–5.2	3.8×10^9 (rel.)	$k/k_{CNS^-} = 0.35$	p.r.	opt.	c.k.	65–0388
		7.6–7.8	4.2×10^9 (rel.)	$k/k_{CNS^-} = 0.38$	p.r.	opt.	c.k.	65–0388
3.148	adenosine 5′–phosphate (adenylic acid)	2–2.2	1.2×10^9 (rel.)	$k/k_{CNS^-} = 0.11$	p.r.	opt.	c.k.	65–0388
		5.2–5.5	3.0×10^9 (rel.)	$k/k_{CNS^-} = 0.27$	p.r.	opt.	c.k.	65–0388
		9	4.0×10^9 (rel.)	$k/k_{RNO} = 0.32$	γ–r.	opt.	c.k.	67–0555
		6.9	$(4.7 \pm 0.5) \times 10^9$	—	p.r.	opt.	p.b.k. at 350 nm.	70–3064
		7	4.7×10^9	—	p.r.	opt.	p.b.k.	73–107
3.149	adipic acid	1	2.9×10^8 (rel.)	$k/k_{Fe^{2+}} = 1.25$	Fenton	chem.	c.k.	49–000
		2–2.2	1.7×10^9 (rel.)	$k/k_{thym} = 0.32 \pm 0.03$	γ–r.	opt.	c.k.	67–046

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.150	alanine, positive ion	1	2.8×10^7 (rel.)	$k/k_{Fe^{2+}} = 0.12$	Fenton	chem.	c.k.	49–0002
		2–2.2	4.8×10^7 (rel.)	$k/k_{thym} = 0.0089$	γ–r.	opt.	c.k.	67–0461
		1	4.4×10^7 (rel.)	$k/k_{thym} = 0.0082$	Fenton	esr	c.k.; $k/k_{perox} = 0.59$.	69–5278
3.151	alanine, zwitterion	6.0	4.6×10^7 (rel.)	$k/k_{ferro} = 0.005$	X–r.	opt.	c.k.; not cor. for H_2O_2.	62–0023
		5.5–6	7.7×10^7 (rel.)	$k/k_{CNS^-} = 0.00697$	p.r.	opt.	c.k.	65–0388
		6.8	7.9×10^7 (rel.)	$k/k_{RNO} = 0.0063$	γ–r.	opt.	c.k.	73–0548
3.152	alanine, negative ion	9.75	6.5×10^8 (rel.)	$k/k_{ferro} = 0.07$	X–r.	opt.	c.k.; not cor. for H_2O_2.	62–0023
3.153	alanine anhydride	5.0	1.8×10^9 (rel.)	$k/k_{CNS^-} = 0.164$	p.r.	opt.	c.k.	71–0554
		11.0	1.8×10^9 (rel.)	$k/k_{CNS^-} = 0.164$	p.r.	opt.	c.k.	71–0554
3.154	alanylglycine, positive ion	2–2.2	1.6×10^8 (rel.)	$k/k_{thym} = 0.03$	γ–r.	opt.	c.k.	65–0388
3.155	ALDH (yeast alcohol dehydrogenase)	9	1.6×10^{11} (rel.)	$k/k_{RNO} = 12.9$	γ–r.	opt.	c.k.	67–0555
		—	6.7×10^{10} (rel.)	$k/k_{CNS^-} = 6.1$	p.r.	opt.	c.k.	70–1226
			1.5×10^{11} (rel.)	$k/k_{NB} = 48$				
3.155a	aldolase	5.5	1.9×10^{11}	—	p.r.	opt.	p.b.k. at 330 nm; enzyme from rabbit muscle.	75–3058
3.156	allyl alcohol	7	2.0×10^9 (rel.)	$k/k_{CNS^-} = 0.18$	p.r.	opt.	c.k.	65–0387
	$OH + CH_2CHCH_2OH \rightarrow CH_2OHCHCH_2OH + CH_2CHOHCH_2OH$	7.0	$(6.0 \pm 1.5) \times 10^9$	—	p.r.	opt.	p.b.k.	73–1070
3.157	allylammonium ion	4	8.6×10^9 (rel.)	$k/k_{CNS^-} = 0.785$	p.r.	opt.	c.k.	70–0371
3.158	*p*–aminobenzoate ion	9	7.9×10^9 (rel.)	$k/k_{EtOH} = 4.3$	γ–r.	opt.	c.k. with RNO.	66–0441
	$OH + NH_2C_6H_4COO^- \rightarrow NH_2(OH)C_6H_4COOH$							
3.159	*p*–aminobenzoic acid	6–7	1.6×10^{10} (rel.)	$k/k_{CNS^-} = 1.5$	p.r.	opt.	c.k.	65–0387
	$OH + NH_2C_6H_4COOH \rightarrow NH_2(OH)C_6H_4COOH$							
3.160	2–aminobutyric acid	2–2.2	3.8×10^8 (rel.)	$k/k_{thym} = 0.07 \pm 0.005$	γ–r.	opt.	c.k.	67–0461
3.161	3–aminobutyric acid	2–2.2	7.8×10^7 (rel.)	$k/k_{thym} = 0.0145 \pm 0.0015$	γ–r.	opt.	c.k.	67–0461
3.162	4–aminobutyric acid	2–2.2	2.2×10^8 (rel.)	$k/k_{thym} = 0.040 \pm 0.004$	γ–r.	opt.	c.k.	67–0461
3.163	2–amino–2–deoxy–D–galactose	—	1.2×10^9 (rel.)	$k/k_{CNS^-} = 0.106$	p.r.	opt.	c.k.	70–3081
3.164	5–aminoindole	9.0	$(3.17 \pm 0.31) \times 10^{10}$ (rel.)	—	γ–r.	opt.	c.k. with RNO; rel. to k(OH + tryptophan) = 1.25×10^{10}.	71–0556
3.165	2–aminopyridine	9	8.4×10^9 (rel.)	$k/k_{RNO} = 0.67 \pm 0.12$	γ–r.	opt.	c.k.	69–0280
3.166	4–aminopyridine	9	5.0×10^9 (rel.)	$k/k_{RNO} = 0.40 \pm 0.01$	γ–r.	opt.	c.k.	69–0280
3.167	2–aminopyrimidine	6–7	4.0×10^8 (rel.)	$k/k_{RNO} = 0.032$	γ–r.	opt.	c.k.; 17°C.	75–0294
	amyl alcohol	*See* 1–pentanol (3.602).						
	tert–amyl alcohol	*See* 2–methyl–2–butanol (3.526).						
3.168	amylamine	—	7.9×10^9 (rel.)	$k/k_{ferro} = 0.85$	p.r.	opt.	c.k.; calcd. from obs. values at pH 8–13.1.	73–0016
			9.0×10^9 (rel.)	$k/k_{CNS^-} = 0.82$				
			5.8×10^9 (rel.)	$k/k_{NB} = 2.8$				
3.169	amylammonium ion	4	9.8×10^9 (rel.)	$k/k_{CNS^-} = 0.89$	p.r.	opt.	c.k.	70–0371
		—	5.6×10^9 (rel.)	$k/k_{ferro} = 0.6$	p.r.	opt.	c.k.; calcd. from obs. values at pH 8–13.1.	73–0016
			4.7×10^9 (rel.)	$k/k_{CNS^-} = 0.43$				
			2.8×10^9 (rel.)	$k/k_{NB} = 0.87$				

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.170	aniline	10.7	7.1×10^9 (rel.)	$k/k_{BrO^-} = 1.24$	γ–r.	trac.	c.k.; meas. $^{14}CO_2$.	65–0099
	$OH + C_6H_5NH_2 \rightarrow$	9	8.9×10^9 (rel.)	$k/k_{EtOH} = 4.8$	γ–r.	opt.	c.k. with RNO.	66–0441
	$C_6H_5NH + H_2O$ or	7.5–9	2.9×10^{10} (rel.)	$k/k_{CNS^-} = 2.6$	p.r.	opt.	c.k.	69–0573
	$\rightarrow OHC_6H_5NH_2$	—	2.8×10^{10} (rel.)	$k/k_{CNS^-} = 2.58$	p.r.	opt.	c.k.	72–0289
		8,11	$(1.4 \pm 0.3) \times 10^{10}$	—	p.r.	opt.	p.b.k. at 355 nm, (cyclohexadienyl radical), 295 nm (anilino radical), and 500 nm.	72–0289
3.171	anilinium ion	3	5.4×10^9 (rel.)	$k/k_{CNS^-} = 0.49$	p.r.	opt.	c.k.	69–0573
	$OH + C_6H_5NH_3^+ \rightarrow$	~4	$(4.8 \pm 0.8) \times 10^9$	—	p.r.	opt.	p.b.k. at 415 nm.	72–0289
	$C_6H_5NH_2^+ + H_2O$ or $\rightarrow OHC_6H_5NH_3^+$							
3.172	anisole	9	6.0×10^9 (rel.)	$k/k_{EtOH} = 3.27$	γ–r.	opt.	c.k. with RNO.	66–0441
	$OH + C_6H_5OCH_3 \rightarrow$ $(OH)C_6H_5OCH_3$	7	$(12 \pm 3) \times 10^9$	—	p.r.	opt.	p.b.k. at 330 nm; cor. for (OH + OH) and (H + aromatic).	68–0304
		9	5.7×10^9 (rel.)	$k/k_{RNO} = 0.45 \pm 0.04$	γ–r.	opt.	c.k.	69–0280
		—	$(5.4 \pm 0.5) \times 10^9$	—	p.r.	—	—	75–1171
3.173	anthranilic acid	—	1.1×10^{10}	—	p.r.	opt.	p.b.k.	74–1063
3.174	9,10–anthraquinone–1–sulfonate ion	—	7.2×10^9	—	p.r.	opt.	p.b.k. ~ 460 nm; OH addn.	72–0391
3.175	9,10–anthraquinone–2–sulfonate ion	—	5.6×10^9	—	p.r.	opt.	p.b.k. ~ 460 nm; OH addn.	72–0391
3.176	9–anthroate ion	9	8.0×10^9	—	p.r.	opt.	p.b.k.	73–0110
3.177	arginine	2–2.2	7.8×10^8 (rel.)	$k/k_{thym} = 0.145$	γ–r.	opt.	c.k.	65–0388
		2–2.2	6.7×10^8 (rel.)	$k/k_{CNS^-} = 0.061$	p.r.	opt.	c.k.	65–0388
		6.5–7.5	3.5×10^9 (rel.)	$k/k_{CNS^-} = 0.32$	p.r.	opt.	c.k.	65–0388
		6.7	5.7×10^8 (rel.)	$k/k_{RNO} = 0.045$	γ–r.	opt.	c.k.	73–0548
3.178	ascorbate ion	7	1.3×10^{10} (rel.)	$k/k_{CNS^-} = 1.17$	p.r.	opt.	c.k.	72–0266
	(H abstr.)	7	$(1.1 \pm 0.3) \times 10^{10}$	—	p.r.	opt.	p.b.k. at 360 nm; also detd. $k/k_{phenylalanine} = 1.0 \pm 0.05$.	73–3006
3.179	ascorbic acid	1	1.2×10^{10} (rel.)	$k/k_{CNS^-} = 1.1$	p.r.	opt.	c.k.	65–0387
		1.5	8.2×10^9 (rel.)	$k/k_{CNS^-} = 0.75$	p.r.	opt.	c.k.	72–0266
3.180	asparagine	2–2.2	3.2×10^7 (rel.)	$k/k_{thym} = (6.0 \pm 0.5) \times 10^{-3}$	γ–r.	opt.	c.k.	67–0461
		6.6	4.9×10^7 (rel.)	$k/k_{RNO} = 0.0039$	γ–r.	opt.	c.k.	73–0548
3.181	aspartic acid	2–2.2	3.3×10^7 (rel.)	$k/k_{thym} = 0.0061$	γ–r.	opt.	c.k.	65–0388
		6.8–7	7.5×10^7 (rel.)	k/k_{CNS^-} 0.0068	p.r.	opt.	c.k.	65–0388
		6.5	4.9×10^7 (rel.)	$k/k_{RNO} = 0.0039$	γ–r.	opt.	c.k.	73–0548
3.182	azelaic acid	2–2.2	4.6×10^9 (rel.)	$k/k_{thym} = 0.85 \pm 0.10$	γ–r.	opt.	c.k.	67–0461
3.183	Bacteriophage T_7	—	~5×10^9 (rel.)	—	γ–r.	opt.	c.k. with ferrocyanide; obs. G(ferri).	70–3048
3.184	benzaldehyde	9	4.4×10^9 (rel.)	$k/k_{RNO} = 0.35 \pm 0.03$	γ–r.	opt.	c.k.	69–0280
3.185	benzamide	1	1.5×10^9 (rel.)	$k/k_{Fe^{2+}} = 6.6$	Fenton	chem.	c.k.	49–0003
		9	4.4×10^9 (rel.)	$k/k_{EtOH} = 2.4$	γ–r.	opt.	c.k. with RNO.	66–0441

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.186	benzene	1	7.4×10^8 (rel.)	$k/k_{Fe^{2+}} = 3.2$	Fenton	chem.	c.k.	49–0003
	$OH + C_6H_6 \rightarrow C_6H_6OH$	—	$(4.3 \pm 0.9) \times 10^9$	—	p.r.	opt.	p.b.k. at 313 nm.	62–0020
		3	$(3.3 \pm 0.8) \times 10^9$	—	p.r.	opt.	p.b.k. at 313 nm.	64–0115
		~7	3.7×10^9 (rel.)	$k/k_{I^-} = 0.31 \pm 0.03$	p.r.	opt.	c.k.; obs. I_2^- at 400 nm.	65–0010
		10.5	6.8×10^9 (rel.)	$k/k_{BrO^-} = 1.2$	γ–r.	trac.	c.k.; meas. $^{14}CO_2$.	65–0099
		3	6.3×10^9 (rel.)	$k/k_{BrOH} \cong 1.1$	γ–r.	trac.	c.k.; meas. $^{14}CO_2$.	65–0099
		6–7	5×10^9 (rel.)	$k/k_{CNS^-} = 0.455$	p.r.	opt.	c.k.	65–0387
		~1	2.3×10^9 (rel.)	$k/k_{Fe^{2+}} = 6.7$	γ–r.	chem.	c.k.	66–0645
		2–2.2	5.4×10^9 (rel.)	$k/k_{thym} = 1.00 \pm 0.08$	γ–r.	opt.	c.k.	65–0388, 67–0461
		9	3.2×10^9 (rel.)	$k/k_{RNO} = 0.26$	γ–r.	opt.	c.k.	67–0555
		7	$(7.8 \pm 1.1) \times 10^9$	—	p.r.	opt.	p.b.k. at 313 nm; cor. for (OH + OH) and (H + aromatic).	68–0304
		~1.2	4.8×10^9 (rel.)	$k/k_{2\text{-PrOH}} = 2.2$	γ–r.	chem.	c.k.	68–0602
		6.98	5.1×10^9 (rel.)	$k/k_{2\text{-PrOH}} = 2.3$	γ–r.	chem.	c.k.	68–0602
		9	4.4×10^9 (rel.)	$k/k_{RNO} = 0.35$	γ–r.	opt.	c.k.	69–0280
		7.0	7.5×10^9 (rel.)	$k/k_{PNBA^-} = 2.9$	p.r.	opt.	c.k.; formn. of $PNBA^-$ – OH adduct at 415 nm.	70–0211
		—	8.2×10^9 (rel.)	$k/k_{CNS^-} = 0.745$	p.r.	opt.	c.k.; k lowered in presence of surfactants.	71–0001, 71–0586
		1.7–1.8	4.4×10^9 (rel.)	$k/k_{2\text{-PrOH}} = 2.0$	Fenton	chem.	c.k.	74–9006
		For other ratios see: 3.12, 3.52, 3.66, 3.78, 3.106, 3.667, 3.668, 3.711.						
3.187	benzene–d_6 $OH + C_6D_6 \rightarrow C_6D_6OH$	—	$(4.7 \pm 0.9) \times 10^9$	—	p.r.	opt.	p.b.k. at 313 nm.	62–0020
3.188	benzenesulfonamide	9	2.8×10^9 (rel.)	$k/k_{EtOH} = 1.5$	γ–r.	opt.	c.k. with RNO.	66–0441
		—	2.8×10^9 (rel.)	—	γ–r.	opt.	c.k. with RNO, assuming k(OH + sulfanilic acid) $= 2.93 \times 10^9$.	73–0094
3.189	benzenesulfonate ion $OH + C_6H_5SO_3^- \rightarrow OHC_6H_5SO_3^-$	9	3.0×10^9 (rel.)	$k/k_{EtOH} = 1.6$	γ–r.	opt.	c.k. with RNO.	66–0441
		7	$(4.7 \pm 0.6) \times 10^9$	—	p.r.	opt.	p.b.k. at 315 nm; cor. for (OH + OH) and (H + aromatic).	68–0304
3.190	benzenesulfonic acid	1	1.1×10^9 (rel.)	$k/k_{Fe^{2+}} = 4.7$	Fenton	chem.	c.k.	49–0003
3.191	benzoate ion	6–7	5.5×10^9 (rel.)	$k/k_{CNS^-} = 0.5$	p.r.	opt.	c.k.	65–0387
	$OH + C_6H_5COO^- \rightarrow OHC_6H_5COO^-$	9	4.2×10^9 (rel.)	$k/k_{EtOH} = 2.3$	γ–r.	opt.	c.k. with RNO.	66–0441
		6–9.4	$(6.0 \pm 0.7) \times 10^9$	—	p.r.	opt.	p.b.k. at 330 nm; cor. for (OH + OH) and (H + aromatic).	68–0304
		5.5	6.4×10^9 (rel.)	$k/k_{NB} = 2.0$	r.	opt.	c.k.; obs. formn. of o–nitrophenol.	68–0494
		9	4.6×10^9 (rel.)	$k/k_{RNO} = 0.37 \pm 0.01$	γ–r.	opt.	c.k.	69–0280
		—	3.2×10^9 (rel.)	$k/k_{CNS^-} = 0.29$	p.r.	opt.	c.k.	71–0282
		nat.	5.4×10^9 (rel.)	$k/k_{ferro} = 0.581$	p.r.	opt.	c.k.	71–0578
		—	5.7×10^9	—	p.r.	opt.	p.b.k. at 330 nm.	71–0578
		—	2.5×10^9 (rel.)	—	γ–r.	opt.	c.k. with RNO assuming k(OH + sulfanilic acid) $= 2.93 \times 10^9$.	73–0094
		For other ratios see: 3.12, 3.21, 3.54, 3.66, 3.73, 3.128, 3.131, 3.143, 3.170, 3.186, 3.192, 3.193, 3.248, 3.358, 3.384, 3.406, 3.511, 3.565, 3.607, 3.608, 3.669.						
3.192	benzoic acid $OH + C_6H_5COOH \rightarrow HOC_6H_5COOH$	1	1.6×10^9 (rel.)	$k/k_{Fe^{2+}} = 7.0$	Fenton	chem.	c.k.	49–0003
		3	$(2.1 \pm 0.3) \times 10^9$	—	p.r.	opt.	p.b.k. at 340–350 nm.	64–0115

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.192 cont.		3	5.7×10^9 (rel.)	$k/k_{BzO^-} = 1$	γ–r.	trac.	c.k.; meas. $G(^{14}CO_2)$.	65–0099
		≤ 3	$(4.3 \pm 0.8) \times 10^9$	—	p.r.	opt.	p.b.k. at 340 nm; cor. for (H + BzOH) and (OH + OH)	68–0229
3.193	benzonitrile OH + $C_6H_5CN \rightarrow OHC_6H_5CN$	10.7	3.4×10^9 (rel.)	$k/k_{BzO^-} = 0.59$	γ–r.	trac.	c.k.; meas. $G(^{14}CO_2)$.	65–0099
		9	3.6×10^9 (rel.)	$k/k_{EtOH} = 1.96$	γ–r.	opt.	c.k. with RNO.	66–0441
		7	$(4.9 \pm 0.6) \times 10^9$	—	p.r.	opt.	p.b.k. at 348 nm; cor. for (OH + OH) and (H + aromatic).	68–0304
		6.3	8.5×10^9	—	p.r.	opt.	p.b.k.	70–0657
		—	3.8×10^9 (rel.)	$k/k_{CNS^-} = 0.35$	p.r.	opt.	c.k.	70–0657
3.194	benzophenone	—	$(8.7 \pm 1.5) \times 10^9$	—	p.r.	opt.	p.b.k. at 380 nm.	68–0727
	OH + $C_6H_5COC_6H_5 \rightarrow C_6H_5(OH)COC_6H_5$	—	$(9 \pm 2) \times 10^9$	—	p.r.	opt.	p.b.k. at 330 nm.	75–1125
3.195	benzoquinone	—	1.2×10^9	—	p.r.	opt.	p.b.k.(OH adduct)	67–0121
3.196	benzyl alcohol OH + $C_6H_5CH_2OH \rightarrow OHC_6H_5CH_2OH$	7	$(8.4 \pm 1.2) \times 10^9$	—	p.r.	opt.	p.b.k. at 320 nm; cor. for (OH + OH) and (H + aromatic).	68–0304
		9	4.6×10^9 (rel.)	$k/k_{RNO} = 0.37 \pm 0.02$	γ–r.	opt.	c.k.	69–0280
3.197	benzylammonium ion	4	1.2×10^{10} (rel.)	$k/k_{CNS^-} = 1.14$	p.r.	opt.	c.k.	70–0371
3.198	β–benzylglucoside	~7	4.2×10^{10} (rel.)	$k/k_{CNS^-} = 3.79$	p.r.	opt.	c.k.	71–0480
3.198a	benzyl methyl ether	1.7–1.8	1.2×10^{10} (rel.)	$k/k_{2\text{-PrOH}} = 5.5$	Fenton	chem.	c.k. with 1–phenylethanol.	74–9006
3.199	benzylpenicillin	—	7.1×10^9 (rel.)	$k/k_{PA^-} = 0.9$	γ–r.	opt.	c.k. with RNO.	73–0134
3.200	benzylpenicilloic acid	—	7.1×10^9 (rel.)	$k/k_{PA^-} = 0.9$	γ–r.	opt.	c.k. with RNO.	73–0134
3.201	benzyltrimethyl–ammonium ion	5.0	6.8×10^9 (rel.)	$k/k_{2\text{-PrOH}} = 3.1$	r.	chem.	c.k.	68–0205
3.202	biacetyl OH + $CH_3COCOCH_3 \rightarrow H_2O + CH_2COCOCH_3$	—	1.6×10^8 (rel.)	$k/k_{CNS^-} = 0.015$	p.r.	opt.	c.k.	68–0249
3.202a	biphenyl	—	$(9.0 \pm 1.0) \times 10^9$	—	p.r.	opt.	p.b.k.	75–1096
3.203	4–biphenylcarboxy–late ion	9	6.8×10^9	—	p.r.	opt.	p.b.k.	73–0110
3.204	2,2′–biphenyldi–carboxylate ion (diphenate ion)	9	7.0×10^9	—	p.r.	opt.	p.b.k.	73–0110
3.205	4,4′–biphenyldi–carboxylate ion	9	8.3×10^9	—	p.r.	opt.	p.b.k.	73–0110
3.206	2,2′–bipyridine	9.3	6.2×10^9	—	p.r.	opt.	p.b.k.	71–0582
3.207	4,4′–bipyridine	9.3	5.3×10^9	—	p.r.	opt.	p.b.k.	71–0582
3.208	bromoacetate ion	9	4.4×10^7 (rel.)	$k/k_{EtOH} = 0.024$	γ–r.	opt.	c.k. with RNO.	66–0423
3.209	*p*–bromobenzoate ion	9	3.1×10^9 (rel.)	$k/k_{EtOH} = 1.68$	γ–r.	opt.	c.k. with RNO.	66–0441
3.210	2–bromoethanol	—	7.8×10^8 (rel.)	$k/k_{EtOH} = 0.42$	γ–r.	opt.	c.k. with RNO.	67–0050
3.211	5–bromoindole	9.0	$(1.57 \pm 0.18) \times 10^{10}$ (rel.)	—	γ–r.	opt.	c.k. with RNO; rel. to k(OH + tryptophan) = 1.25×10^{10}.	71–0556
3.212	5–bromoorotate ion	7	3×10^9	—	p.r.	opt.	p.b.k. at 340 nm.	73–0002
		7	6.6×10^9 (rel.)	$k/k_{CNS^-} = 0.6$	p.r.	opt.	c.k.	73–0002
3.212a	1–(*p*–bromo–phenyl)ethanol	1.7–1.8	7.0×10^9 (rel.)	$k/k_{2\text{-PrOH}} = 3.2$	Fenton	chem.	c.k.	74–9006
3.213	*m*–bromophenyl–β–D–glucopyranoside	—	3.2×10^9 (rel.)	—	γ–r.	opt.	c.k. with RNO; k(OH + X) = 4.4×10^9 (X = phenyl–β–D–glucopyranoside) as standard.	71–0056

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.214	2-bromopropionate ion	8.5	2.2×10^8 (rel.)	$k/k_{EtOH} = 0.12$	γ-r.	opt.	c.k. with RNO.	67-0050
3.215	3-bromopropionate ion	8.5	2.2×10^8 (rel.)	$k/k_{EtOH} = 0.12$	γ-r.	opt.	c.k. with RNO.	67-0050
3.216	2-bromopyridine	9	2.4×10^9 (rel.)	$k/k_{RNO} = 0.19 \pm 0.01$	γ-r.	opt.	c.k.	69-0280
3.217	3-bromopyridine	9	1.1×10^9 (rel.)	$k/k_{RNO} = 0.09 \pm 0.01$	γ-r.	opt.	c.k.	69-0280
3.218	α-bromotetronate ion $OH + C_4H_2BrO_3^- \rightarrow HBr + C_4H_2O_4^-$	7	7.7×10^9	—	p.r.	opt.	d.k. at 258 nm as well as p.b.k. at 360 nm.	74-1053
3.219	5-bromouracil (BU)	9	4.2×10^9 (rel.)	$k/k_{RNO} = 0.34$	r.	opt.	c.k.	67-0555
	$OH + BU \rightarrow BUOH$	7.0	3.6×10^9	—	p.r.	opt.	p.b.k. at 335 nm; complex kinetics.	69-0558
		7	4.0×10^9 (rel.)	$k/k_{CNS^-} = 0.364$	p.r.	opt.	c.k.	72-0049
		7	5.6×10^9	—	p.r.	opt.	p.b.k. at 340 nm.	72-0049
		11	5.8×10^9	—	p.r.	opt.	p.b.k. at 340 nm.	72-0049
3.220	1,3-butadiene	—	7.7×10^9 (rel.)	$k/k_{I^-} = 0.64$	p.r.	opt.	c.k.; obs. formn. of I_2^- at 400 nm.	67-0041
3.221	1,2-butanediol	1	4.4×10^6 (rel.)	$k/k_{Fe^{2+}} = 0.019$	therm.	chem.	c.k.; persulfate oxidation.	49-0002
3.222	1,3-butanediol	7	2.2×10^9 (rel.)	$k/k_{CNS^-} = 0.197$	p.r.	opt.	c.k.	65-0387
		9	2.4×10^9 (rel.)	$k/k_{EtOH} = 1.3$	γ-r.	opt.	c.k. with RNO.	66-0423
3.223	1,4-butanediol	7	3.2×10^9 (rel.)	$k/k_{CNS^-} = 0.29$	p.r.	opt.	c.k.	65-0387
		9	3.0×10^9 (rel.)	$k/k_{EtOH} = 1.6$	γ-r.	opt.	c.k. with RNO.	66-0423
3.224	2,3-butanediol	1	2.3×10^6 (rel.)	$k/k_{Fe^{2+}} = 0.010$	therm.	chem.	c.k.; persulfate oxidation.	49-0002
	(I) $OH + (MeCHOH)_2 \rightarrow$ MeCHOHCOHMe + H_2O	7	1.3×10^9 (rel.)	$k/k_{CNS^-} = 0.12$	p.r.	opt.	c.k.	65-0387
		—	—	$k_{II}/k_I = 0.41$	p.r.	opt.	detd. % α-alcohol radical by reaction with TNM; ≤ 0.1% alkoxy radical detd. by reaction with I^-	73-0126
	(II) $OH + (MeCHOH)_2 \rightarrow CH_2CHOHCHOHMe + H_2O$							
3.225	1-butanol	2-2.2	4.6×10^9 (rel.)	$k/k_{thym} = 0.85 \pm 0.08$	γ-r.	opt.	c.k.	67-0461
	(I) $OH + C_3H_7CH_2OH \rightarrow H_2O +$ C_3H_7CHOH	5-5.5	4.6×10^9 (rel.)	$k/k_{thym} = 0.85 \pm 0.10$	γ-r.	opt.	c.k.	67-0461
	(34%, 69-0522)	7	4.0×10^9 (rel.)	$k/k_{carb} = 11$	p.r.	opt.	c.k.	65-0190
	(II) $OH + C_3H_7CH_2OH \rightarrow H_2O +$ $CH_3CH_2CHCH_2OH$ nat. $+CH_3CHCH_2CH_2OH$ $+CH_2CH_2CH_2CH_2OH$	7	3.7×10^9 (rel.)	$k/k_{CNS^-} = 0.34$	p.r.	opt.	c.k.	65-0387
		9	3.7×10^9 (rel.)	$k/k_{EtOH} = 2$	γ-r.	opt.	c.k. with RNO.	66-0423
		nat.	4.0×10^9 (rel.)	$k/k_{ferro} = 0.43$	p.r.	opt.	c.k.	71-0578
		—	—	$k_{III}/k_I \leq 0.1$ $k_{II}/k_I = 1.4$	p.r.	opt.	detd. % α-alcohol and alkoxy radicals by reaction with TNM and I^-, resp.	73-0126
	(III) $OH + C_3H_7CH_2OH \rightarrow H_2O + C_3H_7CH_2O$	—	6×10^8 (rel.)	$k/k_{MeOH} = 0.62$	Ti(III) + H_2O_2	esr	c.k.	73-5253
			For other ratios see:	3.310.				
3.226	2-butanol	2-2.2	2.7×10^9 (rel.)	$k/k_{thym} = 0.50 \pm 0.05$	γ-r.	opt.	c.k.	67-0461
	$OH + C_2H_5CHOHCH_3 \rightarrow H_2O +$ $C_2H_5COHCH_3$ (53%, 69-0522) + $CH_3CHCHOHCH_3$, etc.	7	3.1×10^9 (rel.)	$k/k_{CNS^-} = 0.28$	p.r.	opt.	c.k.	65-0387
		9	2.4×10^9 (rel.)	$k/k_{EtOH} = 1.3$	γ-r.	opt.	c.k. with RNO.	66-0423
	tert-butanol	*See* 2-methyl-2-propanol (3.546).						
3.227	2-butanone	6-7	9.0×10^8 (rel.)	$k/k_{CNS^-} = 0.082$	p.r.	opt.	c.k.	65-0387

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.228	1–butene	—	7.7×10^9 (rel.)	$k/k_{I^-} = 0.64$	p.r.	opt.	c.k.; obs. formn. of I_2^- at 400 nm.	67–0041
3.229	1–butene–3–one	—	8.5×10^9 (rel.)	$k/k_{CNS^-} = 0.77$	p.r.	opt.	c.k.	70–0165
3.230	*N*–*tert*–butylacetamide	5–6	1.1×10^9 (rel.)	$k/k_{CNS^-} = 0.103 \pm 0.01$	p.r.	opt.	c.k.	71–0414
	tert–butyl alcohol	*See* 2–methyl–2–propanol (3.546).						
3.231	butylamine	—	7.3×10^9 (rel.) 8.3×10^9 (rel.) 5.4×10^9 (rel.)	$k/k_{ferro} = 0.79$ $k/k_{CNS^-} = 0.75$ $k/k_{NB} = 1.7$	p.r.	opt.	c.k.; calcd. from obs. values at pH 8–13.1.	73–0016
3.232	*tert*–butylamine $OH + (CH_3)_3CNH_2 \rightarrow H_2O + \cdot CH_2(CH_3)_2CNH_2 + (CH_3)_3CNH$	12	6.0×10^9 (rel.)	—	p.r.	opt.	c.k., extrapolated value based on $k/k_{CNS^-} = 3.64 \times 10^{-1}$ (obs.) at pH 10.9.	71–0585
3.233	butylammonium ion	4	5.5×10^9 (rel.)	$k/k_{CNS^-} = 0.5$	p.r.	opt.	c.k.	70–0371
		—	2.8×10^9 (rel.) 3.1×10^9 (rel.) 2.05×10^9 (rel.)	$k/k_{ferro} = 0.3$ $k/k_{CNS^-} = 0.28$ $k/k_{NB} = 0.64$	p.r.	opt.	c.k.; calcd. from obs. values at pH 8–13.1.	73–0016
3.234	*tert*–butylammonium ion $OH + (CH_3)_3CNH_3^+ \rightarrow H_2O + \cdot CH_2(CH_3)_2CNH_3^+$	4	2.4×10^8 (rel.)	$k/k_{CNS^-} = 0.022$	p.r.	opt.	c.k.	70–0371
		3.2	7.0×10^8 (rel.)	$k/k_{CNS^-} = 0.0636$	p.r.	opt.	c.k.	71–0585
	butyleneoxide–1,2	*See* 1,2–epoxybutane (3.352).						
3.235	*tert*–butyl mercaptan $OH + (CH_3)_3CSH \rightarrow H_2O + (CH_3)_3CS$	7	1.9×10^{10} (rel.)	$k/k_{CNS^-} = 1.7$	p.r.	opt.	c.k.	69–0553
3.236	*p*–*tert*–butylphenol	9	1.9×10^{10} (rel.)	$k/k_{RNO} = 1.49 \pm 0.26$	γ–r.	opt.	c.k.	72–0837
3.237	butyraldehyde	2.0	3.8×10^9 (rel.)	$k/k_{CNS^-} = 0.35$	p.r.	opt.	c.k.	65–0387
3.238	butyrate ion	9	1.85×10^9 (rel.)	$k/k_{EtOH} = 1$	γ–r.	opt.	c.k. with RNO.	66–0423
3.239	butyric acid	1	1.6×10^8 (rel.)	$k/k_{Fe^{2+}} = 0.72$	Fenton	chem.	c.k.	49–0002
		2–2.2	1.9×10^9 (rel.)	$k/k_{thym} = 0.35 \pm 0.03$	γ–r.	opt.	c.k.	67–0461
3.240	carbon disulfide $OH + CS_2 \rightarrow CS_2OH \rightleftharpoons CSO^- + H^+$	7.6	8.0×10^9 (rel.)	$k/k_{CNS^-} = 0.73$	p.r.	opt.	c.k.; meas. abs. increase at 280 nm (CS_2OH) or at 500 nm.	67–0687, 73–1015
3.241	carboxymethylcellulose (polyanion)	—	2.6×10^9 (rel.)	$k/k_{CNS^-} = 0.24$	p.r.	opt.	c.k.; concn. in monomer units.	68–0352
3.242	carboxypeptidase A	7.8	$(6.9 \pm 1.0) \times 10^{10}$	—	p.r.	opt.	p.b.k. at 320 nm; contains ~ 15% H reaction product.	73–1060
3.243	catalase	—	1.4×10^{11} (rel.)	$k/k_{CNS^-} = 12.58$	p.r.	opt.	c.k.; mol. wt. ≅ 2.5×10^5.	66–0499
3.244	cellobiose	6.5	3.6×10^9 (rel.)	$k/k_{RNO} = 0.29 \pm 0.01$	γ–r.	opt.	c.k.	69–0580
3.245	chloral hydrate	1	1.1×10^9 (rel.)	$k/k_{Fe^{2+}} = 4.7$	Fenton	chem.	c.k.	49–0002
	$OH + CCl_3CH(OH)_2 \rightarrow H_2O + CCl_3C(OH)_2$	—	3.15×10^9 (rel.)	$k/k_{CNS^-} = 0.285$	p.r.	opt.	c.k.	73–0062
3.246	chloroacetate ion	9	5.5×10^7 (rel.)	$k/k_{EtOH} = 0.0296$	γ–r.	opt.	c.k. with RNO.	66–0423
	(I) $OH + ClCH_2COO^- \rightarrow H_2O + ClCHCOO^-$ (II) $OH + ClCH_2COO^- \rightarrow Cl^- +$ products	6.5	6×10^9 (I) (rel.) 1.5×10^8 (II) (rel.)	$k_I/k_{II} \cong 4.0$ $k_{II}/k_{MeOH} \cong 0.08$	γ–r.	chem.	c.k.	69–0422

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.247	chloroacetic acid	2–2.2	8.1×10^7 (rel.)	$k/k_{thym} = 0.015 \pm 0.0015$	γ–r.	opt.	c.k.	67–0461
		1	4.3×10^7 (rel.)	$k/k_{CNS^-} = 0.00394$	p.r.	opt.	c.k.	65–0387
		~0	—	$k/k_{acrylamide} = 0.012$	Fenton	pol.	c.k.	72–9162
3.248	chlorobenzene	10.7	6.3×10^9 (rel.)	$k/k_{BzO^-} = 1.10$	γ–r.	trac.	c.k.; meas. $^{14}CO_2$.	65–0099
		9	4.5×10^9 (rel.)	$k/k_{RNO} = 0.36 \pm 0.05$	γ–r.	opt.	c.k.	69–0280
3.248a	*o*–chlorobenzoate ion	7	6.8×10^9 (rel.)	$k/k_{2\text{-PrOH}} = 3.1$	γ–r.	chem.	c.k.	74–0167
3.248b	*m*–chlorobenzoate ion	7	6.3×10^9 (rel.)	$k/k_{2\text{-PrOH}} = 2.8$	γ–r.	chem.	c.k.	74–0167
3.249	*p*–chlorobenzoate ion	9	3.2×10^9 (rel.)	$k/k_{EtOH} = 1.75$	γ–r.	opt.	c.k. with RNO.	66–0441
	$OH + ClC_6H_4COO^- \rightarrow Cl(OH)C_6H_4COO^-$	6–9.4	$(5.0 \pm 0.8) \times 10^9$	—	p.r.	opt.	p.b.k. at 345 nm; cor. for (OH + OH) and (H + aromatic).	68–0304
		7	7.3×10^9 (rel.)	$k/k_{2\text{-PrOH}} = 3.3$	γ–r.	chem.	c.k.	74–0167
3.250	2–chloroethanol	—	9.25×10^8 (rel.)	$k/k_{EtOH} = 0.5$	γ–r.	opt.	c.k. with RNO.	67–0050
3.251	chloroform	0.4	1.0×10^7 (rel.)	$k/k_{Fe^{2+}} = 0.043$	β–r.	chem.	c.k.	60–0016
	$OH + CHCl_3 \rightarrow H_2O + CCl_3$	0.4	5.3×10^6 (rel.)	$k/k_{Fe^{2+}} = 0.023$	Fenton	chem.	c.k.	60–0016
		9	1.4×10^7 (rel.)	$k/k_{EtOH} = 0.0077$	γ–r.	opt.	c.k. with RNO.	66–0423
		—	7.4×10^6 (rel.)	—	r.	chem.	c.k. with Fe^{2+}.	66–9002
		5.5–5.8	~ 5×10^6 (rel.)	—	γ–r.	chem.	est. from effect of Fe^{2+} on $G(Cl^-)$.	70–0013
3.252	5–chloroindole	9.0	$(1.91 \pm 0.04) \times 10^{10}$ (rel.)	—	γ–r.	opt.	c.k. with RNO; rel. to $k(OH + tryptophan) = 1.25 \times 10^{10}$.	71–0556
3.253	*m*–chlorophenol	9	7.2×10^9 (rel.)	$k/k_{RNO} = 0.58 \pm 0.05$	γ–r.	opt.	c.k.	72–0837
3.254	*o*–chlorophenol	9	8.2×10^9 (rel.)	$k/k_{RNO} = 0.66 \pm 0.12$	γ–r.	opt.	c.k.	72–0837
3.255	*m*–chlorophenyl–β–D–glucopyranoside	—	3.2×10^9 (rel.)	—	γ–r.	opt.	c.k. with RNO; rel. to phenyl–β–D–glucopyranoside (X); $k(OH + X) = 4.4 \times 10^9$.	71–0056
3.256	*p*–chlorophenyl–β–D–glucopyranoside	—	3.4×10^9 (rel.)	—	γ–r.	opt.	c.k. with RNO; relative to phenyl–β–D–glucopyranoside (X); $k(OH + X) = 4.4 \times 10^9$.	71–0056
		—	5.7×10^9 (rel.)	$k/k_{CNS^-} = 0.515$	p.r.	opt.	c.k.	71–0056
3.257	2–chloropropionate ion	8.5	2.4×10^8 (rel.)	$k/k_{EtOH} = 0.13$	γ–r.	opt.	c.k. with RNO.	67–0050
3.258	3–chloropropionate ion	8.5	3.1×10^8 (rel.)	$k/k_{EtOH} = 0.17$	γ–r.	opt.	c.k. with RNO.	67–0050
3.259	2–chloropyridine	9	1.75×10^9 (rel.)	$k/k_{RNO} = 0.14 \pm 0.01$	γ–r.	opt.	c.k.	69–0280
3.260	4–chloropyridine	9	3.1×10^9 (rel.)	$k/k_{RNO} = 0.25 \pm 0.01$	γ–r.	opt.	c.k.	69–0280
3.261	chlorotrifluoromethane	—	~ 5×10^8 (rel.)	—	—	—	c.k. with BzO^-; cited from unpubl. data.	70–0407
3.262	5–chlorouracil	7	5.2×10^9 (rel.)	$k/k_{CNS^-} = 0.472$	p.r.	opt.	c.k.	72–0049
		7	5.5×10^9	—	p.r.	opt.	p.b.k. at 340 nm.	72–0049
		11	5.8×10^9	—	p.r.	opt.	p.b.k. at 340 nm.	72–0049
3.263	chondroitin 4–sulfate l	—	8.0×10^8 (rel.)	$k/k_{CNS^-} = 0.073$	p.r.	opt.	c.k.; concn. of polyanion in hexose units.	70–3081
3.264	chondroitin 6–sulfate l	—	6.8×10^8 (rel.)	$k/k_{CNS^-} = 0.062$	p.r.	opt.	c.k.; concn. in hexose units.	70–3081

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.265	α–chymotrypsin	6.6	3.5×10^{10} (rel.)	$k/k_{RNO} = 2.8$	γ–r.	opt.	c.k.	73–0548
3.266	citric acid	2–2.2	5.4×10^{8} (rel.)	$k/k_{thym} = 0.10 \pm 0.051$	γ–r.	opt.	c.k.	67–0461
		1	5.0×10^{7} (rel.)	$k/k_{CNS^-} = 0.00455$	p.r.	opt.	c.k.	65–0387
3.267	collagen	—	4.0×10^{11} (rel.)	—	p.r.	opt.	c.k. with CNS^-; reference rate not given; mol. wt. 360,000.	68–3007
3.268	*o*–cresol	9	1.1×10^{10} (rel.)	$k/k_{RNO} = 0.90 \pm 0.15$	γ–r.	opt.	c.k.	72–0837
3.269	*p*–cresol	9	1.3×10^{10} (rel.)	$k/k_{RNO} = 1.04 \pm 0.09$	γ–r.	opt.	c.k.	72–0837
		5.5	$(1.2 \pm 0.2) \times 10^{10}$ (rel.)	$k/k_{CNS^-} = 1.1$	p.r.	opt.	c.k.	73–0003
3.270	crotonaldehyde	—	5.8×10^{9} (rel.)	$k/k_{CNS^-} = 0.53$	p.r.	opt.	c.k.	70–0165
3.271	crotonic acid	1	2.7×10^{9} (rel.)	$k/k_{MeOH} = 2.96$	Fenton	chem.	c.k.; $k_{MeOH}/k_{Fe^{2+}} = 4.3$.	73–9341
3.272	cyanoacetate ion	9	1.6×10^{7} (rel.)	$k/k_{EtOH} = 0.0084$	γ–r.	opt.	c.k. with RNO.	66–0423
3.272a	cyanocobalamin	—	6.5×10^{9}	—	p.r.	opt.	p.b.k. at 310–330 nm.	74–1105
3.273	5–cyanoindole	9.0	$(1.06 \pm 0.24) \times 10^{10}$ (rel.)	—	γ–r.	opt.	c.k. with RNO; rel. to k(OH + tryptophan) $= 1.25 \times 10^{10}$.	71–0556
3.274	1–(*p*–cyanophenyl)–ethanol	1.7–1.8	3.3×10^{9} (rel.)	$k/k_{RNO} = 1.3$	Fenton	chem.	c.k. with 1–phenylethanol.	74–9006
3.275	*p*–cyanophenyl–β–D–glucopyranoside	—	3.5×10^{9} (rel.)	—	γ–r.	opt.	c.k. with RNO; rel. to k(OH + X) $= 4.4 \times 10^{9}$, X = phenyl–β–D–glucopyranoside.	71–0056
3.276	cyclobutanecarboxylate ion	9	3.0×10^{9} (rel.)	$k/k_{EtOH} = 1.6$	γ–r.	opt.	c.k. with RNO.	66–0423
3.277	cycloheptanol	1.7–1.8	2.0×10^{9} (rel.)	$k/k_{2\text{-PrOH}} = 0.91$	Fenton	chem.	c.k.	74–9006
3.278	cycloheptanol–1–*d*	1.7–1.8	1.5×10^{9} (rel.)	$k/k_{2\text{-PrOH}} = 0.70$	Fenton	chem.	c.k. with 1–phenylethanol.	74–9006
3.279	cycloheptatriene	—	$(7 \pm 2) \times 10^{9}$ (rel.)	—	p.r.	opt.	c.k. with CNS^-; reference rate not given.	71–0710
3.280	1,3–cyclohexadiene $OH + C_6H_8 \rightarrow H_2O + C_6H_7$ and C_6H_8OH	7.0	1×10^{10} (rel.)	$k/k_{PNBA^-} = 3.8$	p.r.	opt.	c.k., formn. of $PNBA^-$–OH adduct at 415 nm; 30% H abstraction.	70–0211
3.281	1,4–cyclohexadiene $OH + C_6H_8 \rightarrow H_2O + C_6H_7$ and C_6H_8OH	7.0	7.7×10^{9} (rel.)	$k/k_{PNBA^-} = 2.96$	p.r.	opt.	c.k.; formn. of $PNBA^-$–OH adduct at 415 nm; 45% H abstraction.	70–0211
3.282	cyclohexanecarboxylate ion	9	5.4×10^{9} (rel.)	$k/k_{EtOH} = 2.9$	γ–r.	opt.	c.k. with RNO.	66–0423
3.283	*trans*–1,2–cyclohexanediaminetetraacetic acid	~0	—	$k/k_{acrylamide} = 2.0$	Fenton	pol.	c.k.	72–9162
3.284	cyclohexene $OH + C_6H_{10} \rightarrow H_2O + C_6H_9$	7.0	8.8×10^{9} (rel.)	$k/k_{PNBA^-} = 3.4$	p.r.	opt.	c.k.; formn. of $PNBA^-$–OH adduct at 415 nm.	70–0211

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.285	cyclohexylammonium ion	4	1.0×10^{10} (rel.)	$k/k_{CNS^-} = 0.96$	p.r.	opt.	c.k.	70–0371
3.286	cyclopentane $OH + C_5H_{10} \rightarrow H_2O + C_5H_9$	—	3.0×10^9 (rel.)	$k/k_{PNBA^-} = 1.15$	p.r.	opt.	c.k.	74–1052
3.287	cyclopentanecarboxylate ion	9	4.1×10^9 (rel.)	$k/k_{EtOH} = 2.2$	γ–r.	opt.	c.k. with RNO.	66–0423
3.288	cyclopentene	—	7.0×10^9 (rel.)	$k/k_{CNS^-} = 0.64$	p.r.	opt.	c.k.	74–1052
3.289	cysteamine (cyst)	1.4	1.6×10^{10} (rel.)	$k/k_{CNS^-} = 1.44$	p.r.	opt.	c.k.	67–0554
	OH +	6.5, 9	1.4×10^{10} (rel.)	$k/k_{CNS^-} = 1.29$	p.r.	opt.	c.k.	67–0554
	$NH_2CH_2CH_2SH \rightarrow NH_2CH_2CH_2S + H_2O$	1	1.9×10^{10} (rel.)	$k/k_{thym} = 3.5$	Fenton	esr	c.k.; $k/k_{perox} = 251$.	69–5278
		—	—	$k/k_{uracil} = 3.45$	p.r.	esr	c.k.	72–3003
			For other ratios see: 3.627.					
3.290	cysteine	1	1.3×10^{10} (rel.)	$k/k_{CNS^-} = 1.2$	p.r.	opt.	c.k.	65–0387
		2–2.2	5.9×10^9 (rel.)	$k/k_{thym} = 1.10 \pm 0.10$	γ–r.	opt.	c.k.	67–0461
		—	*ca.* 3.4×10^9	—	p.r.	opt.	p.b.k.	69–0638
		1	8.5×10^9 (rel.)	$k/k_{thym} = 1.53$	Fenton	esr	c.k.; $k/k_{perox} = 112$.	69–5278
		7	4.0×10^{10} (rel.)	$k/k_{thym} = 7.42$	p.r.	esr	c.k.	72–3003
		7	—	$k/k_{uracil} = 6.21$	p.r.	esr	c.k.	72–3003
		0.4	1.7×10^{10} (rel.)	$k/k_{CNS^-} = 1.5$	p.r.	opt.	c.k.; ± 15%;	73–0090
		5.8	1.9×10^{10} (rel.)	$k/k_{CNS^-} = 1.7$			not cor. for	
		9.8	1.8×10^{10} (rel.)	$k/k_{CNS^-} = 1.6$			ionization; pK_a =	
		10.8	1.8×10^{10} (rel.)	$k/k_{CNS^-} = 1.6$			1.8, 8.3, 10.8.	
3.291	cystine	2	—	$k/k_{Cl^-} = 24$	γ–r.	chem.	c.k.	63–0127
		2–2.2	6.5×10^9 (rel.)	$k/k_{thym} = 1.03$	γ–r.	opt.	c.k.	65–0388
		—	*ca.* $3–4 \times 10^9$	—	p.r.	opt.	p.b.k.	69–0638
		1	9.6×10^9 (rel.)	$k/k_{thym} = 1.76$	Fenton	esr	c.k.; $k/k_{perox} = 130$.	69–5278
		6.5	2.1×10^9 (rel.)	$k/k_{RNO} = 0.168$	γ–r.	opt.	c.k.	73–0548
3.292	cytidine	2–2.2	3.3×10^9 (rel.)	$k/k_{CNS^-} = 0.303$	p.r.	opt.	c.k.	65–0388
		5.2–5.4	5×10^9 (rel.)	$k/k_{CNS^-} = 0.45$	p.r.	opt.	c.k.	65–0388
		7.2–7.4	4.6×10^9 (rel.)	$k/k_{CNS^-} = 0.42$	p.r.	opt.	c.k.	65–0388
		5.6	$(6.4 \pm 0.2) \times 10^4$	—	p.r.	opt.	p.b.k. at 350 nm.	70–3069
		7	5.8×10^9	—	p.r.	opt.	p.b.k. (OH addn.)	73–1071
3.293	cytidine–5′–phosphate	2–2.2	2.5×10^9 (rel.)	$k/k_{CNS^-} = 0.23$	p.r.	opt.	c.k.	65–0388
		7.4–7.6	4.4×10^9 (rel.)	$k/k_{CNS^-} = 0.4$	p.r.	opt.	c.k.	65–0388
	(5′–cytidylic acid)	7.3	$(4.9 \pm 0.2) \times 10^9$	—	p.r.	opt.	p.b.k. at 425 nm.	70–3069
		7	4.7×10^9	—	p.r.	opt.	p.b.k. at 425 nm (OH adduct).	73–1071
3.294	cytochrome C	5–10	—	$k/k_{hydr} = 500$	X–r.	chem.	c.k.	62–3002
	(ferri)	—	5.5×10^{10} (rel.)	$k/k_{Tl^+} = 5.5$	γ–r.	opt.	c.k.; absorbance change at 550 nm; assume $k_{Tl^+} = 10^{10}$; $k(OH + Fe^{2+}cytC) = 4.6 \times 10^{10}$	67–3020
		—	1.4×10^{10}	—	p.r.	opt.	p.b.k. at 550 nm; cor. for H + H, H + OH, H + cyt C by computer anal.	72–1002
		5.4, 7	2.7×10^{10} (rel.)	$k/k_{thym} = 5 \pm 1$	γ–r.	opt.	c.k.	72–3071
		6.3	6.1×10^{10} (rel.)	$k/k_{RNO} = 4.1$	γ–r.	opt.	c.k.	73–0548
3.295	cytosine	2–2.2	3.1×10^9 (rel.)	$k/k_{CNS^-} = 0.28$	p.r.	opt.	c.k.	65–0388
		5–6	4.5×10^9 (rel.)	$k/k_{CNS^-} = 0.41$	p.r.	opt.	c.k.	65–0388
		7.4–7.6	4.9×10^9 (rel.)	$k/k_{CNS^-} = 0.447$	p.r.	opt.	c.k.	65–0388
		11.4	$\geq 7 \times 10^9$	—	p.r.	opt.	p.b.k. at 335 nm.	68–0597

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.295 cont.		5.8	$(6.2 \pm 0.4) \times 10^9$	—	p.r.	opt.	p.b.k. at 450 nm.	70–3069
		7	$(6.8 \pm 0.5) \times 10^9$	—	p.r.	opt.	p.b.k.	73–1071
		6–7	4.0×10^9 (rel.)	$k/k_{RNO} = 0.32$	γ–r.	opt.	c.k.; 17°C.	75–0294
3.296	deoxyadenylic acid	2–2.2	1.4×10^9 (rel.)	$k/k_{CNS^-} = 0.124$	p.r.	opt.	c.k.	65–0388
		6.4–6.6	3.5×10^9 (rel.)	$k/k_{CNS^-} = 0.32$	p.r.	opt.	c.k.	65–0388
3.297	deoxycytidylic acid	2–2.2	3.0×10^9 (rel.)	$k/k_{CNS^-} = 0.27$	p.r.	opt.	c.k.	65–0388
		4.3–4.5	3.8×10^9 (rel.)	$k/k_{CNS^-} = 0.35$	p.r.	opt.	c.k.	65–0388
		6.7–7	5.0×10^9 (rel.)	$k/k_{CNS^-} = 0.455$	p.r.	opt.	c.k.	65–0388
		7	4.9×10^9	—	p.r.	opt.	p.b.k.	73–1071
3.298	deoxyguanylic acid	2–2.2	4.6×10^9 (rel.)	$k/k_{CNS^-} = 0.42$	p.r.	opt.	c.k.	65–0388
		6.5–7	6.8×10^9 (rel.)	$k/k_{CNS^-} = 0.62$	p.r.	opt.	c.k.	65–0388
3.299	deoxyribose	—	1.9×10^9	—	—	—	—	66–0845
3.300	2–deoxy–2–sulfo–amino–D–glucose	—	2.1×10^9 (rel.)	$k/k_{CNS^-} = 0.192$	p.r.	opt.	c.k.	70–3081
3.301	dextran	7	$> 10^9$ (rel.)	—	p.r.	opt.	c.k. with CNS^-, BzO^-, RNO; k varies with chain length; k per monomer unit.	70–0394
	diamide *See* N,N,N′,N′–tetramethyl–1,2–diazenedicarboxamide (3.696).							
3.301a	di–*tert*–butyl disulfide $OH + C_4H_9SSC_4H_9 \rightarrow OH^- + RSSR^+$	—	$(6.5 \pm 1.5) \times 10^9$	—	p.r.	opt.	p.b.k.	75–1089
3.302	1,1–dichloroethyl–ene $OH + CH_2{=}CCl_2 \rightarrow CH_2OHCCl_2$	—	$(4.1 \pm 0.4) \times 10^9$ (rel.)	—	p.r.	opt.	c.k. with CNS^-; reference rate not given.	71–0709
3.303	1,2–dichloroethyl–ene $OH + CHCl{=}CHCl \rightarrow CHCl(OH)CHCl$	—	$(5.0 \pm 0.4) \times 10^9$	—	p.r.	condy.	p.b.k. (Cl^-); ($CHClOHCHCl \rightarrow H^+ + Cl^- + CHOCHCl$).	71–0709
		—	$(4.4 \pm 0.4) \times 10^9$ (rel.)	—	p.r.	opt.	c.k. with CNS^-; reference rate not given.	71–0709
3.304	1,4–dicyano–benzene $OH + C_6H_4(CN)_2 \rightarrow C_6H_4OH(CN)_2$	—	$(7.2 \pm 0.7) \times 10^8$ (rel.)	$k/k_{MeOH} = 0.8$	p.r.	opt.	c.k.; obs. buildup of OH adduct at 370 nm.	73–0121
3.305	1,2–diethoxy–ethane	9	2.2×10^9 (rel.)	$k/k_{EtOH} = 1.2$	γ–r.	opt.	c.k. with RNO.	66–0423
3.306	diethoxymethane	9	1.6×10^9 (rel.)	$k/k_{EtOH} = 0.84$	γ–r.	opt.	c.k. with RNO.	66–0423
3.307	diethylammonium ion	1	9.2×10^7 (rel.)	$k/k_{Fe^{2+}} = 0.4$	Fenton	chem.	c.k.	49–0002
3.307a	diethyl disulfide $OH + C_2H_5SSC_2H_5 \rightarrow OH^- + RSSR^+$	—	$(1.4 \pm 0.5) \times 10^{10}$	—	p.r.	opt.	p.b.k.	75–1089
3.308	diethyleneglycol	9	2.0×10^9 (rel.)	$k/k_{EtOH} = 1.1$	γ–r.	opt.	c.k. with RNO.	66–0423
3.309	diethyleneglycol diethyl ether	9	3.1×10^9 (rel.)	$k/k_{EtOH} = 1.7$	γ–r.	opt.	c.k. with RNO.	66–0423
3.310	diethylenetri–aminepentaacetic acid $OH + DTPA \rightarrow H_2O + CO_2 +$ prod.	6.0	1.6×10^9 (rel.)	$k/k_{ferro} = 0.17$ $k/k_{BuOH} = 1.36$ $k/k_{t\text{-}BuOH} = 8.6$	γ–r.	chem.	c.k.; obs. G(–DTPA).	72–0169
3.311	diethyl malonate	6–7	6.5×10^8 (rel.)	$k/k_{CNS^-} = 0.0591$	p.r.	opt.	c.k.	65–0387
3.312	diethyl succinate	6–7	7.8×10^8 (rel.)	$k/k_{CNS^-} = 0.071$	p.r.	opt.	c.k.	65–0387
3.313	1,2–difluoroben–zene	—	4.5×10^9 (rel.)	—	p.r.	opt.	c.k. with CNS^-; reference rate not given.	73–0054

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.314	1,4–difluoroben–zene	—	6×10^9 (rel.)	—	p.r.	opt.	c.k. with CNS^-; reference rate not given.	73–0054
3.315	dihydro–6–methyl–uracil	—	2.3×10^9	—	p.r.	opt.	p.b.k. at 500 nm; true rate should be lower.	74–1085
		—	1×10^9	—	p.r.	opt.	c.k. with *tert*–BuOH, CNS^- and EtOH.	74–1085
3.316	dihydroorotate ion	7	3.0×10^9	—	p.r.	opt.	p.b.k. (OH adduct).	70–0567
3.317	5,6–dihydrothy–mine	~7	2.2×10^9	—	p.r.	opt.	p.b.k.; obs. transients at 400 (pH = 7) and 320 (pH = 12.4) nm.	68–0312
		~12.4	0.4×10^9	—				
		7	1.6×10^9	—	—	—	cited from 69–0012.	70–0567
		—	$<2.2 \times 10^9$	—	p.r.	opt.	p.b.k. at 500 nm.	74–1085
		6–8	1.5×10^9 (rel.)	$k/k_{RNO} = 0.12$	γ–r.	opt.	c.k.; 17°C.	75–0294
3.318	dihydrouracil	7	$< (2.1 \pm 0.5) \times 10^9$	—	p.r.	opt.	p.b.k. at 420 nm.	69–0571
		7	$(1.2 \pm 0.2) \times 10^9$ (rel.)	$k/k_{CNS^-} = (0.11 \pm 0.02)$	p.r.	opt.	c.k.; cor. for incomplete scavenging of e^-_{aq} by H_2O_2.	69–0571
		7	1.3×10^9	—	—	—	cited from 69–0012.	70–0567
		—	$<2.0 \times 10^9$	—	p.r.	opt.	p.b.k. at 500 nm.	74–1085
	m–dihydroxybenzene	*See* *m*–hydroxyphenol (3.455).						
	o–dihydroxybenzene	*See* *o*–hydroxyphenol (3.456).						
	p–dihydroxybenzene	*See* hydroquinone (3.446).						
3.319	2,5–dihydroxy–2,5–dimethyl–3–hexyne	1	3.1×10^9 (rel.)	$k/k_{MeOH} = 3.38$	Fenton	chem.	c.k.; $k_{MeOH}/k_{Fe^{2+}} = 4.3$.	73–9350
3.320	4,5–dihydroxy–2,7–naphthalenedi–sulfonic acid	0.1	8.5×10^7 (rel.)	$k/k_{Fe^{2+}} = 0.37$	γ–r.	chem.	c.k.	67–0025
3.320a	1,2–dimethoxyben–zene	—	$(5.2 \pm 0.5) \times 10^9$	—	p.r.	—	—	75–1171
3.320b	1,3–dimethoxyben–zene	—	$(7.2 \pm 0.7) \times 10^9$	—	p.r.	—	—	75–1171
3.320c	1,4–dimethoxyben–zene	—	$(7.0 \pm 0.7) \times 10^9$	—	p.r.	—	—	75–1171
3.321	1,2–dimethoxyethane	9	1.6×10^9 (rel.)	$k/k_{EtOH} = 0.85$	γ–r.	opt.	c.k. with RNO.	66–0423
3.322	dimethoxymethane	9	5.7×10^8 (rel.)	$k/k_{EtOH} = 0.31$	γ–r.	opt.	c.k. with RNO.	66–0423
3.323	*N*,*N*–dimethyl–acetamide $OH + CH_3CON(CH_3)_2 \rightarrow H_2O + CH_3CON(CH_3)CH_2$	5.5	3.5×10^9 (rel.)	$k/k_{CNS^-} = 0.32$	p.r.	opt.	c.k.	70–0098, 71–0645
3.324	dimethylammonium ion (I) $OH + (CH_3)_2NH_2^+ \rightarrow H_2O + (CH_3)_2NH^+$ (II) $OH + (CH_3)_2NH_2^+ \rightarrow H_2O + CH_2(CH_3)NH_2^+$	1	$\sim 10^6$ (I)	—	*e*–r.	esr	estd. from drop in aminium radical signal on addn. of *tert*–BuOH.	72–5118
3.325	*N*,*N*–dimethylaniline	9	8.9×10^9 (rel.)	$k/k_{EtOH} = 4.8$	γ–r.	opt.	c.k. with RNO.	66–0441
		—	1.3×10^{10}	—	p.r.	opt.	p.b.k. at 455 and 330 nm.	72–0289
3.326	*N*,*N*–dimethylanil–inium ion	1	1.5×10^9 (rel.)	$k/k_{Fe^{2+}} = 6.6$	Fenton	chem.	c.k.	49–0003

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.327	3,3–dimethylbutyrate ion	9	1.7×10^9 (rel.)	$k/k_{EtOH} = 0.9$	γ–r.	opt.	c.k. with RNO.	66–0423
3.327a	dimethyl disulfide $OH + CH_3SSCH_3 \rightarrow OH^- + RSSR^+$	—	$(1.7 \pm 0.3) \times 10^{10}$	—	p.r.	opt.	p.b.k.	75–1089
3.328	*N*,*N*–dimethylformamide	5.5	1.7×10^9 (rel.)	$k/k_{CNS^-} = 0.155$	p.r.	opt.	c.k.	70–0098
3.329	1,1–dimethylhydrazine	9.2	1.6×10^{10} (rel.)	$k/k_{CNS^-} = 1.45$	p.r.	opt.	c.k.	72–0003
3.330	1,2–dimethylhydrazine	10.1	1.4×10^{10} (rel.)	$k/k_{CNS^-} = 1.3$	p.r.	opt.	c.k.	72–0003
3.331	1,1–dimethylhydrazinium ion	3.5	8.1×10^8 (rel.)	$k/k_{CNS^-} = 0.074$	p.r.	opt.	c.k.	72–0003
3.332	1,2–dimethylhydrazinium ion	3.5	7.2×10^8 (rel.)	$k/k_{CNS^-} = 0.065$	p.r.	opt.	c.k.	72–0003
3.333	1,2–dimethylindole	9.0	$(1.25 \pm 0.02) \times 10^{10}$ (rel.)	—	γ–r.	opt.	c.k. with RNO; rel. to k(OH + tryptophan) = 1.25×10^{10}.	71–0556
3.334	1,3–dimethylindole	9.0	$(1.01 \pm 0.08) \times 10^{10}$ (rel.)	—	γ–r.	opt.	c.k. with RNO; rel. to k(OH + tryptophan) = 1.25×10^{10}.	71–0556
3.335	2,3–dimethylindole	9.0	$(1.26 \pm 0.01) \times 10^{10}$ (rel.)	—	γ–r.	opt.	c.k. with RNO; rel. to k(OH + tryptophan) = 1.25×10^{10}.	71–0556
3.336	2.4–dimethylphenyl–β–D–glucopyranoside	—	4.5×10^9 (rel.)	$k/k_{CNS^-} = 0.41$	p.r.	opt.	c.k.	71–0056
3.337	3,4–dimethylphenyl–β–D–glucopyranoside	—	3.6×10^9 (rel.)	—	γ–r.	opt.	c.k. with RNO, rel. to k(OH + X) = 4.4×10^9, X = phenyl–β–D–glucopyranoside.	71–0056
3.337a	2,2–dimethyl–1–phenyl–1–propanol	1.7–1.8	1.1×10^{10} (rel.)	$k/k_{2\text{-PrOH}} = 5.2$	Fenton	chem.	c.k. with 1–phenylethanol.	74–9006
3.338	dimethyl phosphate ion $OH + (CH_3O)_2PO_2^- \rightarrow H_2O + CH_2O(CH_3O)PO_2^-$	—	1.2×10^8 (rel.)	$k/k_{CNS^-} = 0.011$	p.r.	opt.	c.k.	72–3008
3.339	*N*,*N*–dimethylpivalamide	5–6	3.9×10^9 (rel.)	$k/k_{CNS^-} = 0.357$	p.r.	opt.	c.k.	71–0414
	dimethyl sulfide *See* methyl sulfide (3.552).							
3.340	2,4–dimethylpyridine	9	3.1×10^9 (rel.)	$k/k_{RNO} = 0.25 \pm 0.01$	γ–r.	opt.	c.k.	69–0280
3.341	2,6–dimethylpyridine	9	3×10^9 (rel.)	$k/k_{RNO} = 0.24 \pm 0.01$	γ–r.	opt.	c.k.	69–0280
3.341a	dimethyl sulfone	1.5	$< 6 \times 10^6$	—	Ti(III) + H_2O_2	esr	estd. rel. to k(OH + Ti(III)) = 3×10^9.	75–5237
3.342	dimethyl sulfoxide	—	7.0×10^9 (rel.)	$k/k_{CNS^-} = 0.64$	p.r.	opt.	c.k.	67–0186
		—	5.8×10^9 (rel.)	$k/k_{CNS^-} = 0.53$	p.r.	opt.	c.k.	73–1077
		For other ratios see: 3.348.						

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.343	1,4–dioxane OH + $C_4H_8O_2$ →	7	2.8×10^9 (rel.)	$k/k_{I^-} = 0.23 \pm 0.02$	p.r.	opt.	c.k.; obs. I_2^- formn. at 400 nm.	65–0010
	H_2O + $C_4H_7O_2$	2–2.2	2.0×10^9 (rel.)	$k/k_{thym} = 0.37 \pm 0.04$	γ–r.	opt.	c.k.	65–0388, 67–0461
		9	1.8×10^9 (rel.)	$k/k_{EtOH} = 1$	γ–r.	opt.	c.k. with RNO.	66–0423
		7	—	$k/k_{t\text{-}BuOH} = 3.5$	Ti(III) + H_2O_2	esr	c.k.	74–5144
		For other ratios see: 3.627.						
3.344	diphenylacetate ion	9.1	4×10^9	—	p.r.	opt.	p.b.k. at 340 nm.	72–0047
3.345	diphenylamine	9	1.3×10^{10} (rel.)	$k/k_{RNO} = 1.04 \pm 0.04$	γ–r.	opt.	c.k.	69–0280
3.345a	di–2–propyl disulfide OH + $C_3H_7SSC_3H_7$ → OH^- + $RSSR^+$	—	$(2.0 \pm 1.0) \times 10^{10}$	—	p.r.	opt.	p.b.k.	75–1089
3.346	2,2′–dithiobis–(ethylamine)	1	1.4×10^{10} (rel.)	$k/k_{thym} = 2.6$	Fenton	esr	c.k.; k/k_{perox} = 186.	69–5278
3.347	dithiothreitol OH + $SHCH_2CHOHCHOHCH_2S^-$ → H_2O + $\cdot SCH_2CHOHCHOHCH_2S^-$	7	$(1.5 \pm 0.5) \times 10^{10}$	—	p.r.	opt.	p.b.k. at 300 nm; ratio with phenylalanine = 2.	73–1020
3.348	DNA	—	~ 10^9 (rel.)	—	p.r.	opt.	c.k. with CNS^-.	65–0388
	OH + DNA → transient	9	~ 1.2×10^{13} (rel.)	$k/k_{RNO} \cong 10^3$	γ–r.	opt.	c.k.; mol. wt. 5×10^6.	67–0555
		~7	0.6×10^9	—	p.r.	opt.	p.b.k.; obs. transients at 400 (pH = 7) and 320 (pH = 12.4) nm; assume nucleotides (mol. wt. 350) react independently.	68–0312
		~12.4	0.6×10^9	—				
		—	< 2.6×10^8 (rel.)	—	p.r.	opt.	c.k. with CNS^-; based on nucleotide concn.;	68–0845
		7.5	1.3×10^{13}	—	p.r.	opt.	p.b.k. at 310 and 420 nm; $k = 8 \times 10^8$ per nucleotide base group.	69–0018
		7	$(4 \pm 1) \times 10^8$	—	p.r.	opt.	p.b.k. at 340 nm; k per base unit.	73–1071
		—	3×10^8 (rel.)	—	γ–r.	trac.	c.k.; effect of *tert*–BuOH, EtOH, 2–PrOH, *iso*–BuOH, isoamyl alcohol and dimethyl sulfoxide on binding of ^{14}C–nitrofurazone to DNA.	73–1077
		—	5.2×10^8	—	p.r.	opt.	d.k. as well as p.b.k. at 400 nm; rate in terms of nucleotide concn. (mol. wt. 360).	73–3016
		7.0	1.8×10^8 (rel.)	—	γ–r.	trac.	c.k. assuming k(OH + dimethyl sulfoxide) = 6×10^9; effect on binding of	73–3080

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.348 cont.							^{14}C-nitrofurazone in N_2O satd. 0.3% DNA; k per base group of mol. wt. ≅ 330.	
		—	—	—	p.r.	opt.	k for DNA–bound proflavine ~ 2 x 10^9.	75–3094
3.349	dodecyl sodium sulfate	—	7.6 x 10^9 (rel.)	—	p.r.	opt.	c.k. with CNS^-; k_{CNS^-} not given; k = 5.0 x 10^8 for concn. > 8.1 x 10^{-3} M.	71–0586
3.350	egg white	—	—	—	p.r.	opt.	p.b.k. at 420 nm (cystine anion radical); OH half–life < 5 x 10^{-9}s.	73–1059
3.351	eosin, dianion	—	1.8 x 10^{10} (I)(rel.)	k_I/k_{carb} = 50	p.r.	opt.	c.k.	66–0501
	(I) OH + S → charge transfer	10.5	1.2 x 10^{10} (I + II) (rel.)	k_{I+II}/k_{carb} = 34	—	—	c.k.; cor for presence of HCO_3^-.	67–0038
	(II) OH + S → addn.	9.0	k_I = 1.7 x 10^9	—	p.r.	opt.	X abs. at 450 nm.	68–0309
		9.0	k_{II} = 6 x 10^8	—	p.r.	opt.	adduct abs. at 600 nm.	68–0309
3.352	1,2–epoxybutane	9	7.6 x 10^8 (rel.)	k/k_{EtOH} = 0.41	γ–r.	opt.	c.k. with RNO.	66–0423
3.353	1,2–epoxypropane	9	2.4 x 10^8 (rel.)	k/k_{EtOH} = 0.13	γ–r.	opt.	c.k. with RNO.	66–0423
3.354	2,3–epoxypropanol	9	4.6 x 10^8 (rel.)	k/k_{EtOH} = 0.246	γ–r.	opt.	c.k. with RNO.	66–0423
3.355	erythritol	9	2.0 x 10^9 (rel.)	k/k_{EtOH} = 1.1	γ–r.	opt.	c.k. with RNO.	66–0423
3.356	ethane	1.2	—	k/k_{HCOOH} = 10 ± 1	γ–r.	chem.	c.k.	66–0265
3.357	ethanesulfonate ion	—	1.0 x 10^8 (rel.)	k/k_{CNS^-} = 0.0091	p.r.	opt.	c.k.	68–0352
3.358	ethanol (EtOH)	1	8.7 x 10^8 (rel.)	$k/k_{Fe^{2+}}$ = 3.8	Fenton	chem.	c.k.	49–0002
	(I) OH + EtOH → H_2O + CH_3CHOH	6.6, 10.5	1.1 x 10^9 (rel.)	k/k_{ferro} = 0.12	X–r.	opt.	c.k.; not cor. for H_2O_2.	62–0023
	(II) OH + EtOH → H_2O + CH_2CH_2OH	—	1.3 x 10^9 (rel.)	k/k_{carb} = 3.6	p.r.	opt.	c.k.	64–0131
		7	1.9 x 10^9 (rel.)	k/k_{ferro} = 0.21	p.r.	opt.	c.k.	65–0007
	(III) OH + EtOH → H_2O + CH_3CH_2O	7	9.1 x 10^8 (rel.)	k/k_{I^-} = 0.076 ± 0.007	p.r.	opt.	c.k.; I_2^- formn. meas. at 400 nm.	65–0010 67–0041
		3, 10.5	1.6 x 10^9 (rel.)	k/k_{BzO^-} = 0.29	γ–r.	trac.	c.k.; meas. $^{14}CO_2$.	65–0099
		—	1.5 x 10^9 (rel.)	k/k_{ferro} = 0.16	phot.	—	c.k.	65–0247
		9.0	1.8 x 10^9 (rel.)	k/k_{RNO} = 0.146	γ–r.	opt.	c.k.; meas. at 400 nm.	65–0356
		2–2.2	2.0 x 10^9 (rel.)	k/k_{tbym} = 0.37 ± 0.035	γ–r.	opt.	c.k.	65–0388, 67–0461
		5–5.5	1.8 x 10^9 (rel.)	k/k_{tbym} = 0.33 ± 0.035	γ–r.	opt.	c.k.	65–0388, 67–0461
		7, 10.7	~1.8 x 10^9 (rel.)	k/k_{carb} ≅ 4.8	p.r.	opt.	c.k.	65–0190
		7	1.8 x 10^9 (rel.)	k/k_{CNS^-} = 0.164	p.r.	opt.	c.k.	65–0190
		2	1.65 x 10^9 (rel.)	k/k_{CNS^-} = 0.15	p.r.	opt.	c.k.	65–0387
		7	1.9 x 10^9 (rel.)	k/k_{CNS^-} = 0.17	p.r.	opt.	c.k.	65–0387
		—	1.9 x 10^9 (rel.)	k/k_{MeOH} = 2.1	p.r.	opt.	c.k. with HSO_4^-, meas. abs. at 450 nm. (SO_4^-).	66–0019
		—	—	k/k_{TCOO^-} = 0.53	γ–r.	trac.	c.k.	68–0209
		—	1.8 x 10^9 (rel.)	k/k_{BzO^-} = 0.31	p.r.	opt.	c.k.; obs. hydroxycyclo–hexadienyl radi–cal buildup.	68–0304
		—	1.8 x 10^9 (rel.)	k/k_{PA^-} = 0.23				
		—	1.8 x 10^9 (rel).	k/k_{PNBA^-} = 0.70				
		5.5	1.7 x 10^9 (rel.)	k/k_{NB} = 0.54	r.	opt.	c.k.	68–0494
		7	1.7 x 10^9 (rel.)	k/k_{BzO^-} = 0.29	r.	lum.	c.k.	68–0494

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.358 cont.		~1.2	1.4×10^9 (rel.)	$k/k_{2\text{-PrOH}} = 0.63$	γ–r.	chem.	c.k.	68–0602
		6.98	1.3×10^9 (rel.)	$k/k_{2\text{-PrOH}} = 0.61$	γ–r.	chem.	c.k.	68–0602
		—	1.6×10^9 (rel.)	$k/k_{RNO} = 0.128$	p.r.	opt.	c.k.	69–0156
		1	2.1×10^9 (rel.)	$k/k_{thym} = 0.395$	Fenton	esr	c.k.; $k/k_{perox} = 28.9$.	69–5278
		1	1.9×10^9 (rel.)	$k/k_{thym} = 0.35$	Ti(III) – H_2O_2	esr	c.k.; $k/k_{perox} = 24.9$.	69–5278
		—		$k_I/k_{II} \cong 8.6$	γ–r.	chem.	c.k. with H_2O_2.	70–0338
		11	2.0×10^9 (rel.)	$k/k_{carb} = 5.5$	p.r.	opt.	c.k.; assume $pK_a(OH) = 11.9$.	70–0511
		—		$k_I/k_{II} = 6.0 \pm 0.2$	γ–r.	chem.	c.k. with H_2O_2; $k_H/k_D(I) = 1.24 \pm 0.04$; $k_H/k_D(II) = 1.55 \pm 0.06$ or 2.28 ± 0.20.	71–0081
		9	6.2×10^8 (rel.)	$k/k_{RNO} = 0.05$	γ–r.	opt.	c.k.; $E_a = -4.0 \pm 1.1$ kcal/mol (-16.7 ± 4.5 kJ/mol) at −8 to 23°C.	71–0469
		nat.	1.9×10^9 (rel.)	$k/k_{ferro} = 0.2$	p.r.	opt.	c.k.	71–0578
		0.82	1.7×10^9 (I) (rel.) 1.6×10^8 (II) (rel.)	$k_I/k_{Fe^{2+}} = 7.32$ $k_{II}/k_{Fe^{2+}} = 0.69$	Fenton	chem.	c.k.; also reported $k/k_{Fe^{3+}} = 7.0$.	71–9132
		—	—	$k_{II}/k_I = 0.16$	p.r.	opt.	detd. % of α–alcohol and ethoxy radicals by reaction with TNM and I^-, resp.	73–0126
		—	—	$k_{III}/k_I = 0.03$				
		—	1.65×10^9 (rel.)	$k/k_{ferro} = 0.18$	p.r.	opt.	c.k.	73–1046
		7,10.6	1.5×10^9 (rel.)	$k/k_{RNO} = 0.12$	phot.	opt.	c.k.; H_2O_2 soln; assume $k_{H_2\ O_2}/k_{RNO} << 1$.	73–7575
			For other ratios see: 3.12, 3.13, 3.25, 3.26, 3.27, 3.36, 3.41, 3.52, 3.54, 3.66, 3.80, 3.107, 3.112, 3.124, 3.127, 3.128, 3.131, 3.133, 3.134, 3.158, 3.170, 3.172, 3.185, 3.188, 3.189, 3.191, 3.193, 3.203, 3.209, 3.210, 3.214, 3.215, 3.222–3, 3.225, 3.226, 3.238, 3.246, 3.249, 3.250, 3.251, 3.257, 3.258, 3.272, 3.276, 3.282, 3.287, 3.305, 3.306, 3.308, 3.309, 3.321, 3.322, 3.325, 3.327, 3.352, 3.353, 3.354, 3.355, 3.359, 3.360, 3.369, 3.370, 3.371, 3.378, 3.380, 3.403, 3.405, 3.406, 3.408, 3.439, 3.440, 3.449, 3.502, 3.509, 3.511, 3.512, 3.514, 3.515, 3.516, 3.522, 3.523, 3.524, 3.526, 3.529, 3.530, 3.534, 3.545, 3.546, 3.549, 3.565, 3.566, 3.567, 3.573, 3.592, 3.593, 3.598, 3.601, 3.602, 3.607, 3.609, 3.610, 3.611, 3.620, 3.622, 3.634, 3.635, 3.636, 3.637, 3.638, 3.641, 3.669, 3.673, 3.690, 3.693, 3.695, 3.698, 3.711, 3.712, 3.720a, 3.723, 3.724, 3.731, 3.732, 3.752.				
3.359	ethanol–d_5 $OH + C_2D_5OH \rightarrow HDO + CD_3CDOH$	6	1.1×10^9 (rel.)	$k/k_{EtOH} = 0.62$	γ–r.	chem.	c.k. with Br^-.	66–0423
3.360	2–ethoxyethanol	9	1.7×10^9 (rel.)	$k/k_{EtOH} = 0.9$	γ–r.	opt.	c.k. with RNO.	66–0423
3.361	ethyl acetate	1	2.5×10^8 (rel.)	$k/k_{Fe^{2+}} = 1.1$	Fenton	chem.	c.k.	49–0002
		6–7	4.0×10^8 (rel.)	$k/k_{CNS^-} = 0.0364$	p.r.	opt.	c.k.	65–0387
		2.0–2.2	2.8×10^8 (rel.)	$k/k_{thym} = 0.052 \pm 0.004$	γ–r.	opt.	c.k.	67–0461
3.362	ethylamine	12	1.3×10^{10} (rel.)	—	p.r.	opt.	c.k.; calcd. from $k/k_{CNS^-} = 1.0$ at pH 11.2.	71–0585
		—	3.2×10^9 (rel.) 6.4×10^9 (rel.)	$k/k_{NB} = 1.3$ $k/k_{CNS^-} = 0.58$	p.r.	opt.	c.k.; calcd. from values obs. at pH 8–13.1.	73–0016

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.363	ethylammonium ion	2	7.8×10^7 (rel.)	$k/k_{CNS^-} = 0.0071$	p.r.	opt.	c.k.	70–0371
		4	5.1×10^8 (rel.)	$k/k_{CNS^-} = 0.0464$	p.r.	opt.	c.k.	70–0371
		3.1	3.0×10^8 (rel.)	$k/k_{CNS^-} = 0.0273$	p.r.	opt.	c.k.	71–0585
		—	3.8×10^8 (rel.)	$k/k_{NB} = 0.085$	p.r.	opt.	c.k.; calcd. from	73–0016
			6×10^8 (rel.)	$k/k_{CNS^-} = 0.54$			values obs. at pH 8–13.1.	
3.364	ethyl butyrate	6–7	1.6×10^9 (rel.)	$k/k_{CNS^-} = 0.146$	p.r.	opt.	c.k.	65–0387
3.365	ethylene	—	4.9×10^8 (rel.)	$k/k_{Fe^{2+}} = 2.13$	γ–r.	opt.	c.k.	67–0037
	(I) OH + CH_2=CH_2 → •CH_2CH_2OH	—	4.8×10^9 (I + II) (rel.)	$k_{I+II}/k_{I^-} = 0.402$	p.r.	opt.	c.k.; meas. I_2^- at 400 nm.	67–0041
	(II) OH + CH_2=CH_2 → CH_2=CH• + H_2O	—	$(1.0 \pm 0.2) \times 10^9$ (rel.)	—	p.r.	opt.	c.k. with CNS^- and HCO_3^-; details not given.	67–0269
		7		$k_{II}/k_I = 0.3$	γ–r.	chem.	meas. G(alcohols).	67–0522
3.366	ethylenediamine	4	~ 3.5×10^7 (rel.)	—	—	—	c.k. with EtOH.	66–0401
		8.0	$(5.3 \pm 1.0) \times 10^8$ (rel.)	$k/k_{CNS^-} = 0.0265$	p.r.	opt.	c.k.; at pH 8.5, 9.0, 10.0 ratio is 0.225, 0.3 and 0.5, resp.	72–0461
3.367	ethylenediamine tetraacetate ion	9	2.6×10^9 (rel.)	$k/k_{ferro} = 0.28$	γ–r.	opt.	c.k. with RNO assuming $k_{RNO} = k_{ferro}$.	67–0555
		7	1.2×10^9 (rel.)	$k/k_{RNO} = 0.096$	phot.	opt.	c.k.; H_2O_2	73–7575
		10	4.8×10^9 (rel.)	$k/k_{RNO} = 0.38$			soln; assume	
		10.3	5.8×10^9 (rel.)	$k/k_{RNO} = 0.46$			$k_{H_2O_2}/k_{RNO} \ll 1$.	
		10.6	6.3×10^9 (rel.)	$k/k_{RNO} = 0.5$				
3.368	ethylenediamine–tetraacetic acid	—	5.3×10^9 (rel.)	$k/k_{MeOH} = 5.9$	X–r.	chem.	c.k.	72–0056
		~0	—	$k/k_{acrylamide} = 2.2$	Fenton	pol.	c.k.	72–9162
3.369	ethyleneglycol OH + CH_2OHCH_2OH →	1	8.3×10^7 (rel.)	$k/k_{Fe^{2+}} = 0.36$	therm.	chem.	c.k.; persulfate oxidation.	49–0002
	H_2O + $CH_2OHCHOH$	7	1.6×10^9 (rel.)	$k/k_{carb} = 4.3$	p.r.	opt.	c.k.	65–0190
		7	1.4×10^9 (rel.)	$k/k_{CNS^-} = 0.13$	p.r.	opt.	c.k.	65–0387
		9	1.5×10^9 (rel.)	$k/k_{EtOH} = 0.82$	γ–r.	opt.	c.k. with RNO.	66–0423
		6	1.1×10^9 (rel.)	$k/k_{EtOH} = 0.62$	γ–r.	chem.	c.k. with Br^-.	66–0423
		2–2.2	1.7×10^9 (rel.)	$k/k_{thym} = 0.32 \pm 0.03$	γ–r.	opt.	c.k.	67–0461
		nat.	1.5×10^9 (rel.)	$k/k_{ferro} = 0.158$	p.r.	opt.	c.k.	71–0578
		—	—	—	p.r.	opt.	> 0.1% alkoxy radical detd. by reaction with I^-.	73–0126
		—	2.1×10^9 (rel.)	$k/k_{ferro} = 0.225$	p.r.	opt.	c.k.	73–1046
3.370	ethylene oxide	9	6.7×10^7 (rel.)	$k/k_{EtOH} = 0.036$	γ–r.	opt.	c.k. with RNO.	66–0423
3.371	ethyl ether	1	1.5×10^9 (rel.)	$k/k_{Fe^{2+}} = 6.4$	Fenton	chem.	c.k.	49–0002
		~7	4.9×10^9 (rel.)	$k/k_{I^-} = 0.38 \pm 0.04$	p.r.	opt.	c.k.; meas. I_2^- formn. at 400 nm.	65–0010
		9	1.4×10^9 (rel.)	$k/k_{EtOH} = 0.74$	γ–r.	opt.	c.k. with RNO.	66–0423
		2	2.8×10^9 (rel.)	$k/k_{thym} = 0.52 \pm 0.04$	γ–r.	opt.	c.k.	67–0461
		~1.2	2.5×10^9 (rel.)	$k/k_{2\text{-PrOH}} = 1.15$	γ–r.	chem.	c.k.	68–0602
		6.98	2.6×10^9 (rel.)	$k/k_{2\text{-PrOH}} = 1.20$	γ–r.	chem.	c.k.	68–0602
3.372	ethyl formate	6–7	3.8×10^8 (rel.)	$k/k_{CNS^-} = 0.035$	p.r.	opt.	c.k.	65–0387
3.373	N–ethylmalcamic acid	6.0	7.0×10^9	—	p.r.	opt.	p.b.k.	72–0144

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.374	*N*–ethylmaleimide	—	4.3×10^9 (rel.)	$k/k_{thym} = (0.8 \pm 0.1)$	X–r.	opt.	c.k.	69–0562
		6.0	9.0×10^9	—	p.r.	opt.	p.b.k.	72–0144
3.375	4–ethyl–5–hydroxy–2–methylpyridine	6.5	1.4×10^9 (rel.)	$k/k_{RNO} = 0.11 \pm 0.01$	γ–r.	opt.	c.k.	69–0580
3.375a	1–(*p*–ethylphenyl)ethanol	1.7–1.8	1.5×10^{10} (rel.)	$k/k_{2\text{-PrOH}} = 6.7$	Fenton	chem.	c.k. with 1–phenylethanol.	74–9006
3.376	ethyl propionate	6–7	8.7×10^8 (rel.)	$k/k_{CNS^-} = 0.079$	p.r.	opt.	c.k.	65–0387
	Flagyl *See* 1–(2–hydroxyethyl)–2–methyl–5–nitroimidazole (3.452a).							
3.377	fluorescein	—	$(1.4 \pm 0.2) \times 10^9$	—	p.r.	opt.	computer anal.	68–0172
	OH + dye → adduct	—	$(1.6 \pm 0.3) \times 10^9$	—	p.r.	opt.	computer anal.	68–0172
	OH + dye → X• + OH^-						(X• = semi–oxidized fluorescein.	
		10	1.2×10^{10}	—	p.r.	opt.	d.k. as well as p.b.k.	73–6068, 74–1063
3.378	fluoroacetate ion	9	3.0×10^7 (rel.)	$k/k_{EtOH} = 0.016$	γ–r.	opt.	c.k. with RNO.	66–0423
3.379	fluorobenzene	—	8×10^9 (rel.)	—	p.r.	opt.	c.k. with CNS^-; reference rate not given.	73–0054
3.380	*p*–fluorobenzoate ion	9	3.5×10^9 (rel.)	$k/k_{EtOH} = 1.88$	γ–r.	opt.	c.k. with RNO.	66–0441
3.381	5–fluorouracil	7	5.2×10^9 (rel.)	$k/k_{CNS^-} = 0.472$	p.r.	opt.	c.k.	72–0049
		7	5.5×10^9	—	p.r.	opt.	p.b.k. at 340 nm.	72–0049
		11	6.0×10^9	—	p.r.	opt.	p.b.k. at 340 nm.	72–0049
3.382	formaldehyde	1	6.9×10^8 (rel.)	$k/k_{Fe^{2+}} = 3.0$	Fenton	chem.	c.k.	49–0002
	OH + HCHO → H_2O + CHO	1.3		$k/k_{oxalic\ acid} = 40$	r.	chem.	c.k.	68–0503
3.383	formamide	5.5	$< 5.0 \times 10^8$ (rel.)	$k/k_{CNS^-} < 0.045$	p.r.	opt.	c.k.	70–0098
3.384	formate ion	5.8–10.1	$\sim 1.9 \times 10^9$ (rel.)	$k/k_{ferro} \cong 0.2$	X–r.	opt.	c.k.; not cor. for H_2O_2.	62–0023
	OH + $HCOO^-$ → H_2O + COO^-	7	2.9×10^9 (rel.)	$k/k_{I^-} = 0.24 \pm 0.002$	p.r.	opt.	c.k.; I_2^- formn. at 400 nm.	65–0010
		10.7	3.5×10^9 (rel.)	$k/k_{BzO^-} = 0.62$	γ–r.	trac.	c.k.; meas. $^{14}CO_2$.	65–0099
		—	2.4×10^9 (rel.)	$k/k_{ferro} = 0.26$	phot.	—	c.k.	65–0247
		9.0	4.0×10^9 (rel.)	$k/k_{RNO} = 0.32 \pm 0.02$	γ–r.	opt.	c.k.	65–0356
		2–5	3.4×10^9 (rel.)	$k/k_{thym} = 0.63 \pm 0.06$	γ–r.	opt.	c.k.; calcd. k on basis of rates obtained with formic/formate systems as function of pH.	67–0461
		7	3.8×10^9 (rel.)	$k/k_{BzO^-} = 0.66$	r.	chem.	c.k.	68–0494
		6.98	2.9×10^9 (rel.)	$k/k_{2\text{-PrOH}} = 1.34$	γ–r.	chem.	c.k.	68–0602
		—	2.2×10^9 (rel.)	$k/k_{RNO} = 0.176$	p.r.	opt.	c.k.	69–0156
		11	4.0×10^9 (rel.)	$k/k_{carb} = 10.6$	p.r.	opt.	c.k. with CO_3^{2-} ($\mu = 0.4$); assumed $pK_a(OH) = 11.9$	69–0379
		8.4	2.9×10^9 (rel.)	$k/k_{bicarb} = 80$	p.r.	opt.	c.k. meas. CO_3^-.	69–0379
		nat.	2.8×10^9 (rel.)	$k/k_{ferro} = 0.301$	p.r.	opt.	c.k.	71–0578
			For other ratios see: 3.24, 3.88, 3.102, 3.103, 3.111, 3.133, 3.137, 3.460, 3.592, 3.643, 3.682, 3.742.					
			For ratios with $^3HCO_2^-$ *see*: 3.66, 3.82, 3.357, 3.511, 3.637.					
3.385	formic acid	2.5	6.5×10^8 (rel.)	$k/k_{ferro} \cong 0.07$	X–r.	opt.	c.k.; not cor. for H_2O_2.	62–0023
	OH + HCOOH → H_2O + COOH	1.0	1.6×10^8 (rel.)	$k/k_{I^-} = (1.3 \pm 0.2) \times 10^{-2}$	p.r.	opt.	c.k.; obs. formn. of I_2^- at 400 nm.	65–0010
		1	1.3×10^8 (rel.)	$k/k_{CNS^-} = 0.0114$	p.r.	opt.	c.k.	65–0387

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.385 cont.		2–5	1.6×10^8 (rel.)	$k/k_{thym} = 0.03 \pm 0.03$	γ–r.	opt.	c.k.; calcd. k on basis of rates obtained with formic/formate system as a function of pH.	67–0461
		~1.2	1.3×10^8 (rel.)	$k/k_{2\text{-PrOH}} = 0.06$	γ–r.	chem.	c.k.	68–0602
		1	1.5×10^8 (rel.)	$k/k_{thym} = 0.028$	Fenton	esr	c.k.; k/k_{perox} = 1.95.	69–5278
		1	1.5×10^8 (rel.)	$k/k_{thym} = 0.028$	Ti(III) – H_2O_2	esr	c.k.; k/k_{perox} = 1.98.	
		0.8	—	$k/k_{bisulf}[HSO_4^-] = 690 \pm 80$	γ–r.	chem.	c.k.; computer anal.	72–0094
		0	—	$= 14.6 \pm 0.6$				
			For other ratios see: 3.26, 3.84, 3.106, 3.137, 3.356.					
3.386	fumaric acid	1	1.1×10^9 (rel.)	$k/k_{MeOH} = 1.24$	Fenton	chem.	c.k.; $k_{MeOH}/k_{Fe^{2+}}$ = 4.3.	73–9341
3.387	Furadantin	7	9.3×10^9	—	p.r.	opt.	p.b.k. as well as d.k.	73–1018
3.388	2–furaldehyde	9	7.75×10^9 (rel.)	$k/k_{RNO} = 0.62 \pm 0.04$	γ–r.	opt.	c.k.	73–0301
3.389	Furamazone	7	1.03×10^{10}	—	p.r.	opt.	p.b.k. as well as d.k.	73–1018
3.390	furan	—	3.8×10^9 (rel.)	$k/k_{CNS^-} = 0.35$	p.r.	opt.	c.k.	71–0360
	$OH + C_4H_4O \rightarrow (OH)C_4H_4O$	9	1.45×10^{10} (rel.)	$k/k_{RNO} = 1.16 \pm 0.05$	γ–r.	opt.	c.k.	73–0301
3.391	furfuryl alcohol	9	1.5×10^{10} (rel.)	$k/k_{RNO} = 1.19 \pm 0.10$	γ–r.	opt.	c.k.	73–0301
3.392	2–furoate ion	9	1.15×10^{10} (rel.)	$k/k_{RNO} = 0.92 \pm 0.16$	γ–r.	opt.	c.k.	73–0301
3.393	gelatin	—	9.1×10^{10} (rel.)	—	p.r.	opt.	c.k. with CNS^-; reference rate not given; mol. wt. 100,000.	68–3007
3.394	glucose	—	7.4×10^8 (rel.)	$k/k_{ferro} \cong 0.08$	phot.	—	c.k.	65–0247
	(I) $OH + C_6H_{12}O_6$	—	1.2×10^9 (rel.)	$k/k_{I^-} = 0.1$	p.r.	opt.	c.k.	65–0391
	→ deoxyglucose	2–2.2	2.2×10^9 (rel.)	$k/k_{thym} = 0.40 \pm 0.03$	γ–r.	opt.	c.k.	67–0461
	(II) $OH + C_6H_{12}O_6$ → malondialdehyde	6.5	3.8×10^8 (rel.)	$k/k_{RNO} = 0.03 \pm 0.01$	γ–r.	opt.	c.k.	69–0580
		8.8	—	$k_I/k_{Br^-} = 0.865$	p.r.	chem.	c.k.	70–0251
		—	—	$k_{II}/k_{Br^-} = 0.642$	p.r.	chem.	c.k.	70–0251
3.395	glucosephosphate	6.5	1.6×10^8 (rel.)	$k/k_{RNO} = 0.013 \pm 0.003$	γ–r.	opt.	c.k.	69–0580
3.396	D–glucuronate ion	—	3.0×10^9 (rel.)	$k/k_{CNS^-} = 0.27$	p.r.	opt.	c.k.	70–0509, 70–3081
3.397	glucuronic acid	acid	1.3×10^9 (rel.)	$k/k_{CNS^-} = 0.12$	p.r.	opt.	c.k.	70–0509
3.398	D–glucuronolactone	—	1.6×10^9 (rel.)	$k/k_{CNS^-} = 0.15$	p.r.	opt.	c.k.	70–0509
3.399	glutamic acid	2–2.2	1.4×10^8 (rel.)	$k/k_{thym} = 0.0255$	γ–r.	opt.	c.k.	65–0388
		6.5	2.3×10^8 (rel.)	$k/k_{RNO} = 0.018$	γ–r.	opt.	c.k.	73–0548
3.400	glutamine	2–2.2	1.6×10^8 (rel.)	$k/k_{thym} = 0.029 \pm 0.003$	γ–r.	opt.	c.k.	67–0461
		6.0	5.4×10^8 (rel.)	$k/k_{RNO} = 0.043$	γ–r.	opt.	c.k.	67–0461
3.401	glutaric acid	2–2.2	7.0×10^8 (rel.)	$k/k_{thym} = 0.13 \pm 0.01$	γ–r.	opt.	c.k.	67–0461
3.402	glutathione	1	1.4×10^{10} (rel.)	$k/k_{CNS^-} = 1.3$	p.r.	opt.	c.k.	65–0387
	(reduced)	1	1.4×10^{10} (rel.)	$k/k_{thym} = 2.6$	Fenton	esr	c.k.; k/k_{perox} = 186.	69–5278
	(oxidized)	1	1.1×10^{10} (rel.)	$k/k_{thym} = 1.98$	Fenton	esr	c.k.; k/k_{perox} = 143.	69–5278

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.403	glycerol	—	1.9×10^9 (rel.)	$k/k_{carb} = 5.3$	p.r.	opt.	c.k.	64–0131
		7	1.8×10^9 (rel.)	$k/k_{carb} = 4.8$	p.r.	opt.	c.k.	65–0190
		10.7	1.9×10^9 (rel.)	$k/k_{carb} = 5.1$	p.r.	opt.	c.k.	65–0190, 65–0387
		9.0	2.0×10^9 (rel.)	$k/k_{RNO} = 0.164 \pm 0.008$	γ–r.	opt.	c.k.	65–0356
		7	1.5×10^9 (rel.)	$k/k_{CNS^-} = 0.14$	p.r.	opt.	c.k.	65–0387
		9	1.85×10^9 (rel.)	$k/k_{EtOH} = 1$	γ–r.	opt.	c.k. with RNO.	66–0423
		2–2.2	1.9×10^9 (rel.)	$k/k_{tbym} = 0.35 \pm 0.03$	γ–r.	opt.	c.k.	67–0461
		nat.	1.9×10^9 (rel.)	$k/k_{ferro} = 0.204$	p.r.	opt.	c.k.	71–0578
		—	2.0×10^9 (rel.)	$k/k_{CNS^-} = 0.18$	p.r.	opt.	c.k.	73–1077
			1.6×10^9 (rel.)	$k/k_{ferro} = 0.17$				
3.404	glycine, positive ion	1	8×10^6 (rel.)	$k/k_{Fe^{2+}} = 0.035$	Fenton	chem.	c.k.	49–0002
		1	1.6×10^7 (rel.)	$k/k_{CNS^-} = 0.0015$	p.r.	opt.	c.k.	65–0387
		2.8	8.1×10^6 (rel.)	$k/k_{tbym} = 0.0015$	γ–r.	opt.	c.k.	65–0388
		2.8–3	1.0×10^7 (rel.)	$k/k_{CNS^-} = 0.00091$	p.r.	opt.	c.k.	65–0388
3.405	glycine, zwitterion	7.0	5.6×10^6 (rel.)	$k/k_{ferro} = 0.0006$	X–r.	opt.	c.k.; not cor. for H_2O_2.	62–0023
		—	2.6×10^8 (rel.)	$k/k_{ferro} = 0.028$	phot.	—	c.k.	65–0247
		5.8–6	1.6×10^7 (rel.)	$k/k_{CNS^-} = 0.0015$	p.r.	opt.	c.k.	65–0388
		5	4.6×10^6 (rel.)	$k/k_{EtOH} = 0.0025$	γ–r.	opt.	c.k. with RNO.	66–0423
		6.7	1.7×10^7 (rel.)	$k/k_{RNO^-} = 0.00135$	γ–r.	opt.	c.k.	73–0548
3.406	glycine, negative ion	9.45	8.4×10^8 (rel.)	$k/k_{ferro} = 0.09$	X–r.	opt.	c.k.; not cor. for H_2O_2.	62–0023
		10.5	2.8×10^9 (rel.)	$k/k_{ferro} = 0.3$	X–r.	opt.	c.k.; not cor. for H_2O_2.	62–0023
		10.5	2.7×10^9 (rel.)	$k/k_{BzO^-} = 0.47$	γ–r.	trac.	c.k.; meas. $^{14}CO_2$.	65–0099
		9.5–9.7	1.9×10^9 (rel.)	$k/k_{CNS^-} = 0.17$	p.r.	opt.	c.k.	65–0388
		12	2.0×10^9 (rel.)	$k/k_{EtOH^-} = 1.1$	γ–r.	opt.	c.k. with RNO.	66–0423
		10.0	5.3×10^9 (rel.)	$k/k_{CNS^-} = 0.485$	p.r.	opt.	c.k.	72–0461
3.407	glycine anhydride	5.0	1.2×10^9 (rel.)	$k/k_{CNS^-} = 0.11$	p.r.	opt.	c.k.	71–0554
		11.0	1.2×10^9 (rel.)	$k/k_{CNS^-} = 0.11$	p.r.	opt.	c.k.	71–0554
3.408	glycolate ion	9	7.1×10^8 (rel.)	$k/k_{EtOH} = 0.386$	γ–r.	opt.	c.k. with RNO.	66–0423
		5.5,7.0	$(8.6 \pm 0.7) \times 10^8$ (rel.)	$k/k_{CNS^-} = 0.078$	p.r.	opt.	c.k.	75–1053
3.409	glycolic acid	1	4.6×10^8 (rel.)	$k/k_{Fe^{2+}} = 2.0$	Fenton	chem.	c.k.	49–0002
		2–2.2	4.6×10^8 (rel.)	$k/k_{tbym} = 0.085 \pm 0.005$	γ–r.	opt.	c.k.	67–0461
3.410	glycylalanine	2–2.2	1.8×10^8 (rel.)	$k/k_{tbym} = 0.0339$	γ–r.	opt.	c.k.	65–0388
		5.5–6	3.5×10^8 (rel.)	$k/k_{CNS^-} = 0.032$	p.r.	opt.	c.k.	65–0388
3.411	glycylglycine, positive ion	2–2.2	1.4×10^8 (rel.)	$k/k_{thym} = 0.0252$	γ–r.	opt.	c.k.	65–0388
		2.2–2.4	1.6×10^8 (rel.)	$k/k_{CNS^-} = 0.0144$	p.r.	opt.	c.k.	65–0388
3.412	glycylglycine, zwitterion	6–7	2.6×10^8 (rel.)	$k/k_{CNS^-} = 0.024$	p.r.	opt.	c.k.	65–0387
		5.5–6	2.2×10^8 (rel.)	$k/k_{CNS^-} = 0.0197$	p.r.	opt.	c.k.	65–0388
		4.2	4.4×10^8 (rel.)	$k/k_{CNS^-} = 0.04$	p.r.	opt.	c.k.	70–0099
3.413	glycylglycine, negative ion	10.5	5.2×10^9 (rel.)	$k/k_{CNS^-} = 0.47$	p.r.	opt.	c.k.	70–0099
3.414	glycylglycine amide	3.3	2.7×10^8	—	p.r.	opt.	p.b.k.	75–1004
3.415	glycylglycylglycine, positive ion	2–2.2	1.6×10^8 (rel.)	$k/k_{thym} = 0.029$	γ–r.	opt.	c.k.	65–0388
		2.8–3	2.4×10^8 (rel.)	$k/k_{CNS^-} = 0.022$	p.r.	opt.	c.k.	65–0388
3.416	glycylglycylglycine, zwitterion	5.5–6	1.8×10^9 (rel.)	$k/k_{CNS^-} = 0.16$	p.r.	opt.	c.k.	65–0388
		8.5–8.7	1.8×10^9 (rel.)	$k/k_{CNS^-} = 0.16$	p.r.	opt.	c.k.	65–0388
		5.4	7.3×10^8 (rel.)	$k/k_{CNS^-} = 0.066$	p.r.	opt.	c.k.	70–0099

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.417	glycylglycylglycine, negative ion	10.6	5.0×10^9 (rel.)	$k/k_{CNS^-} = 0.455$	p.r.	opt.	c.k.	70–0099
3.418	glycylglycylglycylglycine, positive ion	2–2.2	2.4×10^8 (rel.)	$k/k_{thym} = 0.045$	γ–r.	opt.	c.k.	65–0388
		2.4–2.6	3.5×10^8 (rel.)	$k/k_{CNS^-} = 0.032$	p.r.	opt.	c.k.	65–0388
	zwitterion	5.5–6	4.5×10^8 (rel.)	$k/k_{CNS^-} = 0.041$	p.r.	opt.	c.k.	65–0388
		7.7–7.9	1.2×10^9 (rel.)	$k/k_{CNS^-} = 0.11$	p.r.	opt.	c.k.	65–0388
	negative ion	9.5–9.7	3.0×10^9 (rel.)	$k/k_{CNS^-} = 0.27$	p.r.	opt.	c.k.	65–0388
3.419	glycylisoleucine positive ion	2–2.2	2.4×10^9 (rel.)	$k/k_{thym} = 0.452$	γ–r.	opt.	c.k.	65–0388
3.420	glycylleucine positive ion	2–2.2	2.6×10^9 (rel.)	$k/k_{thym} = 0.484$	γ–r.	opt.	c.k.	65–0388
3.421	glycylmethionine	2–2.2	4.4×10^8 (rel.)	$k/k_{thym} = 0.081$	γ–r.	opt.	c.k.	65–0388
	positive ion	2–2.2	1.1×10^8 (rel.)	$k/k_{CNS^-} = 0.00985$	p.r.	opt.	c.k.	65–0388
	zwitterion	5–5.2	2.2×10^8 (rel.)	$k/k_{CNS^-} = 0.0197$	p.r.	opt.	c.k.	65–0388
3.422	glycylphenylalanine, positive ion	2–2.2	8.9×10^8 (rel.)	$k/k_{thym} = 0.165$	γ–r.	opt.	c.k.	65–0388
3.423	glycylproline, positive ion	2–2.2	1.5×10^9 (rel.)	$k/k_{thym} = 0.27$	γ–r.	opt.	c.k.	65–0388
3.424	glycylserine, positive ion	2–2.2	5.9×10^8 (rel.)	$k/k_{thym} = 0.11$	γ–r.	opt.	c.k.	65–0388
3.425	glycyltyrosine, positive ion	2–2.2	9.7×10^9 (rel.)	$k/k_{thym} = 1.8$	γ–r.	opt.	c.k.	65–0388
3.426	glycylvaline, positive ion	2–2.2	1.2×10^9 (rel.)	$k/k_{thym} = 0.226$	γ–r.	opt.	c.k.	65–0388
3.427	glyoxal $OH + CHOCHO \rightarrow H_2O + COCHO$	1.3	—	$k/k_{oxalic\ acid} = 46$	r.	chem.	c.k.	68–0503
3.428	guanine	—	1.05×10^{10}	—	—	—	—	66–0845
		10.0	9.2×10^9 (rel.)	$k/k_{RNO} = 0.74$	γ–r.	opt.	c.k.; 17°C.	75–0294
3.429	guanosine	9	7.6×10^9 (rel.)	$k/k_{RNO} = 0.61$	γ–r.	opt.	c.k.	67–0555
3.430	guanylic acid	6.7	$(4.7 \pm 0.2) \times 10^9$	—	p.r.	opt.	p.b.k. at 325 nm.	70–3069
3.431	hemin	—	$\sim 1.0 \times 10^{10}$	—	—	—	—	66–0844
3.432	hemoglobin	—	3.6×10^{10}	—	—	—	—	66–0844
3.433	heparin	—	3.6×10^8 (rel.)	$k/k_{CNS^-} = 0.033$	p.r.	opt.	c.k.; concn. of polyanion in hexose units.	68–0352, 70–3081
3.434	heparin, desulfated	—	8.0×10^8 (rel.)	$k/k_{CNS^-} = 0.073$	p.r.	opt.	c.k.; concn. of polyanion in hexose units.	70–3081
3.435	1–heptanol	2–2.2	6.2×10^9 (rel.)	$k/k_{thym} = 1.15 \pm 0.10$	γ–r.	opt.	c.k.	67–0461
3.436	hexadecyltrimethylammonium bromide	—	1.1×10^{10} (rel.)	$k/k_{MeOH} = 11.8$	p.r.	opt.	c.k.; meas. Br_2^- at 360 nm; concn. $< 9 \times 10^{-4}$ M; at higher concn. ratio = 2.4.	71–0001 71–0586
3.437	2,4–hexadien–1–ol	7.0	$(9.8 \pm 1.0) \times 10^9$	—	p.r.	opt.	p.b.k.	73–1070
3.438	hexafluorobenzene $OH + C_6F_6 \rightarrow$ addn. $\rightarrow F^- + H^+ + \cdot C_6F_5{=}O$	—	2×10^9 (rel.)	—	p.r.	opt.	c.k. with CNS^-; 280 nm. abs. grows in at same rate as condy. (F^-).	73–0054
3.438a	hexamethylbenzene	~7	7.2×10^9	—	p.r.	opt.	p.b.k.; OH addn. as well as H abstr. (< 50%).	75–1009
3.439	1,6–hexanediol	9	4.6×10^9 (rel.)	$k/k_{EtOH} = 2.46$	γ–r.	opt.	c.k. with RNO.	66–0423

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.440	hexanoate ion	9	3.9×10^9 (rel.)	$k/k_{EtOH} = 2.1$	γ–r.	opt.	c.k. with RNO.	66–0423
3.441	1–hexanol	2–2.2	5.9×10^9 (rel.)	$k/k_{thym} = 1.10 \pm 0.10$	γ–r.	opt.	c.k.	67–0461
3.442	histidine	2–2.2	1.9×10^9 (rel.)	$k/k_{CNS^-} = 0.174$	p.r.	opt.	c.k.	65–0388
		6–7	5.0×10^9 (rel.)	$k/k_{CNS^-} = 0.455$	p.r.	opt.	c.k.	65–0388
		6.7	4.3×10^9 (rel.)	$k/k_{RNO} = 0.34$	γ–r.	opt.	c.k.	73–0548
3.443	histidylhistidine	5.5–6.5	9.0×10^9 (rel.)	$k/k_{CNS^-} = 0.82$	p.r.	opt.	c.k.	65–0388
3.444	hyaluronic acid	—	1.3×10^9 (rel.)	$k/k_{CNS^-} = 0.116$	p.r.	opt.	c.k.; based on disaccharide unit.	67–0730
		—	6.7×10^8 (rel.)	$k/k_{CNS^-} = 0.061$	p.r.	opt.	c.k.; concn. of polyanion in hexose units.	68–0352, 70–3081
3.445	hyaluronic acid, sulfated	—	6.0×10^8 (rel.)	$k/k_{CNS^-} = 0.055$	p.r.	opt.	c.k.; concn. of polyanion in hexose units.	70–3081
3.446	hydroquinone	6–7	2.1×10^{10} (rel.)	$k/k_{CNS^-} = 1.88$	p.r.	opt.	c.k.	65–0387
	$OH + HOC_6H_4OH \rightarrow C_6H_4(OH)_3$	—	1×10^{10} (rel.)	$k/k_{MeOH} = 10.8$	p.r.	opt.	c.k. with HSO_4^-; obs. decreased abs. at 450 nm.	66–0019
		9	5.5×10^9 (rel.)	$k/k_{RNO} = 0.44 \pm 0.12$	γ–r.	opt.	c.k.	72–0837
3.447	hydroxocobalamin	—	$\sim 10^{10}$	—	—	—	c.k. with RNO.	72–3046
3.447a	hydroxyacetamide	8.5	$(1.1 \pm 0.1) \times 10^9$ (rel.)	$k/k_{CNS^-} = 0.1$	p.r.	opt.	c.k.	75–1053
	o–hydroxybenzaldehyde *See* salicylaldehyde (3.668a).							
3.448	*p*–hydroxybenz–aldehyde	9	1.0×10^9 (rel.)	$k/k_{RNO} = 0.82 \pm 0.2$	γ–r.	opt.	c.k.	72–0837
	o–hydroxybenzoate ion *See* salicylate ion (3.669).							
3.449	*p*–hydroxybenzoate ion	9	5.5×10^9 (rel.)	$k/k_{EtOH} = 2.95$	γ–r.	opt.	c.k. with RNO.	66–0441
	$OH + OHC_6H_4COO^- \rightarrow (OH)_2C_6H_4COO^-$	7	$(9 \pm 2) \times 10^9$	—	p.r.	opt.	p.b.k. at 375; cor. for (OH + OH) and (H + aromatic).	68–0304
		9	8.7×10^9 (rel.)	$k/k_{RNO} = 0.70 \pm$	γ–r.	opt.	c.k.	72–0837
3.450	2–hydroxybutyric acid	1	6.9×10^8 (rel.)	$k/k_{Fe^{2+}} = 3.0$	Fenton	chem.	c.k.	49–0002
3.451	2–hydroxyethyl acetate	—	8.5×10^8 (rel.)	$k/k_{CNS^-} = 8.25 \times 10^{-2}$	p.r.	opt.	c.k.	75–1126
3.452	2–hydroxyethyl–ethylenediamine–triacetic acid	~0	—	$k/k_{acrylamide} = 1.9$	Fenton	pol.	c.k.	72–9162
3.453	1–(2–hydroxyethyl)–2–methyl–5–nitroimidazole	—	4.1×10^9 (rel.)	$k/k_{CNS^-} = 0.37$	p.r.	opt.	c.k.; d.k. at 320 nm gave $k \cong 10^9$.	74–1135
		—	$(5.5 \pm 0.2) \times 10^9$	—	p.r.	opt.	p.b.k. at 420 nm.	75–1067
3.454	2–hydroxyethyl–sulfide ion $OH + OH(CH_2)_2S^- \rightarrow OH^- + OH(CH_2)_2S\bullet$	11	4.0×10^9 (± 15%)	—	p.r.	opt.	p.b.k. at 410–420 nm ($RSSR^-$).	69–0553
3.454a	1–(2–hydroxy–3–methoxypropyl)–2–nitroimidazole	—	$(7.1 \pm 0.3) \times 10^9$	—	p.r.	opt.	p.b.k. at 475 nm.	75–1067
3.455	5–hydroxyindole	9.0	$(1.67 \pm 0.10) \times 10^{10}$ (rel.)	—	γ–r.	opt.	c.k. with RNO; rel. to k(OH + tryptophan) = 1.25×10^{10}.	71–0556
3.456	*m*–hydroxyphenol	9	1.2×10^{10} (rel.)	$k/k_{RNO} = 0.97 \pm 0.12$	γ–r.	opt.	c.k.	72–0837
3.457	*o*–hydroxyphenol	9	1.1×10^{10} (rel.)	$k/k_{RNO} = 0.89 \pm 0.14$	γ–r.	opt.	c.k.	72–0837
	p–hydroxyphenol	*See* hydroquinone (3.446).						

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.458	p–hydroxyphenyl–β–D–glucopyranoside	—	2.7×10^9 (rel.)	—	γ–r.	opt.	c.k. with RNO; rel. to $k = 4.4 \times 10^9$ for phenyl β–D–glucopyranoside.	71–0056
3.459	p–hydroxyphenyl–propionate ion	10.6	2.1×10^{10} (rel.)	$k/k_{carb} = 58.5$	p.r.	opt.	c.k.	68–0062
		6.3	$(1.2 \pm 0.2) \times 10^{10}$ (rel.)	$k/k_{CNS^-} = 1.1$	p.r.	opt.	c.k.	73–0003
		11.0	$(1.6 \pm 0.2) \times 10^{10}$ (rel.)	$k/k_{CNS^-} = 1.45$	p.r.	opt.	c.k.	73–0003
3.460	p–hydroxyphenyl–propionic acid	4.6	1.3×10^{10} (rel.)	$k/k_{HCOO^-} = 3.7$	p.r.	opt.	c.k.; $pK_a = 4.6$, 10.1.	68–0062
3.461	hydroxyproline	2–2.2	3.6×10^8 (rel.)	$k/k_{thym} = 0.066$	γ–r.	opt.	c.k.	65–0388
		6.8	3.2×10^8 (rel.)	$k/k_{RNO} = 0.0255$	γ–r.	opt.	c.k.	73–0548
3.461a	2–hydroxypropionamide	4.5, 7.0	$(1.3 \pm 0.3) \times 10^9$ (rel.)	$k/k_{CNS^-} = 0.12$	p.r.	opt.	c.k.	75–1053
3.461b	2–hydroxypurine	6–7	5.0×10^9 (rel.)	$k/k_{RNO} = 0.4$	γ–r.	opt.	c.k.; 17°C.	75–0294
3.462	2–hydroxypyridine, anion	9	4.8×10^9 (rel.)	$k/k_{RNO} = 0.38 \pm 0.01$	γ–r.	opt.	c.k.	69–0280
3.463	3–hydroxypyridine	6.5	6.8×10^9 (rel.)	$k/k_{RNO} = 0.54 \pm 0.03$	γ–r.	opt.	c.k.	69–0280
3.464	3–hydroxypyridine, anion	9	5.4×10^9 (rel.)	$k/k_{RNO} = 0.43 \pm 0.02$	γ–r.	opt.	c.k.	69–0280
3.465	4–hydroxypyridine anion	9	2.75×10^9 (rel.)	$k/k_{RNO} = 0.23 \pm 0.01$	γ–r.	opt.	c.k.	69–0280
3.466	α–hydroxytetronate ion	7	4.7×10^9 (rel.)	—	p.r.	opt.	p.b.k. at 360 nm.	74–1053
3.466a	hypoxanthine	6–7	2.7×10^9 (rel.)	$k/k_{RNO} = 0.22$	γ–r.	opt.	c.k.; 17°C.	75–0294
3.467	imidazole	3.4	5.5×10^9	—	p.r.	opt.	p.b.k.; OH addn.; $pK_a = 7.1$, 14.5.	75–1066
		6.8	8.7×10^9					
		10.9	1.2×10^{10}					
3.468	indole	9.0	$(1.37 \pm 0.05) \times 10^{10}$ (rel.)	—	γ–r.	opt.	c.k. with RNO; rel. to k(OH + tryptophan) = 1.25×10^{10}.	71–0556
		9.0	$(3.18 \pm 0.25) \times 10^{10}$	—	p.r.	opt.	p.b.k. at 320 nm.	71–0556
		—	1.3×10^{10} (rel.)	$k/k_{2\text{-PrOH}} = 5.9$	γ–r.	chem.	c.k.	72–0541
3.469	indole–3–acetic acid	—	1.1×10^{10} (rel.)	$k/k_{2\text{-PrOH}} = 5.0$	γ–r.	chem.	c.k.	72–0541
3.470	indole–5–acetic acid	9.0	$(0.79 \pm 0.07) \times 10^{10}$ (rel.)	—	γ–r.	opt.	c.k. with RNO; rel. to k(OH + tryptophan) = 1.25×10^{10}.	71–0556
3.471	indole–3–propionic acid	—	1.4×10^{10} (rel.)	$k/k_{2\text{-PrOH}} = 6.5$	γ–r.	chem.	c.k.	72–0541
3.472	indoline	9.0	$(2.02 \pm 0.14) \times 10^{10}$ (rel.)	—	γ–r.	opt.	c.k. with RNO; rel. to k(OH + tryptophan) = 1.25×10^{10}.	71–0556
		9.0	$(3.83 \pm 0.48) \times 10^{10}$	—	p.r.	opt.	p.b.k. at 320 nm.	71–0556
3.473	inositol	6.5	1.0×10^{10} (rel.)	$k/k_{RNO} = 0.8 \pm 0.1$	γ–r.	opt.	c.k.	69–0580
		—	1.4×10^9 (rel.)	$k/k_{CNS^-} = 0.13$	p.r.	opt.	c.k.	73–1077
			1.8×10^9 (rel.)	$k/k_{ferro} = 0.19$				
3.473a	iodoacetic acid	1	$(5 \pm 1) \times 10^9$ (rel.)	$k/k_{ferro} = 0.54$	p.r.	opt.	c.k.	74–5286
3.474	iodobenzene	9	5×10^9 (rel.)	$k/k_{RNO} = 0.40 \pm 0.02$	γ–r.	opt.	c.k.	69–0280
3.475	2–iodobenzoate ion	9	4.5×10^9 (rel.)	—	—	—	c.k. with RNO.	66–0843
3.476	3–iodobenzoate ion	9	2.9×10^9 (rel.)	—	—	—	c.k. with RNO.	66–0843

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.477	4–iodobenzoate ion	9	2.5×10^9 (rel.)	—	—	—	c.k. with RNO.	66–0843
3.478	iodomethane $OH + CH_3I \rightarrow CH_3OH + I$	—	1.4×10^9 (rel.)	$k/k_{MeOH} = 1.54$	γ–r.	chem.	c.k.; meas. I_2 yields.	69–0019
3.479	3–iodopropionic acid	—	$(1.2 - 4.0) \times 10^8$ (rel.)	$k/k_{CNS^-} = (1.1 - 3.6) \times 10^{-2}$	p.r.	opt.	c.k.	70–1226
			1.6×10^8 (rel.)	$k/k_{NB} = 0.051$	p.r.	opt.	c.k.	70–1226
	isoamyl alcohol	*See* 3–methyl–1–butanol (3.527).						
3.480	isoamylammonium ion	4	7.8×10^9 (rel.)	$k/k_{CNS^-} = 0.714$	p.r.	opt.	c.k.	70–0371
	isobutanol	*See* 2–methyl–1–propanol (3.545).						
3.481	isobutylammonium ion	4	3.1×10^9 (rel.)	$k/k_{CNS^-} = 0.278$	p.r.	opt.	c.k.	70–0371
3.482	isobutylene	—	5.9×10^9 (rel.)	$k/k_{I^-} = 0.49$	p.r.	opt.	c.k.; meas. I_2^- at 400 nm.	67–0041
3.483	isobutyramide	5–6	1.6×10^9 (rel.)	$k/k_{CNS^-} = 0.143$	p.r.	opt.	c.k.	71–0414
3.483a	isoguanine	11.0	1.23×10^{10} (rel.)	$k/k_{RNO} = 0.98$	γ–r.	opt.	c.k.; 17°C.	75–0294
3.484	isoleucine	2–2.2	1.8×10^9 (rel.)	$k/k_{thym} = 0.34$	γ–r.	opt.	c.k.	65–0388
		6.6	1.7×10^9 (rel.)	$k/k_{RNO} = 0.14$	γ–r.	opt.	c.k.	73–0548
3.485	isoorotate ion	7	4.0×10^9	—	p.r.	opt.	p.b.k. (OH adduct).	70–0567
		6–7	2.5×10^9 (rel.)	$k/k_{RNO} = 0.2$	γ–r.	opt.	c.k.; 17°C.	75–0294
	isopropanol *See* 2–propanol (3.637).							
3.486	isopropyl acetate	1	2.9×10^8 (rel.)	$k/k_{Fe^{2+}} = 1.25$	Fenton	chem.	c.k.	49–0002
		6–7	4.5×10^8 (rel.)	$k/k_{CNS^-} = 0.041$	p.r.	opt.	c.k.	65–0387
		2.0	4.3×10^8 (rel.)	$k/k_{CNS^-} = 0.0395$	p.r.	opt.	c.k.	65–0387
3.487	isopropylamine $OH + (CH_3)_2CHNH_2 \rightarrow H_2O + (CH_3)_2\dot{C}NH_2$	12.0	1.3×10^{10} (rel.)	—	p.r.	opt.	c.k.; value extrapolated from obs. $k/k_{CNS^-} = 8.2 \times 10^{-1}$ at pH 10.8.	71–0585
3.488	isopropylammonium ion	3.0	5.0×10^8 (rel.)	$k/k_{CNS^-} = 0.0455$	p.r.	opt.	c.k.	71–0585
	$OH + (CH_3)_2CHNH_3^+ \rightarrow H_2O + CH_2(CH_3)CHNH_3^+$	4	4.7×10^8 (rel.)	$k/k_{CNS^-} = 0.0429$	p.r.	opt.	c.k.	70–0371
3.489	keratan sulfate	—	7.9×10^8 (rel.)	$k/k_{CNS^-} = 0.072$	p.r.	opt.	c.k.	71–0067
3.490	lactate ion	9	4.8×10^9 (rel.)	—	—	—	c.k. with RNO.	66–0843
		—	7×10^8	—	p.r.	—	prelim. value.	74–1007
3.491	lactic acid	1	3.9×10^8 (rel.)	$k/k_{Fe^{2+}} = 1.7$	Fenton	chem.	c.k.	49–0002
		2–2.2	6.5×10^8 (rel.)	$k/k_{thym} = 0.12 \pm 0.01$	γ–r.	opt.	c.k.	67–0461
		1	4.3×10^8 (rel.)	$k/k_{CNS^-} = 0.0393$	p.r.	opt.	c.k.	65–0387
3.492	lactose	6.5	2.4×10^9 (rel.)	$k/k_{RNO} = 0.19 \pm 0.02$	γ–r.	opt.	c.k.	69–0580
3.493	leucine, positive ion	2–2.2	1.5×10^9 (rel.)	$k/k_{CNS^-} = 0.14$	p.r.	opt.	c.k.	65–0388
		2–2.2	2.0×10^9 (rel.)	$k/k_{thym} = 0.37$	γ–r.	opt.	c.k.	65–0388
3.494	leucine, zwitterion	5.5–6	1.6×10^9 (rel.)	$k/k_{CNS^-} = 0.15$	p.r.	opt.	c.k.	65–0388
		6.9	1.8×10^9 (rel.)	$k/k_{RNO} = 0.145$	γ–r.	opt.	c.k.	73–0548
3.495	leucine, negative ion	9.7–9.9	3.7×10^9 (rel.)	$k/k_{CNS^-} = 0.34$	p.r.	opt.	c.k.	65–0388
3.496	luminol	9.5	8.7×10^9	—	p.r.	opt.	p.b.k.	73–1068
3.497	lysine	2–2.2	6.5×10^8 (rel.)	$k/k_{thym} = 0.12$	γ–r.	opt.	c.k.	65–0388
		6.6	3.5×10^8 (rel.)	$k/k_{RNO} = 0.028$	γ–r.	opt.	c.k.	73–0548
3.497a	lysine vasopressin	~6	$(1.4 \pm 0.2) \times 10^{10}$	—	p.r.	opt.	p.b.k. at 325 nm.	74–1102
3.498	lysozyme	9	1.9×10^{10} (rel.)	$k/k_{RNO} = 1.49$	γ–r.	opt.	c.k.	67–0555
		5.6	5.2×10^{10} (rel.)	$k/k_{CNS^-} = 4.7$	p.r.	opt.	c.k.; mol. wt. 15,000; k is upper limit.	68–0683
		7.4	4.9×10^{10}	—	p.r.	opt.	p.b.k. at 350 nm.	69–3039

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.498 cont.		7.4	—	$k/k_{t\text{-BuOH}} = 56$	—	—	c.k.	69–3039
		6.4	4.2×10^{10} (rel.)	$k/k_{RNO} = 3.4$	γ–r.	opt.	c.k.	73–0548
3.499	malate ion	—	$(8.6 \pm 0.8) \times 10^{8}$	—	p.r.	—	prelim. value.	74–1007
3.500	maleic acid	1	4.6×10^{8} (rel.)	$k/k_{MeOH} = 0.515$	Fenton	chem.	c.k.; $k_{MeOH}/k_{Fe^{2+}} = 4.3$.	73–9341
3.501	malic acid	2–2.2	5.4×10^{8} (rel.)	$k/k_{thym} = 0.10 \pm 0.01$	γ–r.	opt.	c.k.	67–0461
3.502	malonate ion	9	5.5×10^{7} (rel.)	$k/k_{EtOH} = 0.0296$	γ–r.	opt.	c.k. with RNO.	66–0423
3.503	malonic acid	6–7	3.0×10^{8} (rel.)	$k/k_{CNS^-} = 0.0273$	p.r.	opt.	c.k.	65–0387
		2–2.2	2.0×10^{7} (rel.)	$k/k_{thym} = 0.0037$	γ–r.	opt.	c.k.	67–0461
		1	2.6×10^{7} (rel.)	$k/k_{MeOH} = 0.017$	Fenton	chem.	c.k.; $k_{MeOH}/k_{Fe^{2+}} = 4.3$.	73–9341
3.504	melibiose	6.5	3.8×10^{9} (rel.)	$k/k_{RNO} = 0.3 \pm 0.1$	γ–r.	opt.	c.k.	69–0580
3.505	menaquinone (Vitamin K_3)	—	5.5×10^{9}	—	—	—	—	73–0026
	2–mercaptoacetate ion *See* thioglycolate ion (3.705).							
3.506	2–mercaptoethanol	6–7	8.5×10^{9} (rel.)	$k/k_{CNS^-} = 0.773$	p.r.	opt.	c.k.	65–0387
	$OH + OH(CH_2)_2SH \rightarrow$	7	2.7×10^{10} (rel.)	$k/k_{CNS^-} = 2.43$	p.r.	opt.	c.k.	69–0553
	$H_2O + OH(CH_2)_2S\cdot$	6.5	6.0×10^{9} (rel.)	$k/k_{ferro} = 0.65$	p.r.	opt.	c.k.	71–0175
		6	3.3×10^{9} (rel.)	$k/k_{NB} = 1.04$	p.r.	opt.	c.k.; cor. for H.	71–0175
		6	1.8×10^{10} (rel.)	$k/k_{CNS^-} = 1.68$	p.r.	opt.	c.k.	71–0175
	See also 2–hydroxyethylsulfide ion (3.453).							
	2–mercaptoethylamine *See* cysteamine (3.286).							
	2–mercaptopropionate ion *See* thiolactate ion (3.706).							
3.508	3–mercaptopropionate ion	6.0	3.0×10^{10} (rel.)	$k/k_{CNS^-} = 2.7 \pm 0.4$	p.r.	opt.	c.k.; $pK_a = 4.3$, 10.3 for the acid.	73–0090
		10.7	2.1×10^{10} (rel.)	$k/k_{CNS^-} = 1.9 \pm 0.3$				
	2–mercaptovaline *See* penicillamine (3.596).							
3.509	methane	9	2.4×10^{8} (rel.)	$k/k_{EtOH} = 0.13$	γ–r.	opt.	c.k. with RNO.	66–0423
	$OH + CH_4 \rightarrow H_2O + CH_3$	5.5	$(1.21 \pm 0.4) \times 10^{8}$	—	p.r.	opt.	d.k. (OH) at 250 nm.	72–0445
3.509a	methanesulfonic acid	—	1.3×10^{9} (rel.)	$k/k_{CNS^-} = 0.114$	p.r.	opt.	c.k.	75–1072
3.510	methanethiol $OH + CH_3SH \rightarrow H_2O + CH_3S$	7	3.3×10^{10} (rel.)	$k/k_{CNS^-} = 3.04$	p.r.	opt.	c.k.	69–0553
	See also methylsulfide ion (3.553).							
3.511	methanol (MeOH)	1	5.3×10^{8} (rel.)	$k/k_{Fe^{2+}} = 2.3$	Fenton	chem.	c.k.	49–0002
	(I) $OH + CH_3OH \rightarrow H_2O + CH_2OH$	7	6.0×10^{8} (rel.)	$k/k_{I^-} = 0.046 \pm 0.004$	p.r.	opt.	c.k.; meas. I_2^- at 400 nm.	65–0010
	(II) $OH + CH_3OH \rightarrow H_2O + CH_3O$	10.5	9.7×10^{8} (rel.)	$k/k_{BzO^-} = 0.17$	γ–r.	trac.	c.k.; formn. of $^{14}CO_2$.	65–0099
		7	8.8×10^{8} (rel.)	$k/k_{carb} = 2.4$	p.r.	opt.	c.k.	65–0190
		10.7	8.4×10^{8} (rel.)	$k/k_{carb} = 2.3$	p.r.	opt.	c.k.	65–0190
		7.0	7.7×10^{8} (rel.)	$k/k_{CNS^-} = 0.07$	p.r.	opt.	c.k.	65–0190
		—	5.7×10^{8} (rel.)	$k/k_{ferro} = 0.061$	phot.	—	c.k.	65–0247
		9.0	1.1×10^{9} (rel.)	$k/k_{RNO} = 8.6 \pm 0.4) \times 10^{-2}$	γ–r.	opt.	c.k.	65–0356
		2	7.4×10^{8} (rel.)	$k/k_{CNS^-} = 0.067$	p.r.	opt.	c.k.	65–0387
		7	8.0×10^{8} (rel.)	$k/k_{CNS^-} = 0.073$	p.r.	opt.	c.k.	65–0387
		4.5	3×10^{8}	—	γ–r.	chem.	est. from yields in carboxylation of methanol.	65–0375
		2–2.2	8.6×10^{8} (rel.)	$k/k_{thym} = 0.16 \pm 0.015$	γ–r.	opt.	c.k.	65–0388, 67–0461
		5–5.5	9.4×10^{8} (rel.)	$k/k_{thym} = 0.175 \pm 0.015$	γ–r.	opt.	c.k.	65–0388, 67–0461

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.511 cont.		—	—	$k/k_{bisulf} = 550$	p.r.	opt.	c.k.; obs. formn. of SO_4^- at 450 nm.	66–0019
		6	8.6×10^8 (rel.)	$k/k_{EtOH} = 0.464$	γ–r.	chem.	c.k. with Br^-.	66–0423
		9	1.0×10^9 (rel.)	$k/k_{EtOH} = 0.555$	γ–r.	opt.	c.k. with RNO.	66–0423
		—	5.5×10^8 (rel.)	$k/k_{I^-} = 0.046$	p.r.	opt.	c.k.; meas. I_2^- at 400 nm.	67–0041
		2	2.8×10^9 (rel.)	$k/k_{RNO} = 0.22$	Fenton	opt.	c.k.	67–0555
		—	—	$k/k_{TCOO^-} = 0.3$	γ–r.	trac.	c.k.; meas. ^{3}HHO produced.	68–0209
		9	1×10^9 (rel.)	$k/k_{RNO} = 0.08$	γ–r.	opt.	c.k.	68–0310
		—	8.0×10^8 (rel.)	$k/k_{BzO^-} = 0.14$	p.r.	opt.	c.k.; obs. hydroxycyclohex–adienyl radical buildup.	68–0304
			8.3×10^8 (rel.)	$k/k_{PA^-} = 0.105$				
			8.3×10^8 (rel.)	$k/k_{PNBA^-} = 0.32$				
		~1.2	6.4×10^8 (rel.)	$k/k_{2\text{-PrOH}} = 0.29$	γ–r.	chem.	c.k.	68–0602
		6.98	7.9×10^8 (rel.)	$k/k_{2\text{-PrOH}} = 0.36$	γ–r.	chem.	c.k.; $\mu = 0.1$; ratio = 0.34 at $\mu = 1.1$.	68–0602
		—	9.5×10^8 (rel.)	$k/k_{RNO} = 0.076$	p.r.	opt.	c.k.	69–0156
		1	1.1×10^9 (rel.)	$k/k_{tbym} = 0.206$	Fenton	esr	c.k.; $k/k_{perox} = 15.0$.	69–5278
		1	9.8×10^8 (rel.)	$k/k_{thym} = 0.18$	Ti(III) – H_2O_2	esr	c.k.; $k/k_{perox} = 12.8$.	69–5278
		9	1.1×10^9 (rel.)	$k/k_{RNO} = 0.09$	γ–r.	opt.	c.k.; $E_a = -1.9 \pm 0.08$ kcal/mol(7.9kJ/mol) at −8 to 23°C.	71–0469
		nat.	8.6×10^8 (rel.)	$k/k_{ferro} = 0.0925$	p.r.	opt.	c.k.	71–0578
		0.82	9.9×10^8 (rel.)	$k/k_{Fe^{2+}} = 4.30$	Fenton	chem.	c.k.	71–9132
		—	—	$k_{II}/k_I = 0.075$	p.r.	opt.	hydroxymethyl radical identified by reaction with TNM, methoxy radical by I^-.	73–0126
		~1	1.3×10^9 (rel.)	$k/k_{EtOH} = 0.63$	γ–r.	chem.	obs. effect of alcohols on oxid. Sb(III) → Sb(IV).	73–0289
		10.4	1.2×10^9 (rel.)	$k/k_{EtOH} = 0.62$	X–r.	lum.	obs. effect. of alcohols on quenching chemiluminescence from fluorescein.	73–6068
			For other ratios see: 3.8, 3.10, 3.12, 3.25, 3.27, 3.41, 3.50, 3.54, 3.58, 3.66, 3.71, 3.80, 3.82, 3.88, 3.90, 3.91, 3.100, 3.102, 3.103, 3.106, 3.107, 3.112, 3.129, 3.131, 3.132, 3.144, 3.225, 3.246, 3.271, 3.304, 3.319, 3.358, 3.368, 3.386, 3.436, 3.446, 3.478, 3.500, 3.503, 3.546, 3.592, 3.593, 3.636, 3.637, 3.669, 3.673, 3.680, 3.698, 3.711, 3.755.				
3.512	methanol–d_3 $OH + CD_3OH \rightarrow HDO + CD_2OH$	6	4.2×10^8 (rel.)	$k/k_{EtOH} = 0.227$	p.r.	chem.	c.k. with Br^-.	66–0423
3.513	methionine	6–7	8.5×10^9 (rel.)	$k/k_{CNS^-} = 0.77$	p.r.	opt.	c.k.	65–0387
		2–2.2	6.5×10^9 (rel.)	$k/k_{thym} = 1.2$	γ–r.	opt.	c.k.	65–0388
		5.5–5.7	8.1×10^9 (rel.)	$k/k_{CNS^-} = 0.74$	p.r.	opt.	c.k.	65–0388
		6.6	6.5×10^9 (rel.)	$k/k_{RNO} = 0.52$	γ–r.	opt.	c.k.	73–0548
3.514	methoxyacetate ion	9	6.0×10^8 (rel.)	$k/k_{EtOH} = 0.323$	γ–r.	opt.	c.k. with RNO.	66–0423
3.515	*p*–methoxybenzoate ion	9	5.0×10^9 (rel.)	$k/k_{EtOH} = 2.7$	γ–r.	opt.	c.k. with RNO.	66–0441
3.516	2–methoxyethanol	9	1.3×10^9 (rel.)	$k/k_{EtOH} = 0.7$	γ–r.	opt.	c.k. with RNO.	66–0423

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.517	5–methoxyindole	9.0	$(1.39 \pm 0.04) \times 10^{10}$ (rel.)	—	γ–r.	opt.	c.k. with RNO; rel. to k(OH + tryptophan) = $(1.25 \pm 0.3) \times 10^{10}$.	71–0556
3.517a	1–methoxy–2–methyl–1–phenylpropane	1.7–1.8	8.6×10^9 (rel.)	$k/k_{2\text{-PrOH}} = 3.9$	Fenton	chem.	c.k. with 1–phenylethanol.	74–9006
3.518	*o*–methoxyphenol	9	1.5×10^{10} (rel.)	$k/k_{RNO} = 1.18 \pm 0.15$	γ–r.	opt.	c.k.	72–0837
3.519	*p*–methoxyphenol	9	1.45×10^{10} (rel.)	$k/k_{RNO} = 1.15 \pm 0.23$	γ–r.	opt.	c.k.	72–0837
3.520	*p*–methoxyphenyl–β–D–gluco–pyranoside	—	7.0×10^9 (rel.)	—	p.r.	opt.	c.k. with RNO; rel. to k(OH + X) = 4.4×10^9 where X = phenyl–β–D–glucopyranoside.	71–0056
		—	1.1×10^{10} (rel.)	$k/k_{CNS^-} = 1.04$	p.r.	opt.	c.k.	71–0056
3.521	*N*–methylacetamide $OH + CH_3CONHCH_3 \rightarrow CH_3CONHCH_2 + H_2O$	5.5	1.6×10^9 (rel.)	$k/k_{CNS^-} = 0.146$	p.r.	opt.	c.k.	70–0098, 71–0645
3.522	methyl acetate	1	2×10^8 (rel.)	$k/k_{Fe^{2+}} = 0.85$	Fenton	chem.	c.k.	49–0002
		6–7	1.2×10^8 (rel.)	$k/k_{CNS^-} = 0.0106$	p.r.	opt.	c.k.	65–0387
		2.0	1.3×10^8 (rel.)	$k/k_{CNS^-} = 0.0121$	p.r.	opt.	c.k.	65–0387
		9	1.1×10^8 (rel.)	$k/k_{EtOH} = 0.0595$	γ–r.	opt.	c.k. with RNO.	66–0423
3.523	methylamine	12	2.4×10^9 (rel.)	$k/k_{EtOH} = 1.3$	γ–r.	opt.	c.k. with RNO.	66–0423
	$OH + CH_3NH_2 \rightarrow H_2O + CH_2NH_2 + CH_3NH$	11.5–12.5	4.7×10^9 (rel.)	$k/k_{NB} = 1.47$	p.r.	opt.	c.k.	69–0573
		10.5	1.8×10^9 (rel.)	$k/k_{CNS^-} = 0.16$	p.r.	opt.	c.k.	71–0595
		11.1	3.3×10^9 (rel.)	$k/k_{NB} = 1.04$	p.r.	opt.	c.k.; at pH 9.7, 12.8 ratio = 0.13 and 1.5, resp.	71–0595
3.524	methylammonium ion	5	1.9×10^7 (rel.)	$k/k_{EtOH} = 0.0103$	γ–r.	opt.	c.k. with RNO.	66–0423
		6–8	7.5×10^7 (rel.)	$k/k_{NB} = 0.0234$	p.r.	opt.	c.k.	69–0573
		2	2.8×10^7 (rel.)	$k/k_{CNS^-} = 0.0025$	p.r.	opt.	c.k.	70–0371
		4	3.5×10^7 (rel.)	$k/k_{CNS^-} = 0.0032$	p.r.	opt.	c.k.	70–0371
		7	5.9×10^7 (rel.)	$k/k_{CNS^-} = 0.0054$	p.r.	opt.	c.k.	70–0371
3.525	methylarabinoside	6.5	2.4×10^9 (rel.)	$k/k_{RNO} = 0.19 \pm 0.04$	γ–r.	opt.	c.k.	69–0580
3.526	2–methyl–2–butanol	9	1.85×10^9 (rel.)	$k/k_{EtOH} = 1.0$	γ–r.	opt.	c.k. with RNO.	66–0423
3.527	3–methyl–1–butanol (isoamyl alcohol)	—	3.8×10^9 (rel.)	$k/k_{CNS^-} = 0.34$	p.r.	opt.	c.k.	73–1077
			3.4×10^9 (rel.)	$k/k_{ferro} = 0.36$				
3.528	methyl butyrate	6–7	1.7×10^9 (rel.)	$k/k_{CNS^-} = 0.152$	p.r.	opt.	c.k.	65–0387
3.529	2–methylbutyrate ion	9	2.2×10^9 (rel.)	$k/k_{EtOH} = 1.18$	γ–r.	opt.	c.k. with RNO.	66–0423
3.530	3–methylbutyrate ion	9	2.3×10^9 (rel.)	$k/k_{EtOH} = 1.27$	γ–r.	opt.	c.k. with RNO.	66–0423
3.531	3–methylbutyric acid	1	7.6×10^8 (rel.)	$k/k_{Fe^{2+}} = 3.3$	Fenton	chem.	c.k.	49–0002
3.532	*S*–methylcysteine	5.4	8.0×10^9 (rel.)	$k/k_{CNS^-} = 0.73$	—	—	c.k.; $pK_a \cong 2,8.8$.	73–0090
		11.0	7.9×10^9 (rel.)	$k/k_{CNS^-} = 0.72$				
3.533	5–methylcytosine	4.2	$(4.7 \pm 0.5) \times 10^9$	—	p.r.	opt.	p.b.k. at 450 nm.	70–3069
		6–7	5.2×10^9 (rel.)	$k/k_{RNO} = 0.42$	γ–r.	opt.	c.k.; 17°C.	75–0294
3.534	methylene blue $OH + MB^+ \rightarrow MB^{2+} + OH^-$	—	4.1×10^{10} (rel.)	$k/k_{EtOH} = 22$	γ–r.	chem.	c.k.; obs. $G(-MB^+)$.	71–0682
3.535	*N*–methylformamide	5.5	1.2×10^9 (rel.)	$k/k_{CNS^-} = 0.11$	p.r.	opt.	c.k.	70–0098
3.536	methylgalactoside	6.5	1.6×10^9 (rel.)	$k/k_{RNO} = 0.13 \pm 0.01$	γ–r.	opt.	c.k.	69–0580
3.537	methylglucoside	6.5	2.4×10^9 (rel.)	$k/k_{RNO} = 0.19 \pm 0.02$	γ–r.	opt.	c.k.	69–0580
3.538	*O*–methylhydroxyl–amine	4.5	$\leq 4.0 \times 10^8$ (rel.)	$k/k_{CNS^-} = 0.036$	p.r.	opt.	c.k.	71–0493
		9.1	1.4×10^{10} (rel.)	$k/k_{CNS^-} = 1.3$	p.r.	opt.	c.k.	71–0493

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.538a	*N*–methylimidazole	5.4	5.0×10^9	—	p.r.	opt.	p.b.k.; $pK_a = 7.0$;	75–1066
		9.4	8.1×10^9				OH addn.	
3.539	1–methylindole	9.0	$(1.45 \pm 0.01) \times 10^{10}$ (rel.)	—	γ–r.	opt.	c.k. with RNO; rel. to k(OH + tryptophan) = 1.25×10^{10}.	71–0556
3.540	2–methylindole	9.0	1.44×10^{10} (rel.)	—	γ–r.	opt.	c.k. with RNO; rel. to k(OH + tryptophan) = 1.25×10^{10}.	71–0556
		9.0	$(3.41 \pm 0.28) \times 10^{10}$	—	p.r.	opt.	p.b.k. at 320 nm.	71–0556
3.541	3–methylindole	9.0	$(1.05 \pm 0.09) \times 10^{10}$ (rel.)	—	γ–r.	opt.	c.k. with RNO; rel. to k(OH + tryptophan) = 1.25×10^{10}.	71–0556
		9.0	$(3.34 \pm 0.08) \times 10^{10}$	—	p.r.	opt.	p.b.k. at 320 nm.	71–0556
3.542	5–methylindole	9.0	$(1.66 \pm 0.06) \times 10^{10}$ (rel.)	—	γ–r.	opt.	c.k. with RNO; rel. to k(OH + tryptophan) = 1.25×10^{10}.	71–0556
3.543	*N*–methylisobutyramide	5–6	1.9×10^9 (rel.)	$k/k_{CNS^-} = 0.176$	p.r.	opt.	c.k.	71–0414
	methyl mercaptan *See* methanethiol (3.510).							
3.543a	2–methyl–4–phenyl–2–butanol	1.7–1.8	6.8×10^9 (rel.)	$k/k_{2\text{-PrOH}} = 3.1$	Fenton	chem.	c.k. with cycloheptanol.	74–9006
3.543b	2–methyl–5–phenyl–2–pentanol	1.7–1.8	$< 4.4 \times 10^7$ (rel.)	$k/k_{2\text{-PrOH}} = < 0.02$	Fenton	chem.	c.k. with 3–pentanol.	74–9006
3.543c	2–methyl–1–phenyl–1–propanol	1.7–1.8	1.1×10^{10} (rel.)	$k/k_{2\text{-PrOH}} = 5.0$	Fenton	chem.	c.k. with 1–phenylethanol.	74–9006
3.543d	2–methyl–1–phenyl–1–propanol–1–*d*	1.7–1.8	9.9×10^9 (rel.)	$k/k_{2\text{-PrOH}} = 4.5$	Fenton	chem.	c.k. with 1–phenylethanol.	74–9006
3.543e	2–methyl–1–phenyl–2–propanol	1.7–1.8	2.0×10^{10} (rel.)	$k/k_{2\text{-PrOH}} = 9.0$	Fenton	chem.	c.k. with cycloheptanol.	74–9006
3.544	*N*–methylpivalamide	5–6	2.4×10^9 (rel.)	$k/k_{CNS^-} = 0.218$	p.r.	opt.	c.k.	71–0414
3.545	2–methyl–1–propanol	7	3.3×10^9 (rel.)	$k/k_{CNS^-} = 0.303$	p.r.	opt.	c.k.	65–0387
		9	3.5×10^9 (rel.)	$k/k_{EtOH} = 1.9$	γ–r.	opt.	c.k. with RNO.	66–0423
	(isobutanol)	2–2.2	3.8×10^9 (rel.)	$k/k_{thym} = 0.70 \pm 0.05$	γ–r.	opt.	c.k.	67–0461
	$OH + (CH_3)_2CHCH_2OH \rightarrow (CH_3)_2CHCHOH$ (75%, 69–0522) $+ H_2O +$ $CH_3CH(CH_2)CH_2OH$, etc.	—	3.6×10^9 (rel.)	$k/k_{CNS^-} = 0.33$	p.r.	opt.	c.k.	73–1077
			2.6×10^9 (rel.)	$k/k_{ferro} = 0.28$				
3.546	2–methyl–2–propanol (*tert*–butanol)	1	1.4×10^8 (rel.)	$k/k_{Fe^{2+}} = 0.0065$	Fenton	chem.	c.k.	49–0002
		7	4.2×10^8 (rel.)	$k/k_{CNS^-} = 0.038$	p.r.	opt.	c.k.	65–0387
		9	4.6×10^8 (rel.)	$k/k_{EtOH} = 0.25$	γ–r.	opt.	c.k. with RNO.	66–0423
	(I) $OH + (CH_3)_3COH \rightarrow$	2–2.2	7.3×10^8 (rel.)	$k/k_{thym} = 0.135 \pm 0.015$	γ–r.	opt.	c.k.	67–0461 65–0388
	$(CH_3)_2COHCH_2 + H_2O$	nat.	5.2×10^8 (rel.)	$k/k_{ferro} = 0.056$	p.r.	opt.	c.k.	71–0578
		0.82	4.3×10^8 (rel.)	$k/k_{Fe^{2+}} = 1.90$	Fenton	chem.	c.k.	71–9132
	(II) $OH + (CH_3)_3COH \rightarrow H_2O + (CH_3)_3CO$	—	—	$k_{II}/k_I = 0.045$	p.r.	opt.	detd. % alkoxy radical by reaction with I^-.	73–0126
		—	$\sim 6 \times 10^8$ (rel.)	$k/k_{EtOH} \cong 0.33$	Fenton	chem.	c.k.	73–9105
		7	5.8×10^8 (rel.)	$k/k_{MeOH} = 0.65$	Ti(III) + H_2O_2	esr	obs. radical ratios.	74–5144
		1.7–1.8	2.2×10^7 (rel.)	$k/k_{2\text{-PrOH}} = 0.01$	Fenton	chem.	c.k. with 3–pentanol.	74–9006
			For other ratios see:	3.41, 3.97, 3.310, 3.343, 3.498.				

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.547	*N*–methylpropion–amide	5–6	1.4×10^9 (rel.)	$k/k_{CNS^-} = 0.13$	p.r.	opt.	c.k.	71–0414
3.548	methyl propionate	6–7	4.5×10^8 (rel.)	$k/k_{CNS^-} = 0.041$	p.r.	opt.	c.k.	65–0387
3.549	2–methylpropionate ion (isobutyrate ion)	9	1.3×10^9 (rel.)	$k/k_{EtOH} = 0.68$	γ–r.	opt.	c.k. with RNO.	66–0423
3.550	2–methylpyridine	9	2.5×10^9 (rel.)	$k/k_{RNO} = 0.20 \pm 0.01$	γ–r.	opt.	c.k.	69–0280
3.551	3–methylpyridine	9	2.4×10^9 (rel.)	$k/k_{RNO} = 0.19 \pm 0.01$	γ–r.	opt.	c.k.	69–0280
3.552	methyl sulfide $OH + CH_3SCH_3 \rightarrow CH_3S(OH)CH_3 \rightarrow (CH_3SCH_3)^+ + OH^-$	—	5.2×10^9 (rel.)	—	p.r.	opt.	c.k. with MeOH, 2–PrOH and $HCOO^-$; meas. abs. at 470 nm $(CH_3SCH_3)^+$.	67–0186
3.553	methylsulfide ion $OH + CH_3S^- \rightarrow OH^- + CH_3S$	11	$(6.0 \pm 0.9) \times 10^9$	—	p.r.	opt.	p.b.k. at 410–420 nm. $(RSSR^-)$.	69–0553
3.554	methyl thioglycolate	5.1	2.1×10^{10} (rel.)	$k/k_{CNS^-} = 1.9$	p.r.	opt.	c.k.; pK = 7.8	73–0090
		10.6	1.8×10^{10} (rel.)	$k/k_{CNS^-} = 1.6$				
	5–methyluracil *See* thymine (3.711).							
	Metronidazole *See* 1–(2–hydroxyethyl)–2–methyl–5–nitroimidazole (3.453).							
3.555	1–naphthalene–acetic acid	—	1×10^{10} (rel.)	$k/k_{2\text{–PrOH}} = 4.6$	γ–r.	chem.	c.k.	72–0541
3.556	1–naphthoate ion	9	7.9×10^9	—	p.r.	opt.	p.b.k.	73–0110
3.557	2–naphthoate ion	9	7.6×10^9	—	p.r.	opt.	p.b.k.	73–0110
3.558	nicotinamide	9.0	1.5×10^9	—	p.r.	opt.	p.b.k.	71–0582
3.559	omitted							
3.560	nicotinate ion	9	1.6×10^9 (rel.)	$k/k_{RNO} = 0.13 \pm 0.01$	γ–r.	opt.	c.k.	69–0280
		9.1	2.3×10^9	—	p.r.	opt.	p.b.k.	71–0582
3.561	nicotinic acid	3.1	2.6×10^8	—	p.r.	opt.	p.b.k.	71–0582
3.562	nicotinuric acid	7.5	1.1×10^9	—	p.r.	opt.	p.b.k.	71–0582
3.563	nitrilotriacetic acid	~0	—	$k/k_{acrylamide} = 0.36$	Fenton	pol.	c.k.	72–9162
3.564	5–nitrobarbituric acid	5.9	$(9.2 \pm 0.9) \times 10^9$	—	p.r.	opt.	p.b.k. at 420 nm.	73–1003
			7.8×10^9	—			d.k. at 350 nm.	
3.565	nitrobenzene	1	6.7×10^8 (rel.)	$k/k_{Fe^{2+}} = 2.9$	Fenton	chem.	c.k.	49–0003
	$OH + C_6H_5NO_2 \rightarrow OHC_6H_5NO_2$	10.5	2.2×10^9 (rel.)	$k/k_{BzO^-} = 0.39$	γ–r.	trac.	c.k.; meas. $^{14}CO_2$ formn.	65–0099
		9	3.3×10^9 (rel.)	$k/k_{EtOH} = 1.8$	γ–r.	opt.	c.k. with RNO.	66–0441
		—	$(4.7 \pm 0.5) \times 10^9$	—	p.r.	opt.	p.b.k. at 410 nm.	67–0458
		—	3.5×10^9 (rel.)	$k/k_{CNS^-} = 0.318$	p.r.	opt.	c.k.	67–0458
		—	2.9×10^9 (rel.)	$k/k_{EtOH} = 1.55$	γ–r.	opt.	c.k. with RNO.	68–0157
		7	$(3.2 \pm 0.4) \times 10^9$	—	p.r.	opt.	p.b.k. at 410 nm; cor. for (OH + OH) and (H + aromatic).	68–0304
		7	2.8×10^9 (rel.)	$k/k_{BzO^-} = 0.49$	r.	chem.	c.k.; meas. salicylate formn.	68–0494
		9	3.1×10^9 (rel.)	$k/k_{RNO} = 0.25 \pm 0.01$	γ–r.	opt.	c.k.	69–0280
			For other ratios see: 3.12, 3.25, 3.66, 3.155, 3.168, 3.169, 3.191, 3.231, 3.233, 3.358, 3.362, 3.479, 3.506, 3.523, 3.524, 3.645, 3.646.					
3.566	nitrobenzene–d_5	—	3×10^9 (rel.)	$k/k_{EtOH} = 1.64$	γ–r.	opt.	c.k. with RNO.	68–0157
3.567	*p*–nitrobenzoate ion (PNBA$^-$)	9	2×10^9 (rel.)	$k/k_{EtOH} = 1.06$	γ–r.	opt.	c.k. with RNO.	66–0441
	$OH + NO_2C_6H_4COO^- \rightarrow NO_2C_6H_4(OH)COO^-$	6–9.4	$(2.6 \pm 0.4) \times 10^9$	—	p.r.	opt.	p.b.k. at 420 nm; cor. for (OH + OH) and (H + aromatic).	68–0304
			For other ratios see: 3.133, 3.186, 3.280–1, 3.284, 3.286, 3.358, 3.511.					
3.568	*anti*–5–nitro–2–furaldoxime (nifuroxime)	7	1.0×10^{10}	—	p.r.	opt.	p.b.k. at 500 nm as well as d.k. at 360 nm.	73–1018

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.569	5–nitro–2–furaldehyde	7	5.5×10^9	—	p.r.	opt.	p.b.k. at 500 nm as well as d.k. at 360 nm.	73–1018
3.570	5–nitro–2–furaldehyde semicarbazone (nitrofurazone)	7	1.06×10^{10}	—	p.r.	opt.	p.b.k. at 500 nm as well as d.k. at 360 nm.	73–1018, 73–3016
3.571	5–nitrofuroate ion	7	5.3×10^9	—	p.r.	opt.	p.b.k. at 500 nm as well as d.k. at 300 nm.	73–1018, 73–0114
3.572	5–nitroindole	9.0	$(1.25 \pm 0.24) \times 10^{10}$	—	γ–r.	opt.	c.k. with RNO; rel. to k(OH + tryptophan) = $(1.25 \pm 0.3) \times 10^{10}$.	71–0556
3.573	nitromethane	9	3.1×10^8 (rel.)	$k/k_{EtOH} = 0.168$	γ–r.	opt.	c.k. with RNO.	66–0423
		—	$\leq 8.4 \times 10^6$ (rel.)	$k/k_{CNS^-} \leq 7.6 \times 10^{-4}$	p.r.	opt.	c.k.	66–0800
3.574	nitromethane ion $OH + CH_2{=}NO_2^- \rightarrow CH_2(OH)NO_2^-$	10.5	$(8.5 \pm 1.5) \times 10^9$	—	p.r.	opt.	p.b.k. at 280 nm.	68–0342
3.575	5–nitro–6–methyluracil	5.9	$(5.3 \pm 0.5) \times 10^9$	—	p.r.	opt.	p.b.k. at 420 nm.	73–1003
3.576	5–nitroorotate ion	5.9	$(5.8 \pm 0.6) \times 10^9$	—	p.r.	opt.	p.b.k. at 420 nm.	73–1003
3.577	*m*–nitrophenol	9	7.1×10^9 (rel.)	$k/k_{RNO} = 0.57 \pm 0.05$	γ–r.	opt.	c.k.	72–0837
3.577a	*o*–nitrophenol	9	9.2×10^9 (rel.)	$k/k_{RNO} = 0.74 \pm 0.06$	γ–r.	opt.	c.k.	72–0837
3.577b	*p*–nitrophenol	—	$(3.8 \pm 0.6) \times 10^9$	—	p.r.	opt.	p.b.k. at 290 nm, d.k. at 400 nm.	68–0303
	$OH + HOC_6H_4NO_2 \rightarrow HOC_6H_4NO_3^- + H^+$	9	7.6×10^9 (rel.)	$k/k_{RNO} = 0.61 \pm 0.08$	γ–r.	opt.	c.k.	72–0837
3.578	*o*–nitrophenyl–β–D–glucopyranoside	—	3.0×10^9 (rel.)	—	γ–r.	opt.	c.k. with RNO; rel. to k(OH + X) = 4.4×10^9 where X = phenyl β–D–glucopyranoside.	71–0056
		—	4.8×10^9 (rel.)	$k/k_{CNS^-} = 0.44$	p.r.	opt.	c.k.	71–0056
3.579	*m*–nitrophenyl–β–D–glucopyranoside	—	3.4×10^9 (rel.)	—	γ–r.	opt.	c.k. with RNO; rel. to k(OH + X) = 4.4×10^9 where X = phenyl β–D–glucopyranoside.	71–0056
3.580	*p*–nitrophenyl–β–D–glucopyranoside	—	2.8×10^9 (rel.)	—	γ–r.	opt.	c.k. with RNO; rel. to $k_X = 4.4 \times 10^9$ where X = phenyl β–D–glucopyranoside.	71–0056
		—	4.3×10^9 (rel.)	$k/k_{CNS^-} = 0.395$	p.r.	opt.	c.k.	71–0056
3.581	nitrosobenzene	7.0	1.1×10^{10}	—	p.r.	opt.	p.b.k. at 285 nm.	66–0433
	$OH + C_6H_5NO \rightarrow C_6H_5NO_2^- + H^+$	7.0	1.8×10^{10} (rel.)	$k/k_{CNS^-} = 1.67$	p.r.	opt.	c.k.	67–0688, 66–0433
3.582	*p*–nitrosodimethylaniline (RNO)	9.0	*ca.* 1.0×10^{10} (rel.)	—	γ–r.	opt.	c.k. with 18 different compounds; meas. loss of abs. at 440 nm; $k/k_{ferro} \cong k/k_{I^-} \cong 1$.	65–0356

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.582 cont.		—	1.8×10^{10}	—	p.r.	opt.	d.k. at 440 nm.	68–0066
		—	$(1.8_5 \pm 0.15) \times 10^{10}$ (rel.)	—	p.r.	opt.	c.k. with $HCOO^-$, I^-, AsO_2^-, NO_2^-	68–0066
		7, 9.0	$(7.1 \pm 0.5) \times 10^9$ (rel.)	—	γ–r.	opt.	c.k. with Br^-, $HCOO^-$, EtOH. In N_2O saturated solution with concn. of above scavengers for complete OH removal, dye still bleaches.	68–0066
		7	$(1.25 \pm 0.2) \times 10^{10}$	—	p.r.	opt.	d.k. at 440 nm.	69–0156
		For other ratios see: 3.9, 3.12, 3.23, 3.25, 3.27, 3.35, 3.39, 3.52, 3.54, 3.63, 3.64, 3.66, 3.70, 3.73, 3.82, 3.128, 3.131, 3.146, 3.148, 3.151, 3.155, 3.165, 3.166, 3.172, 3.177, 3.180, 3.181, 3.184, 3.186, 3.191, 3.196, 3.216, 3.217, 3.219, 3.236, 3.244, 3.248, 3.253, 3.254, 3.259, 3.260, 3.265, 3.268, 3.269, 3.291, 3.294–5, 3.318, 3.340, 3.341, 3.345, 3.348, 3.358, 3.367, 3.375, 3.384, 3.388, 3.390, 3.391, 3.392, 3.394, 3.395, 3.399, 3.400, 3.403, 3.405, 3.428, 3.429, 3.442, 3.446, 3.448, 3.449, 3.456, 3.457, 3.461, 3.461a, 3.462, 3.463, 3.464, 3.465, 3.466a, 3.473, 3.474, 3.483a, 3.484, 3.485, 3.492, 3.494, 3.497, 3.498, 3.504, 3.511, 3.513, 3.518, 3.519, 3.525, 3.533, 3.536, 3.537, 3.550, 3.551, 3.560, 3.565, 3.577, 3.583, 3.590, 3.592, 3.607, 3.608, 3.614, 3.615, 3.633, 3.637, 3.648, 3.648a, 3.649, 3.651–5, 3.657a 3.660, 3.663, 3.664, 3.666, 3.669, 3.674, 3.676, 3.677, 3.689, 3.708, 3.711, 3.714, 3.715, 3.716, 3.728, 3.733, 3.737, 3.743, 3.746, 3.749, 3.749a, 3.750, 3.751, 3.753, 3.754a.					
3.583	*p*–nitro–*o*–toluene–sulfonic acid	—	1.6×10^9 (rel.)	$k/k_{RNO} = 0.128$	r.	opt.	c.k.	72–0425
3.584	5–nitrouracil	5.9	$(5.4 \pm 0.5) \times 10^9$ 7.4×10^9	—	p.r.	opt.	p.b.k. at 420 nm. d.k. at 350 nm.	73–1003
		—	$(6.5 \pm 1) \times 10^9$	—	p.r.	opt.	p.b.k. as well as d.k.	73–0145
3.585	norleucine	2.2	3×10^9 (rel.)	$k/k_{thym} = 0.55 \pm 0.06$	γ–r.	opt.	c.k.	67–0461
3.586	norpseudopelletierine *N*–oxyl (NPPN)	10.5	6.7×10^9 (rel.)	$k/k_{carb} = 18.4$	p.r.	opt.	c.k.; cor. for CO_3^- + NPPN.	71–0061
		7	$(4.7 - 4.2) \times 10^9$	—	p.r.	opt.	d.k. at 242 nm.	71–0061
3.587	norvaline	2–2.2	1.5×10^9 (rel.)	$k/k_{thym} = 0.28 \pm 0.02$	γ–r.	opt.	c.k.	67–0461
3.588	1–octanol	2–2.2	6.5×10^9 (rel.)	$k/k_{thym} = 1.20 \pm 0.15$	γ–r.	opt.	c.k.	67–0461
3.589	ornithine	2–2.2	1.7×10^8 (rel.)	$k/k_{thym} = 0.032 \pm 0.003$	γ–r.	opt.	c.k.	67–0461
3.590	orotate ion	5.2	5.8×10^9 (rel.)	$k/k_{ferro} = 0.62$	p.r.	opt.	c.k.	70–0567
		11	5.3×10^9	—	p.r.	opt.	p.b.k. at 340 nm (OH adduct).	70–0567
		11	5.0×10^9	—	p.r.	opt.	d.k. at 280 nm (5,6–double bond); ave. k(pH 5–11) by all methods = 5.2×10^9; k decreases at pH < 5.	70–0567
		6–7	4.5×10^9 (rel.)	$k/k_{RNO} = 0.36$	γ–r.	opt.	c.k.; 17°C.	73–0294
3.591	orotidine	7	4.0×10^9	—	p.r.	opt.	p.b.k. (OH adduct).	70–0567

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.592	oxalate ion $OH + C_2O_4^{2-} \rightarrow$	9.0	8.4×10^6 (rel.)	$k/k_{RNO} = 6.7 \times 10^{-4}$ (± 15%)	γ–r.	opt.	c.k.	65–0356
	$OH^- + COOCOO^- \rightarrow CO_2 + CO_2^- + OH^-$	9–13	—	$k/k_{HCOO^-} = k(O^- + C_2O_4^{2-})/k(O^- + HCOO^-)$	γ–r.	trac.	meas. formn. of $H_2C_2O_4$.	66–0151, 66–0621
		7	1×10^7 (rel.)	$k/k_{EtOH} = 0.00565$	γ–r.	chem.	c.k.	67–0131, 66–0621
		7	1×10^7 (rel.)	$k/k_{MeOH} = 0.0112$	γ–r.	chem.	c.k.	67–0131
		7	—	$k/k_{perox} = 0.208$	γ–r.	opt.	c.k.	70–1050
		6	7.8×10^6 (rel.)	$k/k_{CNS^-} = 0.0007$	p.r.	opt.	c.k.	71–0041
		—	1.6×10^7 (rel.)	$k/k_{I^-} = 0.0012$	p.r.	opt.	c.k.; obs. I_2^- formn.	73–0020
3.593	oxalate ion, hydrogen	2.7	5.6×10^8 (rel.)	$k/k_{EtOH} = 0.3$	γ–r.	chem.	c.k.	67–0131, 66–0621
			6.9×10^8 (rel.)	$k/k_{MeOH} = 0.77$				
	$OH + HC_2O_4^- \rightarrow OH^- + CO_2 + CO_2H$	3	4.7×10^7 (rel.)	$k/k_{CNS^-} = 0.00425$	p.r.	opt.	c.k.	71–0041
3.594	oxalic acid $OH + (COOH)_2 \rightarrow H_2O + CO_2 + CO_2H$	1.3, 2.7	$< 10^7$ (rel.)	—	γ–r.	chem.	c.k. with MeOH and EtOH.	66–0621, 67–0131
		2.0–2.2	9.2×10^6 (rel.)	$k/k_{thym} = (1.7 \pm 0.7) \times 10^{-3}$	γ–r.	opt.	c.k.	67–0461
		0.5	1.45×10^6 (rel.)	$k/k_{CNS^-} = 0.00013$	p.r.	opt.	c.k.	71–0041
		1.5	—	$k/k_{Cl^-} = 1.3$	X–r.	pol.	effect of Cl^- and oxalic acid on reaction of U (VI).	71–0542
			For other ratios see: 3.382, 3.427.					
3.594a	oxytocin	~6	$(1.3 \pm 0.2) \times 10^{10}$	—	p.r.	opt.	p.b.k. at 330 nm.	74–1102
3.595	papain	6.4	4.7×10^{10}	—	p.r.	opt.	p.b.k. at 310–350 nm.	72–3042
	paraldehyde *See* 2,4,6–trimethyl–1,3,5–trioxane (3.731).							
5.596	DL–penicillamine	1	5.9×10^9 (rel.)	$k/k_{thym} = 1.09$	Fenton	esr	c.k.; $k/k_{perox} = 79.2$.	69–5278
3.597	penicillamine disulfide	1	8.1×10^9 (rel.)	$k/k_{thym} = 1.5$	Fenton	esr	c.k.; $k/k_{perox} = 110$.	69–5278
3.598	pentaerythritol	9	3.2×10^9 (rel.)	$k/k_{EtOH} = 1.73$	γ–r.	opt.	c.k. with RNO	66–0423
3.599	1,4–pentadien–3–ol	7.0	$(1.0 \pm 0.2) \times 10^{10}$	—	p.r.	opt.	p.b.k.	73–1070
3.600	pentafluorobenzene	—	4×10^9 (rel.)	$k/k_{CNS^-} = 0.36$	p.r.	opt.	p.b.k.	73–0054
3.600a	pentamethylbenzene	~7	7.5×10^9	—	p.r.	opt.	p.b.k.; OH addn. and H abstr.; rate for H abstr. = 2.4×10^9.	75–1009
3.601	1,5–pentanediol	9	3.5×10^9 (rel.)	$k/k_{EtOH} = 1.9$	γ–r.	opt.	c.k. with RNO.	66–0423
	pentanoate ion *See* valerate ion (3.752).							
3.602	1–pentanol	9	4.9×10^9 (rel.)	$k/k_{EtOH} = 2.65$	γ–r.	opt.	c.k. with RNO.	66–0423
		2–2.2	5.1×10^9 (rel.)	$k/k_{thym} = 0.95 \pm 0.10$	γ–r.	opt.	c.k.	67–0461
		5–5.5	5.5×10^9 (rel.)	$k/k_{thym} = 1.02 \pm 0.10$	γ–r.	opt.	c.k.	67–0461
		—	3.7×10^9 (rel.)	$k/k_{CNS^-} = 0.34$	p.r.	opt.	c.k.	73–1077
			3.5×10^9 (rel.)	$k/k_{CNS^-} = 0.38$				
3.602a	3–pentanol	1.7–1.8	2.4×10^9 (rel.)	$k/k_{2\text{–PrOH}} = 1.1$	Fenton	chem.	c.k. with cyclo–heptanol.	74–9006
3.603	2–pentanone	6–7	1.9×10^9 (rel.)	$k/k_{CNS^-} = 0.174$	p.r.	opt.	c.k.	65–0387
3.604	3–pentanone	6–7	1.4×10^9 (rel.)	$k/k_{CNS^-} = 0.123$	p.r.	opt.	c.k.	65–0387
	pentylamine *See* amylamine (3.168).							
	pentylammonium ion *See* amylammonium ion (3.169).							
3.605	phenethyl alcohol	—	7.0×10^9 (rel.)	$k/k_{CNS^-} = 0.64$	p.r.	opt.	c.k.	73–1077
			5.1×10^9 (rel.)	$k/k_{CNS^-} = 0.55$				
3.606	phenethylammonium ion	4	9.8×10^9 (rel.)	$k/k_{CNS^-} = 0.89$	p.r.	opt.	c.k.	70–0371

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.607	phenol	7.0	6.2×10^9 (rel.)	$k/k_{BzO^-} = 1.08$	γ–r.	trac.	c.k.; meas. $^{14}CO_2$.	65–0099
	OH + $C_6H_5OH \rightarrow$	6–7	1.8×10^{10} (rel.)	$k/k_{CNS^-} = 1.61$	p.r.	opt.	c.k.	65–0387
	$C_6H_5(OH)_2$	9	8.6×10^9 (rel.)	$k/k_{EtOH} = 4.64$	γ–r.	opt.	c.k. with RNO.	66–0441
		7.4–7.7	$(1.4 \pm 0.3) \times 10^{10}$	—	p.r.	opt.	p.b.k. at 330 nm.	67–0122
		~1.2	9.7×10^9 (rel.)	$k/k_{2\text{-PrOH}} = 4.4$	γ–r.	chem.	c.k.	68–0602
		6.98	1.1×10^{10} (rel.)	$k/k_{2\text{-PrOH}} = 5.2$	γ–r.	chem.	c.k.	68–0602
		9	8.5×10^9 (rel.)	$k/k_{RNO} = 0.68 \pm 0.02$	γ–r.	opt.	c.k.	72–0837
3.608	phenoxide ion OH + $C_6H_5O^- \rightarrow$ $C_6H_5(OH)O^-$	10.7	9.2×10^9 (rel.)	$k/k_{BzO^-} = 1.62$	γ–r.	trac.	c.k.; meas. $^{14}CO_2$.	65–0099
3.608a	*p*–phenoxybenzoate ion	—	7.0×10^9	—	p.r.	opt.	p.b.k.; OH addn.	75–1001
3.609	phenylacetamide	9	5×10^9 (rel.)	$k/k_{EtOH} = 2.73$	γ–r.	opt.	c.k. with RNO.	66–0441
3.610	phenyl acetate	9	5×10^9 (rel.)	$k/k_{EtOH} = 2.73$	γ–r.	opt.	c.k. with RNO.	66–0441
3.611	phenylacetate ion (PA^-)	9	4.6×10^9 (rel.)	$k/k_{EtOH} = 2.36$	γ–r.	opt.	c.k.	66–0441
		6–8	$(7.9 \pm 1.1) \times 10^9$	—	p.r.	opt.	p.b.k. at 325 nm, cor. for (OH + OH) and (H + aromatic).	68–0304
			For other ratios see: 3.199, 3.200, 3.358, 3.511.					
3.612	phenylacetic acid	1	1.1×10^9 (rel.)	$k/k_{Fe^{2+}} = 4.8$	Fenton	chem.	c.k.	49–0003
		—	1.8×10^{10} (rel.)	$k/k_{2\text{-PrOH}} = 8.2$	γ–r.	chem.	c.k.	72–0541
3.613	phenylalanine, positive ion	2–2.2	5.7×10^9 (rel.)	$k/k_{CNS^-} = 0.515$	p.r.	opt.	c.k.	65–0388
		2–2.2	7.7×10^9 (rel.)	$k/k_{thym} = 1.42 \pm 0.08$	γ–r.	opt.	c.k.	65–0388, 67–0461
3.614	phenylalanine, zwitterion	5.5–6	5.8×10^9 (rel.)	$k/k_{CNS^-} = 0.53$	γ–r.	opt.	c.k.	65–0388, 67–0461
		nat.	6×10^9 (rel.)	$k/k_{ferro} = 0.645$	p.r.	opt.	c.k.	71–0578
		nat.	6.6×10^9	—	p.r.	opt.	p.b.k. at 300 nm.	71–0578
		6.9	7.2×10^9 (rel.)	$k/k_{RNO} = 0.57$	γ–r.	opt.	c.k.	73–0548
			For other ratios see: 3.178, 3.347, 3.697.					
3.615	phenylalanine, negative ion	10.6	8.4×10^9 (rel.)	$k/k_{carb} = 23$	p.r.	opt.	c.k.	68–0062
		—	1.5×10^9 (rel.)	$k/k_{RNO} = 0.12$	p.r.	opt.	c.k.	69–0156
3.615a	1–phenyl–3–butanol	1.7–1.8	2.0×10^{10} (rel.)	$k/k_{2\text{-PrOH}} = 9$	Fenton	chem.	c.k. with 1–phenylethanol.	74–9006
3.615b	1–phenylethanol	1.7–1.8	1.3×10^{10} (rel.)	$k/k_{2\text{-PrOH}} = 5.8$	Fenton	chem.	c.k. with cyclo–heptanol.	74–9006
3.615c	1–phenylethanol–1–*d*	1.7–1.8	1.3×10^{10} (rel.)	$k/k_{2\text{-PrOH}} = 5.9$	Fenton	chem.	c.k. with bromo–phenylethanol.	74–9006
	2–phenylethanol *See* phenethyl alcohol (3.605).							
3.616	phenyl–β–D–glucopyranoside	6.8	4.4×10^9	—	p.r.	opt.	p.b.k. at 300 nm.	71–0055, 71–0056
	OH + $C_6H_5OC_6H_{11}O_5 \rightarrow$ $C_6H_5(OH)OC_6H_{11}O_5$	—	5.8×10^9 (rel.)	$k/k_{CNS^-} = 0.53$	p.r.	opt.	c.k.	71–0055, 71–0056
			For other ratios see: 3.213, 3.255, 3.256, 3.274, 3.337, 3.458, 3.520, 3.578, 3.579, 3.580, 3.729.					
3.617	phenylhydroxylamine	3.7–11.5	1.5×10^{10}	—	p.r.	opt.	p.b.k. at 290 nm.	67–0191, 67–0688
	OH + $C_6H_5NHOH \rightarrow$ $C_6H_5(OH)NHOH$	—	2×10^{10} (rel.)	$k/k_{CNS^-} = 1.82$	p.r.	opt.	c.k.	67–0688
3.617a	1–phenyl–1–propanol	1.7–1.8	1.2×10^{10} (rel.)	$k/k_{2\text{-PrOH}} = 5.5$	Fenton	chem.	c.k. with 1–phenylethanol.	74–9006
3.617b	1–phenyl–2–propanol	1.7–1.8	2.4×10^{10} (rel.)	$k/k_{2\text{-PrOH}} = 11$	Fenton	chem.	c.k. with 1–phenylethanol.	74–9006
3.617c	2–phenyl–2–propanol	1.7–1.8	5.3×10^9 (rel.)	$k/k_{2\text{-PrOH}} = 2.4$	Fenton	chem.	c.k. with cyclo–heptanol.	74–9006
3.618	phthalate ion	9	5.9×10^9	—	p.r.	opt.	p.b.k.	73–0110
		—	3.0×10^9 (rel.)	—	γ–r.	opt.	c.k. with RNO assuming k(OH + sulfanilic acid) = 2.93×10^9.	73–0094

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.619	pimelic acid	2–2.2	3×10^9 (rel.)	$k/k_{thym} = 0.55 \pm 0.06$	γ–r.	opt.	c.k.	67–0461
3.620	pinacol	1	2.9×10^8 (rel.)	$k/k_{Fe^{2+}} = 1.25$	Fenton	chem.	c.k.	49–0002
		9	5.4×10^8 (rel.)	$k/k_{EtOH} = 0.29$	γ–r.	opt.	c.k. with RNO.	66–0423
3.621	pivalamide	5–6	1.4×10^9 (rel.)	$k/k_{CNS^-} = 0.132$	p.r.	opt.	c.k.	71–0414
3.622	pivalate ion	9	1.4×10^9 (rel.)	$k/k_{EtOH} = 0.78$	γ–r.	opt.	c.k. with RNO.	66–0423
3.623	polyacrylate ion	—	$(3.2 - 4.5) \times 10^8$ (rel.)	—	p.r.	opt.	c.k. with RNO and CNS^-; k depends on chain length; at mol. wt. 9×10^3 k = $(1 \rightarrow 3) \times 10^8$ as pH varies $2 \rightarrow 8$.	73–1095
3.624	polyadenylic acid (poly A)	4.6	1.6×10^8 (rel.)	$k/k_{CNS^-} = 0.015$	p.r.	opt.	c.k.; rate in terms of nucleotide concn.	68–0845
		5.9	2.8×10^8 (rel.)	$k/k_{CNS^-} = 0.025$				
		6.3	3.6×10^8 (rel.)	$k/k_{CNS^-} = 0.033$				
		7.3	3.8×10^8 (rel.)	$k/k_{CNS^-} = 0.035$				
		7	$(9 \pm 1) \times 10^8$	—	p.r.	opt.	p.b.k.	73–1071
3.625	polyadenylic + –uridylic acid (poly A + U)	7	$(5 \pm 1) \times 10^8$	—	p.r.	opt.	p.b.k.	73–1071
3.626	polycytidylic acid (poly C)	7	$(1.2 \pm 0.1) \times 10^9$	—	p.r.	opt.	p.b.k. at 425 nm; $\epsilon = 780 \pm 80$; mol. wt. $> 10^5$.	73–1071
3.627	polyethylene oxide H abstr.	7.3	$> 2.4 \times 10^8$ (rel.)	$k/k_{cyst} = 2.86 \times 10^{-2}$	p.r.	opt.	c.k.; k based on monomer unit of mol. wt. 44, and $k_{cyst} = 8.5 \times 10^9$.	69–0088
		7	$> 10^9$ (rel.)	—	p.r.	opt.	c.k. with CNS^-, BzO^- and RNO; k based on monomer unit; varies with chain length and concn.	70–0394
		—	$< 2.0 \times 10^9$ (rel.)	—	r.	visc.	c.k.; $k >> 2.0 \times 10^6$; effect of dioxane on crosslinking; rel. to k(OH + dioxane) = 2.35×10^9.	70–2058
		—	$(2.8–7.6) \times 10^8$ (rel.)	—	p.r.	opt.	c.k.; k depends on concn. and mol. wt. of polymer; rel. to ferrocyanide or I^-.	73–1046
		—	$\sim 1 \times 10^9$ (rel.)	$k/k_{Br^-} \cong 0.026$	r.	chem.	c.k.; effect of Br^- on product yields, assume $k(OH + Br^-) = 3.7 \times 10^{10}$.	73–2129, 73–2126
3.628	poly(ethylenesulfonate) (polyanion)	—	1.2×10^8 (rel.)	$k/k_{CNS^-} = 0.0106$	p.r.	opt.	c.k.; concn. in monomer units.	68–0352
3.629	polyoxyethylene–(15)nonylphenol (Igepal CO–730)	—	1.1×10^{10} (rel.)	$k/k_{CNS^-} = 1$	p.r.	opt.	c.k.; concn. $< 10^{-4}$ M; at higher concn. k decreases.	71–0001, 71–0586

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.630	poly(styrenesulfonate) (polyanion)	—	3.3×10^8 (rel.)	$k/k_{CNS^-} = 0.0303$	p.r.	opt.	c.k.; concn. in monomer units.	68–0352
3.631	polyuridylic acid	7	$< (3.8 \pm 0.4) \times 10^9$	—	p.r.	opt.	p.b.k.	69–0571
	(poly U)	7	1.4×10^9 (rel.)	$k/k_{CNS^-} = 0.13 \pm 0.06$	p.r.	opt.	c.k.; rate per base unit.	69–0571
		7	$(1.25 \pm 0.05) \times 10^9$	—	p.r.	opt.	p.b.k. at 390 nm.	73–1071
3.632	polyvinylpyrrolidone	7	$> 10^{10}$ (rel.)	—	p.r.	opt.	c.k. with CNS^-, BzO^- and RNO; k varies with chain length and is per monomer unit.	70–0394
3.632a	proflavine	—	$(1.0 \pm 0.2) \times 10^{10}$	—	p.r.	opt.	d.k. at 444 nm; deduced $k \cong 2 \times 10^9$ for dye bound to DNA.	75–3094
3.633	proline	2–2.2	3.1×10^8 (rel.)	$k/k_{thym} = 0.0565$	γ–r.	opt.	c.k.	65–0388
		6.8	6.5×10^8 (rel.)	$k/k_{RNO} = 0.052$	γ–r.	opt.	c.k.	73–0548
3.634	1,2–propanediol	7	1.7×10^9 (rel.)	$k/k_{CNS^-} = 0.153$	p.r.	opt.	c.k.	65–0387
	(I) OH + $C_3H_8O_2$	9	1.7×10^9 (rel.)	$k/k_{EtOH} = 0.9$	γ–r.	opt.	c.k. with RNO.	66–0423
	→ MeCHOHCHOH	6	1.6×10^9 (rel.)	$k/k_{EtOH} = 0.855$	γ–r.	chem.	c.k. with Br^-.	66–0423
	or $MeCOHCH_2OH$ + H_2O	2–2.2	1.9×10^9 (rel.)	$k/k_{thym} = 0.35 \pm 0.03$	γ–r.	opt.	c.k.	67–0461
	(II) OH + $C_3H_8O_2$ → $CH_2CHOHCH_2OH$ + H_2O	—	—	$k_{II}/k_I = 0.26$	p.r.	opt.	detd. % α–alcohol radical by reaction with TNM ≤ 0.1% alkoxy radical detd. by reaction with I^-.	73–0126
3.635	1,3–propanediol	9	2.4×10^9 (rel.)	$k/k_{EtOH} = 1.3$	γ–r.	opt.	c.k. with RNO.	66–0423
		6	2.0×10^9 (rel.)	$k/k_{EtOH} = 1.1$	γ–r.	chem.	c.k. with Br^-.	66–0423
3.636	1–propanol (PrOH)	1	6.0×10^8 (rel.)	$k/k_{Fe^{2+}} = 2.6$	Fenton	chem.	c.k.	49–0002
	(I) OH + PrOH → H_2O + $MeCH_2CHOH$	7, 10.7	2.7×10^9 (rel.)	$k/k_{carb} = 7.5$	p.r.	opt.	c.k.	65–0190, 65–0387
	(61%, 69–0522)	7	2.5×10^9 (rel.)	$k/k_{CNS^-} = 0.223$	p.r.	opt.	c.k.	65–0387
	(II) OH + PrOH → H_2O + $MeCHCH_2OH$	9	2.8×10^9 (rel.)	$k/k_{EtOH} = 1.5$	γ–r.	opt.	c.k. with RNO.	66–0423
		2–2.2	3.2×10^9 (rel.)	$k/k_{thym} = 0.60 \pm 0.05$	γ–r.	opt.	c.k.	67–0461
	(III) OH + PrOH → H_2O + $MeCH_2CH_2O$	~5–5.5	3.0×10^9 (rel.)	$k/k_{thym} = 0.56 \pm 0.06$	γ–r.	opt.	c.k.	67–0461
		nat.	2.7×10^9 (rel.)	$k/k_{ferro} = 0.29$	p.r.	opt.	c.k.	71–0578
		—	—	$k_{II}/k_I = 0.86$ $k_{III}/k_I \leq 0.01$	p.r.	opt.	detd. % of α–alcohol and alkoxy radicals by reaction with TNM and I^-, resp.	73–0126
		—	1.5×10^9 (rel.)	$k/k_{MeOH} = 1.65$	Ti(III) + H_2O_2	esr	c.k.	73–5253
3.637	2–propanol (2–PrOH)	1	6.9×10^8 (rel.)	$k/k_{Fe^{2+}} = 3.0$	Fenton	chem.	c.k.	49–0002
	(I) OH + 2–PrOH → H_2O + $(CH_3)_2COH$	7	2.2×10^9 (rel.)	$k/k_{I^-} = 0.17 \pm 0.006$	p.r.	opt.	c.k.	65–0010, 67–0041
	(89%), 69–0522)	—	2.1×10^9 (rel.)	$k/k_{ferro} = 0.23$	phot.	—	c.k.	65–0247
	(II) OH + 2–PrOH	9.0	2.1×10^9 (rel.)	$k/k_{RNO} = 0.17$	γ–r.	opt.	c.k.	65–0356
	→ H_2O +	7	6.5×10^9 (rel.)	$k/k_{CNS^-} = 0.591$	p.r.	opt.	c.k.	65–0387
	$CH_3CHOHCH_2$	2–2.2	2.1×10^9 (rel.)	$k/k_{thym} = 0.387$	γ–r.	opt.	c.k.	65–0388
	(III) OH +	—	3.2×10^9 (rel.)	$k/k_{MeOH} = 3.6$	p.r.	opt.	c.k. with HSO_4^-.	66–0019
	2–PrOH → H_2O + CH_3CHOCH_3	6.8	1.4×10^9 (rel.)	$k/k_{ferro} = 0.15 \pm 0.03$	X–r.	—	c.k.	66–0234
		6	2.2×10^9 (rel.)	$k/k_{EtOH} = 1.2$	γ–r.	chem.	c.k. with Br^-.	66–0423
		9	2.0×10^9 (rel.)	$k/k_{EtOH} = 1.1$	γ–r.	opt.	c.k. with RNO.	66–0423

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.637 cont.		2–2.2	2.3×10^9 (rel.)	$k/k_{thym} = 0.42 \pm 0.03$	γ–r.	opt.	c.k.	67–0461
		5–5.5	2.3×10^9 (rel.)	$k/k_{thym} = 0.42 \pm 0.05$	γ–r.	opt.	c.k.	67–0461
		—	—	$k/k_{TCOO^-} = 0.45$	γ–r.	trac.	c.k.; meas. ^{3}HHO.	68–0209
		2–10	1.9×10^9 (rel.)	$k/k_{CNS^-} = 0.17$	p.r.	opt.	c.k.	68–0316
		—	1.5×10^9 (rel.)	$k/k_{RNO} = 0.12$	p.r.	opt.	c.k.	69–0156
		—		$k_I/k_{II} = 6.2$	r.	—	c.k. with H_2O_2.	70–0104
		—		$k_I/k_{II} = 5.2 \pm 0.1$	γ–r.	chem.	c.k. with H_2O_2; k_H/k_D(I) = 1.38 ± 0.05; k_H/k_D(II) = 2.08 ± 0.12 or 2.15 ± 0.16.	71–0081
		nat.	2.0×10^9 (rel.)	$k/k_{ferro} = 0.216$	p.r.	opt.	c.k.	71–0578
		0.82	1.3×10^9 (rel.) (I)	$k_I/k_{Fe^{2+}} = 5.73$	Fenton	chem.	c.k.	71–9132
		0.82	2.1×10^8 (rel.) (II)	$k_{II}/k_{Fe^{2+}} = 0.92$	Fenton	chem.	c.k.	71–9132
		0	—	$k/k_{bisulf}[HSO_4^-] = 202 \pm 12\ M^{-1}$	γ–r.	chem.	c.k.; computer anal.; 4 M H_2SO_4.	72–0094
		0.8	—	$k/k_{bisulf}[HSO_4^-] = (1.1 \pm 0.2) \times 10^4\ M^{-1}$	γ–r.	chem.	c.k.; computer anal.	72–0094
		0	—	$k_{III}/k_I = 1.4 \pm 0.3$	γ–r.	chem.	calcd. by comparing oxid. of Ce(III) in HCOOH and 2–PrOH solns.	72–0094
		—	—	$k_I/k_{II} = 6.4$ $k_{III}/k_I = 0.014$	p.r.	opt.	detd. % of α–alcohol and alkoxy radicals by reaction with TNM and I^-, resp.	73–0126
		10.4	2.3×10^9 (rel.)	$k/k_{EtOH} = 1.23$	X–r.	lum.	c.k.; effect of alcohols on quenching of chemiluminescence from fluorescein.	73–6068
			For other ratios see: 3.12, 3.66, 3.80, 3.107, 3.111, 3.186, 3.198a, 3.201, 3.212a, 3.248a–3.249, 3.274, 3.277–8, 3.337a, 3.358, 3.371, 3.375a, 3.384, 3.385, 3.468, 3.469, 3.471, 3.511, 3.517a, 3.543a–e, 3.546, 3.555, 3.602, 3.607, 3.612, 3.615a–c, 3,617a–c, 3.687, 3.695a.					
3.638	2–propanol–2–d	6	1.4×10^9 (rel.)	$k/k_{EtOH} = 0.78$	γ–r.	chem.	c.k. with Br^-.	66–0423
	(I) OH + $(CH_3)_2CDOH \rightarrow HDO + (CH_3)_2COH$	0.82	7.9×10^8 (I) (rel.)	$k_I/k_{Fe^{2+}} = 3.42$	Fenton	chem.	c.k.	71–9132
	(II) OH + $(CH_3)_2CDOH \rightarrow H_2O + CH_2CDOHCH_3$		2.1×10^8 (II) (rel.)	$k_{II}/k_{Fe^{2+}} = 0.91$				
3.639	2–propanol–d_6	0.82	1.2×10^9 (I) (rel.)	$k_I/k_{Fe^{2+}} = 5.43$	Fenton	chem.	c.k.	71–9132
	(I) OH + $(CD_3)_2CHOH \rightarrow H_2O + (CD_3)_2COH$		5.0×10^7 (II) (rel.)	$k_{II}/k_{Fe^{2+}} = 0.22$				
	(II) OH + $(CD_3)_2CHOH \rightarrow HDO + CD_3CHOHCD_2$							
3.640	propionamide $OH + C_2H_5CONH \rightarrow H_2O + CH_3CHCONH_2 + CH_2CH_2CONH_2 + CH_3CH_2CONH$	5–6	7.0×10^8 (rel.)	$k/k_{CNS^-} = 0.064$	p.r.	opt.	c.k.; 45% $CH_3CHCONH_2$ formed; anal. of transient spectra.	71–0414, 71–0645

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.641	propionate ion	9	8.0×10^8 (rel.)	$k/k_{EtOH} = 0.43$	γ–r.	opt.	c.k. with RNO.	66–0423
3.642	propionic acid	1	2.0×10^8 (rel.)	$k/k_{Fe^{2+}} = 0.86$	Fenton	chem.	c.k.	49–0002
		2–2.2	5.2×10^8 (rel.)	$k/k_{thym} = 0.097 \pm 0.01$	γ–r.	opt.	c.k.	67–0461
3.643	propionitrile	—	1.0×10^8 (rel.)	$k/k_{HCOO^-} = 0.029$	γ–r.	chem.	c.k.	73–0364
3.644	propyl acetate	6–7	1.4×10^9 (rel.)	$k/k_{CNS^-} = 0.124$	p.r.	opt.	c.k.	65–0387
3.645	propylamine	—	7.3×10^9 (rel.)	$k/k_{CNS^-} = 0.66$	p.r.	opt.	c.k.	73–0016
			4.8×10^9 (rel.)	$k/k_{NB} = 1.5$				
	2–propylamine *See* isopropylamine (3.487).							
3.646	propylammonium ion	2	7.5×10^8 (rel.)	$k/k_{CNS^-} = 0.068$	p.r.	opt.	c.k.	70–0371
		4	1.6×10^9 (rel.)	$k/k_{CNS^-} = 0.143$	p.r.	opt.	c.k.	70–0371
		—	1.4×10^9 (rel.)	$k/k_{CNS^-} = 0.13$	p.r.	opt.	c.k.	73–0016
			6.7×10^9 (rel.)	$k/k_{NB} = 0.21$				
3.647	propylene	—	8.3×10^9 (rel.)	$k/k_{I^-} = 0.64$	p.r.	opt.	c.k.	67–0041
	propylene oxide	*See* 1,2–epoxypropane (3.353).						
3.648	propyl gallate	6.5	1.2×10^{10} (rel.)	$k/k_{RNO} = 0.94 \pm 0.16$	γ–r.	opt.	c.k.	69–0580
3.648a	purine	6–7	3.0×10^8 (rel.)	$k/k_{RNO} = 0.024$	γ–r.	opt.	c.k.; 17°C.	75–0294
3.649	pyridine	7	$(3.0 \pm 0.6) \times 10^9$ (rel.)	$k/k_{CNS^-} = 0.272 \pm 0.054$	p.r.	opt.	c.k.	67–0251
	$OH + C_5H_5N \rightarrow$							
	$OHC_5H_5N +$	9	2×10^9 (rel.)	$k/k_{RNO} = 0.16$	γ–r.	opt.	c.k.	69–0280
	$C_5H_5N–OH$	7.0	1.8×10^9	—	p.r.	opt.	p.b.k.	71–0582
3.650	pyridine–d_5	7	$(2.7 \pm 0.9) \times 10^9$ (rel.)	$k/k_{CNS^-} = 2.42 \times 10^{-1} (\pm 0.073)$	p.r.	opt.	c.k.	67–0251
3.651	3–pyridine–carboxamide	9	1×10^9 (rel.)	$k/k_{RNO} = 0.08$	γ–r.	opt.	c.k.	69–0280
3.652	4–pyridine–carboxamide	9	1.5×10^9 (rel.)	$k/k_{RNO} = 0.12$	γ–r.	opt.	c.k.	69–0280
3.653	3–pyridinecar–boxylate ion	9	2.3×10^9 (rel.)	$k/k_{RNO} = 0.18$	γ–r.	opt.	c.k.	69–0280
3.654	4–pyridinecar–boxylate ion	9	2.6×10^9 (rel.)	$k/k_{RNO} = 0.21$	γ–r.	opt.	c.k.	69–0280
3.655	4–pyridinenitrile	9	7.5×10^8 (rel.)	$k/k_{RNO} = 0.06$	γ–r.	opt.	c.k.	69–0280
3.656	pyridinium ion	1	4.1×10^7 (rel.)	$k/k_{Fe^{2+}} = 0.18$	Fenton	chem.	c.k.	49–0002
	$OH + C_5H_5NH^+ \rightarrow$ $OHC_5H_5NH^+$	1–2	$(3.3 \pm 0.7) \times 10^7$ (rel.)	$k/k_{CNS^-} = (3 \pm 0.6) \times 10^{-3}$	p.r.	opt.	c.k.	67–0251
		2.0	2×10^7	—	p.r.	opt.	p.b.k.	71–0582
3.657	pyridinium ion–d_5	1–2	3.6×10^7 (rel.)	$k/k_{CNS^-} = (3.3 \pm 1) \times 10^{-3}$	p.r.	opt.	c.k.	67–0251
3.657a	pyridoxine(PH)	7.2	6.3×10^9	—	p.r.	opt.	p.b.k.	75–1024
	PH_2^+	3.6	4.3×10^9	—				
	P^-	10.5	7.4×10^9	—				
3.657b	pyrimidine	6–7	1.6×10^8 (rel.)	$k/k_{RNO} = 0.013$	γ–r.	opt.	c.k.; 17°C.	75–0294
3.658	pyrrole	—	1.5×10^{10}	—	p.r.	opt.	p.b.k. at 300 nm.	71–0360
	$OH + C_4H_4NH \rightarrow$ $(OH)C_4H_4NH$							
3.659	pyrrolidinium ion	6.2	5.7×10^9 (rel.)	$k/k_{CNS^-} = 0.52$	p.r.	opt.	c.k.; see also 70–0006.	75–1016
3.660	pyruvate ion	9	3.1×10^7 (rel.)	$k/k_{RNO} = 0.0025$	γ–r.	opt.	c.k.; assume $k_{RNO} = k_{ferro}$.	67–0555
3.661	rennin	6.4	2.1×10^{10} (rel.)	—	X–r.	biol.	effects of methanol, malonate, glycerol, ethanol, glycylglycine, formate, glucose and adenine on enzyme inacti–vation.	73–3030
3.662	Rhodamine B (RhB)	—	$\sim 10^{10}$	—	p.r.	opt.	d.k. at 530 nm (RhB) as well as p.b.k. at 460 nm.	67–0239, 67–6053

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.663	ribonuclease	—	2.6×10^{10} (rel.) (T = 20°C) 5.2×10^{10} (rel.) (T = 60°C)	—	p.r.	opt.	c.k. with CNS^-; mol. wt. 13,683; ref. rate not given.	68–3007
		3.5	$(3.6 \pm 0.5) \times 10^{10}$	—	p.r.	opt.	p.b.k.	72–3079
		5.6	$(1.9 \pm 0.3) \times 10^{10}$	—				
		~7	$(2.4 \pm 0.6) \times 10^{10}$	—				
		6.5	2.5×10^{10} (rel.)	$k/k_{RNO} = 2$	γ–r.	opt.	c.k.	73–0548
3.664	ribose	9	2.1×10^{9} (rel.)	$k/k_{RNO} = 0.17$	γ–r.	opt.	c.k.; assume $k_{RNO} = k_{ferro}$.	67–0555
		6.5	4.4×10^{8} (rel.)	$k/k_{RNO} = 0.035 \pm 0.03$	γ–r.	opt.	c.k.	69–0580
		7	1.6×10^{9} (rel.)	$k/k_{CNS^-} = 0.145$	p.r.	opt.	c.k.	73–1071
		—	1.2×10^{9} (rel.)	$k/k_{CNS^-} = 0.11$	p.r.	opt.	c.k.	73–1077
		—	1.0×10^{9} (rel.)	$k/k_{ferro} = 0.101$	p.r.	opt.	c.k.	73–1077
3.665	ribose–5–phosphate	7	1.3×10^{9} (rel.)	$k/k_{CNS^-} = 0.12$	p.r.	opt.	c.k.	73–1071
3.666	RNA	6.5	1.9×10^{9} (rel.)	$k/k_{RNO} = 0.15 \pm 0.02$	γ–r.	opt.	c.k.	69–0580
3.667	Safranine T (S.T)	3–5.5	9.3×10^{9} (rel.)	$k/k_{PhH} = 1.19$	γ–r.	chem.	c.k.; OH addn.	69–0279
3.668	Safranine T, protonated ($S.TH^+$) $OH + S.TH^+ \rightarrow OH{\bullet}S.TH^+$	0.4	3.4×10^{10} (rel.)	$k/k_{PhH} = 4.35$	γ–r.	chem.	c.k.	69–0279
3.668a	salicylaldehyde	9	8.6×10^{9} (rel.)	$k/k_{RNO} = 0.69 \pm 0.16$	γ–r.	opt.	c.k.	72–0837
3.669	salicylate ion $OH + HOC_6H_4COO^- \rightarrow (HO)_2C_6H_4COO^-$	10.7	5.8×10^{9} (rel.)	$k/k_{BzO^-} = 1.01$	γ–r.	trac.	c.k.; meas. $^{14}CO_2$.	65–0099
		9.0	9.4×10^{9} (rel.)	$k/k_{RNO} = 0.752 \pm 0.038$	γ–r.	opt.	c.k.	65–0356
		7	1.2×10^{10}	—	p.r.	opt.	p.b.k. at 350 nm.	68–0305
		7	2.0×10^{10} (rel.)	$k/k_{CNS^-} = 1.8 \pm 0.2$	p.r.	opt.	c.k.	68–0305
		9	8.6×10^{9} (rel.)	$k/k_{RNO} = 0.69 \pm 0.16$	γ–r.	opt.	c.k.	72–0837
3.670	sarcosine anhydride	5.0, 11.0	2.6×10^{9} (rel.)	$k/k_{CNS^-} = 0.236$	p.r.	opt.	c.k.	71–0554
3.671	sebacic acid	2–2.2	5.4×10^{9} (rel.)	$k/k_{thym} = 1.00 \pm 0.10$	γ–r.	opt.	c.k.	67–0461
3.672	selenocystine (RSeSeR)	7	1.0×10^{10}	—	p.r.	opt.	p.b.k. at 460 nm (RSe•); c.k. with CNS^- gave $k = 1.7 \times 10^{10}$.	73–1010
3.672a	selenomethionine	7	$\sim 1 \times 10^{10}$	—	p.r.	opt.	p.b.k. at 380 nm; c.k. gave $k/k_{CNS^-} = 1.2$.	74–1092
3.673	selenourea $OH + NH_2CSeNH_2 \rightarrow H_2O + NHCSeNH_2$	6.5	6.9×10^{9}	—	p.r.	opt.	d.k. at 250 nm.	70–0240
			5.5×10^{9}	—	p.r.	opt.	p.b.k. at 410 nm.	70–0240
			1.2×10^{10} (rel.)	$k/k_{CNS^-} = 1.09$	p.r.	opt.	c.k.	70–0240
			1.1×10^{10} (rel.)	$k/k_{EtOH} = 6.2$	p.r.	opt.	c.k.	70–0240
			1.2×10^{10} (rel.)	$k/k_{MeOH} = 13.8$	p.r.	opt.	c.k.	70–0240
3.674	serine	2–2.2	2.5×10^{8} (rel.)	$k/k_{CNS^-} = 0.0228$	p.r.	opt.	c.k.	65–0388
		5.5–6	3.2×10^{8} (rel.)	$k/k_{CNS^-} = 0.0288$	p.r.	opt.	c.k.	65–0388
		2–2.2	2.9×10^{8} (rel.)	$k/k_{thym} = 0.0532$	γ–r.	opt.	c.k.	65–0388
		6.6	2.3×10^{8} (rel.)	$k/k_{RNO} = 0.184$	γ–r.	opt.	c.k.	73–0548
3.675	serum albumin, human	—	2.3×10^{10}	—	—	—	—	66–0844
		—	$\sim 6 \times 10^{10}$	—	—	—	calcd.	70–0253
3.676	starch, corn	6.5	2.8×10^{7} (rel.)	$k/k_{RNO} = 0.0023 \pm 0.002$	γ–r.	opt.	c.k.	69–0580

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.677	starch, waxy	6.5	2.5×10^7 (rel.)	$k/k_{RNO} = 0.002 \pm 0.003$	γ–r.	opt.	c.k.	69–0580
3.678	styrene	5.5	$(6.0 \pm 0.6) \times 10^9$	—	p.r.	opt.	p.b.k. at 320 nm (66% $C_6H_5CHCH_2OH$) and 345 nm (33% ring addn.).	74–1138
3.679	suberic acid	2–2.2	4.0×10^9 (rel.)	$k/k_{thym} = 0.75 \pm 0.07$	γ–r.	opt.	c.k.	67–0461
3.680	succinic acid	1	7×10^6 (rel.)	$k/k_{Fe^{2+}} = 0.03$	Fenton	chem.	c.k.	49–0002
		2–2.2	1.4×10^8 (rel.)	$k/k_{thym} = 0.026 \pm 0.002$	γ–r.	opt.	c.k.	67–0461
		1	8.9×10^7 (rel.)	$k/k_{MeOH} = 0.097$	Fenton	chem.	c.k.; $k_{MeOH}/k_{Fe^{2+}} = 4.3$.	73–9341
3.681	succinimide	3.5	5.0×10^8	—	p.r.	opt.	p.b.k.	71–0145
3.682	succinonitrile	—	3.0×10^7 (rel.)	$k/k_{HCOO^-} = 0.012$	γ–r.	chem.	c.k.	73–0364
3.683	sucrose	2–2.2	2.8×10^9 (rel.)	$k/k_{thym} = 0.52 \pm 0.05$	γ–r.	opt.	c.k.	67–0461
3.684	sulfacetamide, Na	—	4.7×10^9 (rel.)	—	γ–r.	—	c.k. with RNO.	71–0128
3.685	sulfaguanidine	—	3.1×10^9 (rel.)	—	γ–r.	opt.	c.k. with RNO assuming k(OH + sulfanilic acid) = 2.93×10^9.	73–0094
3.686	sulfanilamide	—	3.2×10^9 (rel.)	—	γ–r.	—	c.k. with RNO.	71–0128
		—	1.6×10^9 (rel.)	—	γ–r.	opt.	c.k. with RNO; rel. to k(OH + sulfanilic acid) = 2.93×10^9.	73–0094
		7–8	1.9×10^9 (rel.)	$k/k_{ferro} = 0.21$	γ–r.	chem.	c.k.	74–0283
3.687	sulfanilic acid	—	3.4×10^9 (rel.)	—	γ–r.	—	c.k. with RNO.	71–0128
		0.4	2.1×10^9 (rel.)	$k/k_{2\text{-PrOH}} = 0.95$	γ–r.	chem.	c.k.	73–0270
		—	2.93×10^9	—	p.r.	opt.	p.b.k. at 270 nm.	73–0094
		For other ratios see: 3.189, 3.191, 3.700, 3.701, 3.702.						
	sulfasuccidine *See* 4–(2–thiazolylsulfamoyl)succanilic acid (3.701).							
	sulfathiazole *See* N′–(2–thiazolyl)sulfanilamide (3.702).							
3.687a	superoxide dismutase	7.2	5.3×10^{10}	—	p.r.	opt.	p.b.k. at 330 nm; rate for bovine enzyme; human enzyme gave $k = 4.6 \times 10^{10}$.	74–3081
	TAN *See* 2,2,6,6–tetramethylpiperidone–*N*–oxyl (3.697).							
3.688	tartaric acid	2–2.2	5.9×10^8 (rel.)	$k/k_{thym} = 0.11 \pm 0.01$	γ–r.	opt.	c.k.	67–0461
3.689	tartrate ion	9	6.7×10^8 (rel.)	$k/k_{RNO} = 0.054$	γ–r.	opt.	c.k.; assume $k_{ferro} = k_{RNO}$.	67–0555
		9	7.5×10^8 (rel.)	$k/k_{RNO} = 0.06$	r.	opt.	c.k.; $E_a = -1.2 \pm 0.3$ kcal/mol(–5kJ/mol) (–8 to 23°).	71–0469
3.690	terephthalate ion	9	3.2×10^9 (rel.)	$k/k_{EtOH} = 1.75$	γ–r.	opt.	c.k. with RNO.	66–0441
3.691	tetrachloroethylene	—	$(2.3 \pm 0.3) \times 10^9$	—	p.r.	condy.	p.b.k. (Cl^-); ($CCl_2CCl_2OH \rightarrow H^+ + Cl^- + CCl_2COCl$)	71–0709
	$OH + CCl_2{=}CCl_2 \rightarrow CCl_2CCl_2OH$	—	$(1.7 \pm 0.3) \times 10^9$ (rel.)	—	p.r.	opt.	c.k. with CNS^-; reference rate not given.	71–0709
3.692	1,2,3,4–tetrafluorobenzene	—	5×10^9 (rel.)	—	p.r.	opt.	c.k. with CNS^-.	73–0054
3.693	tetrahydrofuran	1	1.4×10^9 (rel.)	$k/k_{Fe^{2+}} = 6.2$	Fenton	chem.	c.k.	49–0002
		9	2.7×10^9 (rel.)	$k/k_{EtOH} = 1.46$	γ–r.	opt.	c.k. with RNO.	66–0423
3.694	tetrahydropyran	1	1.0×10^9 (rel.)	$k/k_{Fe^{2+}} = 4.5$	Fenton	chem.	c.k.	49–0002

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.695	tetrahydroxysuccinate ion	9	1.3×10^9 (rel.)	$k/k_{EtOH} = 0.7$	γ–r.	opt.	c.k. with RNO.	66–0423
3.695a	α–tetralol	1.7–1.8	8.1×10^9 (rel.)	$k/k_{2\text{-PrOH}} = 3.7$	Fenton	chem.	c.k. with 1–phenylethanol.	74–9006
3.695b	1,2,3,4–tetramethylbenzene	~7	7.2×10^9	—	p.r.	opt.	p.b.k.; OH addn. as well as H abstr.; rate for H abstr. = 1.9×10^9.	75–1009
3.695c	1,2,3,5–tetramethylbenzene	~7	7.1×10^9	—	p.r.	opt.	p.b.k.; OH addn. and H abstr.; rate for H abstr. = 1.8×10^9.	75–1009
3.695d	1,2,4,5–tetramethylbenzene (Durene)	~7	7.0×10^9	—	p.r.	opt.	p.b.k.; OH addn. and H abstr.; rate for H abstr. = 1.8×10^9.	75–1009
3.696	N,N,N′,N′–tetramethyl–1,2–diazenedicarboxamide	7.1	7.7×10^9	—	p.r.	opt.	p.b.k. at 400 nm;	74–1061
		7	3×10^9 (rel.)	$k/k_{CNS^-} = 0.27$	p.r.	opt.	c.k.	74–1061
		10.3–11	4.8×10^9 (rel.)	$k/k_{carb} = 14.1$	p.r.	opt.	c.k.	74–1061
3.697	2,2,6,6–tetramethylpiperidone–*N*–oxyl (TAN)	10.5	3.8×10^9 (rel.)	$k/k_{carb} = 10.5$	p.r.	opt.	c.k.; cor. for CO_3^- + TAN.	71–0061
		7	$(4.1 \pm 0.4) \times 10^9$	—	p.r.	opt.	d.k. at 230 nm.	71–0061
		5–6	$< 10^8$ (rel.)	$k/k_{ferro} < 10^{-2}$	p.r.	opt.	c.k.	71–0618
		nat.	$(3.3 \pm 0.3) \times 10^9$ (rel.)	$k/k_X = 5.2 \pm 0.4$	p.r.	opt.	c.k. with phenylalanine (X); $k_X = 6.3 \times 10^9$; cor. for H; obs. X abs. at 320 nm.	72–3021
3.698	tetrasulfonated Cu phthalocyanine	10.7	7.3×10^9 (rel.)	$k/k_{carb} = 20$	γ–r.	chem.	c.k.	69–0827
			7.6×10^9 (rel.)	$k/k_{EtOH} = 4.1$	γ–r.	chem.	c.k.	69–0827
			7.7×10^9 (rel.)	$k/k_{MeOH} = 8.6$	γ–r.	chem.	c.k.	69–0827
3.699	tetronate ion	7	9.2×10^9	—	p.r.	opt.	d.k. at 248 nm.	74–1053
3.700	thalamyd	—	6.3×10^9 (rel.)	—	γ–r.	opt.	c.k. with RNO rel. to k(OH + sulfanilic acid) = 2.93×10^9.	73–0094
3.701	4–(2–thiazolylsulfamoyl)–succinanilic acid (sulfasuccidine)	—	4.6×10^9 (rel.)	—	γ–r.	opt.	c.k. with RNO rel. to k(OH + sulfanilic acid) = 2.93×10^9.	73–0094
3.702	N′–(2–thiazolyl)–sulfanilamide (sulfathiazole)	—	7.8×10^9 (rel.)	—	γ–r.	opt.	c.k. with RNO rel. to k(OH + sulfanilic acid) = 2.93×10^9.	73–0094
3.703	thiodiglycolic acid	1	6.0×10^9 (rel.)	$k/k_{CNS^-} = 0.546$	p.r.	opt.	c.k.	65–0387
3.704	thioglycolic acid	1	6.2×10^8 (rel.)	$k/k_{Fe^{2+}} = 2.7$	Fenton	chem.	c.k.	49–0002
3.705	thioglycolate ion	6.6	5.9×10^9 (rel.)	$k/k_{CNS^-} = 0.53$	p.r.	opt.	c.k.; $pK_a = 3.7$, 10.3 for thioglycolic acid.	73–0090
		11.1	5.5×10^9 (rel.)	$k/k_{CNS^-} = 0.05$				
3.706	thiolactate ion	7.2	1.7×10^{10} (rel.)	$k/k_{CNS^-} = 1.55$	p.r.	opt.	c.k.; $pK_a \cong 4$, 10.7 for thiolactic acid.	73–0090
		10.8	1.6×10^{10} (rel.)	$k/k_{CNS^-} = 1.45$				
3.707	thiophene $OH + C_4H_4S \rightarrow (OH)C_4H_4S$	—	3.3×10^9 (rel.)	$k/k_{CNS^-} = 0.304$	p.r.	opt.	c.k.	71–0360
3.708	threonine	2–2.2	3.9×10^8 (rel.)	$k/k_{thym} = 0.0727$	γ–r.	opt.	c.k.	65–0388
		6.6	5.1×10^8 (rel.)	$k/k_{RNO} = 0.041$	γ–r.	opt.	c.k.	73–0548

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.709	thymidine	2–2.2	4.6×10^9 (rel.)	$k/k_{CNS^-} = 0.417$	p.r.	opt.	c.k.	65–0388
		5–5.2	5.0×10^9 (rel.)	$k/k_{CNS^-} = 0.455$	p.r.	opt.	c.k.	65–0388
		7.4–7.6	4.6×10^9 (rel.)	$k/k_{CNS^-} = 0.417$	p.r.	opt.	c.k.	65–0388
		~7	4.7×10^9	—	p.r.	opt.	p.b.k. at 375 (pH = 7) and 400 (pH = 12.4) nm.	68–0312
		~12.4	2.1×10^9					
		5.6	$(5.3 \pm 0.5) \times 10^9$	—	p.r.	opt.	p.b.k. at 400 nm.	70–3069
3.710	thymidylic acid	2–2.2	4.3×10^9 (rel.)	$k/k_{CNS^-} = 0.394$	p.r.	opt.	c.k.; NH_4^+ salt.	65–0388
		6.5–7.0	5.2×10^9 (rel.)	$k/k_{CNS^-} = 0.477$	p.r.	opt.	c.k.; NH_4^+ salt.	65–0388
3.711	thymine OH addn. to 5,6–double bond	0.7–7	3.7×10^9 (rel.)	$k/k_{EtOH} = 2.00 \pm 0.10$	γ–r.	opt.	c.k.	65–0133
		1	5.2×10^9 (rel.)	$k/k_{CNS^-} = 0.47$	p.r.	opt.	c.k.	65–0387
		2–2.2	5.2×10^9 (rel.)	$k/k_{CNS^-} = 0.47$	p.r.	opt.	c.k.	65–0388
		5–5.5	5.0×10^9 (rel.)	$k/k_{CNS^-} = 0.455$	p.r.	opt.	c.k.	65–0388
		7.2–7.4	5.3×10^9 (rel.)	$k/k_{CNS^-} = 0.485$	p.r.	opt.	c.k.	65–0388
		2	7.8×10^9 (rel.)	$k/k_{PhH} = 1$	γ–r.	opt.	c.k.	67–0461
		9	6.2×10^9 (rel.)	$k/k_{RNO} = 0.5$	γ–r.	opt.	c.k.; assume $k_{ferro} = k_{RNO}$.	67–0555
		~7	7.4×10^9	—	p.r.	opt.	p.b.k.; obs. transient at 400 and 550 (pH = 12.4) nm.	68–0312
		~11	3.9×10^9					
		~12.4	1.1×10^9					
		—	5.6×10^9 (rel.)	$k/k_{1^-} = 0.435$	X–r.	opt.	c.k.	68–0359
		—	4.1×10^9 (rel.)	$k/k_{MeOH} = 4.55$	X–r.	opt.	c.k.	68–0359
		—	4.9×10^9 (rel.)	$k/k_{EtOH} = 2.63$	X–r.	opt.	c.k.	68–0359
		7	7.4×10^9	—	p.r.	opt.	p.b.k. at 400 nm (adduct).	68–0597
		7	$(7.4 \pm 0.5) \times 10^9$	—	p.r.	opt.	d.k.; obs. disappearance of 5,6–double bond at 270 nm.	69–0571
		7	$(4.6 \pm 0.3) \times 10^9$	—	p.r.	opt.	p.b.k.; OH–adduct obs. at 385 nm.	69–0571
		7	7.6×10^9 (rel.)	$k/k_{CNS^-} = (0.69 \pm 0.15)$	p.r.	opt.	c.k.; cor. for incomplete scav. of e^-_{aq} by H_2O_2.	69–0571
		1	—	$k/k_{perox} = 72.4$	Fe(II) + H_2O_2	esr	c.k.	69–5278
		1	—	$k/k_{perox} = 71.5$	Ti(III) + H_2O_2	esr	c.k.	69–5278
		6.1	$(5.6 \pm 0.4) \times 10^9$	—	p.r.	opt.	p.b.k. at 400 nm.	70–3069
		nat.	4.7×10^9 (rel.)	$k/k_{ferro} = 0.505$	p.r.	opt.	c.k.	71–0578
		nat.	5.1×10^9	—	p.r.	opt.	d.k.	71–0578
		9	5.5×10^9	—	p.r.	opt.	p.b.k. at 375 nm.	72–0047
		6–7	4.7×10^9 (rel.)	$k/k_{RNO} = 0.38$	γ–r.	opt.	c.k.; 17°C.	75–0294
			For other ratios see: 3.25, 3.27, 3.129, 3.131, 3.149, 3.150, 3.154, 3.160, 3.161, 3.162, 3.177, 3.180, 3.181, 3.182, 3.186, 3.225, 3.226, 3.239, 3.247, 3.266, 3.289–90, 3.291–94, 3.343, 3.346, 3.358, 3.361, 3.369, 3.371, 3.374, 3.384, 3.385, 3.394, 3.399, 3.400, 3.401, 3.402, 3.403, 3.404, 3.409, 3.410, 3.411, 3.415, 3.418, 3.419, 3.420, 3.421, 3.422, 3.423, 3.424, 3.425, 3.426, 3.435, 3.441, 3.461, 3.484, 3.491, 3.493, 3.497, 3.501, 3.503, 3.507, 3.511, 3.513, 3.545, 3.546, 3.585, 3.587, 3.588, 3.589, 3.594, 3.596, 3.597, 3.602, 3.613, 3.619, 3.633, 3.634, 3.636, 3.637, 3.642, 3.671, 3.674, 3.679, 3.680, 3.683, 3.688, 3.708, 3.735, 3.741, 3.753.				
3.712	*p*–toluate ion	9	4.4×10^9 (rel.)	$k/k_{EtOH} = 2.38$	γ–r.	opt.	c.k. with RNO.	66–0441
	OH + $CH_3C_6H_4COO^-$ → $CH_3(OH)C_6H_4COO^-$	9	8×10^9	—	p.r.	opt.	p.b.k. at 340 nm.	72–0047

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.713	toluene	3	$(3.0 \pm 0.7) \times 10^9$	—	p.r.	opt.	p.b.k. at 313 and 309 nm.	64–0115
	(I) OH + $C_6H_5CH_3 \rightarrow$ $C_6H_5CH_2$ + H_2O	~7	6.8×10^9	—	p.r.	opt.	p.b.k. at 258 nm ($C_6H_5CH_2$).	73–0089, 75–1009
	(II) OH + $C_6H_5CH_3 \rightarrow$ $C_6H_5(OH)CH_3$		4.0×10^8 (I)	$k_I/k_{II} = 0.033$				
3.714	*o*–toluenesulfonate ion	—	3.2×10^9 (rel.)	$k/k_{RNO} = 0.258$	r.	opt.	c.k.	72–0425
3.715	*m*–toluenesulfonate ion	—	3.8×10^9 (rel.)	$k/k_{RNO} = 0.303$	r.	opt.	c.k.	72–0425
3.716	*p*–toluenesulfonate ion	9	1.8×10^9 (rel.)	—	—	—	c.k. with RNO.	66–0843
		—	3.7×10^9 (rel.)	$k/k_{RNO} = 0.294$	r.	opt.	c.k. with RNO.	72–0425
3.717	*o*–tolyl–β–D–gluco–pyranoside	—	5.3×10^9 (rel.)	$k/k_{CNS^-} = 0.485$	p.r.	opt.	c.k.	71–0056
		—	3.4×10^9 (rel.)	—	γ–r.	opt.	c.k. with RNO; relative to k(OH + X) = 4.4×10^9, X = phenyl–β–D–gluco–pyranoside.	71–0056
3.718	*m*–tolyl–β–D–gluco–pyranoside	—	3.0×10^9 (rel.)	—	γ–r.	opt.	c.k. with RNO; relative to k(OH + X) = 4.4×10^9, X = phenyl–β–D–gluco–pyranoside.	71–0056
		—	6.2×10^9 (rel.)	$k/k_{CNS^-} = 0.56$	p.r.	opt.	c.k.	71–0056
3.719	*p*–tolyl–β–D–glucopyranoside	—	2.7×10^9 (rel.)	—	γ–r.	opt.	c.k. with RNO; rel. to k(OH + X) = 4.4×10^9, X = phenyl–β–D–gluco–pyranoside.	71–0056
		—	3.6×10^9 (rel.)	$k/k_{CNS^-} = 0.33$	p.r.	opt.	c.k.	71–0056
3.720	*p*–tolyl–*S*–β–D–thioglucopyranoside	—	8.7×10^9	—	p.r.	opt.	transient absorbs at 320 nm.	70–1056
	triacetoneamine–*N*–oxyl(TAN) *See* 2,2,6,6–tetramethylpiperidone–*N*–oxyl (3.697).							
3.720a	tributyl phosphate	1.2	1.03×10^{10} (rel.)	$k/k_{EtOH} = 5.5$	γ–r.	chem.	c.k.; $k/k_{HNO3} = 77$.	74–0439
3.721	1,1,2–trichloro–ethylene	—	$(4.0 \pm 0.4) \times 10^9$	—	p.r.	eondy.	p.b.k. (Cl^-); ($CHClOHCCl_2 \rightarrow H^+ + Cl^- + CCl_2CHO$).	71–0709
	OH + $CHCl{=}CCl_2 \rightarrow$ $CHCl(OH)CCl_2$	—	$(2.6 \pm 0.3) \times 10^9$ (rel.)	—	p.r.	opt.	c.k. with CNS^-; referenee rate not given.	71–0709
3.722	2,4,6–trichloro–phenyl–β–D–gluco–pyranoside	—	1.9×10^9 (rel.)	—	γ–r.	opt.	c.k. with RNO; rel. to k(OH + X) = 4.4×10^9, X = phenyl–β–D–gluco–pyranoside.	71–0056
3.723	triethylamine	—	1.1×10^{10} (rel.)	$k/k_{CNS^-} = 1$	p.r.	opt.	c.k.; extrapolat–ed value based on $k/k_{CNS^-} = 0.73$ at pH 11.	71–0585
	(I) OH + $Et_3N \rightarrow H_2O + CH_3CHNEt_2$							
	(II) OH + $Et_3N \rightarrow H_2O +$ $CH_2CH_2NEt_2$	12	3.7×10^9 (I) (rel.)	$k_I/k_{EtOH} = 2$	γ–r.	chem.	c.k.; no II ohs.; may be O^- reaction.	71–0590
3.724	triethylammonium ion	1	1.8×10^8 (rel.)	$k/k_{Fe^{2+}} = 0.8$	Fenton	chem.	c.k.	49–0002
		3.6	3.5×10^8 (rel.)	$k/k_{CNS^-} = 0.032$	p.r.	opt.	c.k.	71–0585
	(I) OH + $Et_3NH^+ \rightarrow$ $CH_3CHNH^+Et_2$ + H_2O	1.5, 6.5	1.3×10^8 (rel.)	$k_I/k_{EtOH} = 0.068$	γ–r.	chem.	c.k.; $k_{II}/k_I = 0.76$.	71–0590
	(II) OH + $Et_3NH^+ \rightarrow$ $H_2O + CH_2CH_2NH^+Et_2$							
3.725	trifluoroacetate ion	9	2×10^5 (rel.)	—	—	—	c.k. with RNO.	66–0843
3.725a	1,2,3–trimethoxy–benzene	—	$(8.0 \pm 0.8) \times 10^9$	—	p.r.	—	—	75–1171

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.725b	1,2,4–trimethoxy–benzene	—	$(8.1 \pm 0.8) \times 10^9$	—	p.r.	—	—	75–1171
3.725c	1,3,5–trimethoxy–benzene	—	$(8.1 \pm 0.8) \times 10^9$	—	p.r.	—	—	75–1171
	trimethylacetate ion *See* privalate ion (3.622).							
3.726	trimethylamine OH + $(CH_3)_3N \rightarrow H_2O + CH_2N(CH_3)_2$	—	1.3×10^{10} (rel.)	$k/k_{CNS^-} = 1.2$	p.r.	opt.	c.k.; extrapolated value based on $k/k_{CNS^-} = 1.1$ at pH 10.9.	71–0585
3.727	trimethylammonium ion OH + $(CH_3)_3NH^+ \rightarrow H_2O + CH_2NH^+(CH_3)_2$	7.5	4×10^8 (rel.)	$k/k_{CNS^-} = 0.0364$	p.r.	opt.	c.k.	71–0585
3.727a	1,2,3–trimethyl–benzene	~7	7.0×10^9	—	p.r.	opt.	p.b.k.; OH addn. as well as H abstr.; rate for H abstr. = 1.3×10^9.	75–1009
3.727b	1,2,4–trimethyl–benzene	~7	6.2×10^9	—	p.r.	opt.	p.b.k.; OH addn. and H abstr.; rate for H abstr. = 1.15×10^9.	75–1009
3.727c	1,3,5–trimethyl–benzene (Mesitylene)	~7	6.4×10^9	—	p.r.	opt.	p.b.k.; OH addn. and H abstr.; rate for H abstr. = 1.2×10^9.	75–1009
3.728	2,4,6–trimethyl–3–hydroxypyridine	6.5	2.5×10^9 (rel.)	$k/k_{RNO} = 0.20 \pm 0.03$	γ–r.	opt.	c.k.	69–0580
3.729	2,4,5–trimethyl–phenyl–β–D–glucopyranoside	—	3.2×10^9 (rel.)	—	γ–r.	opt.	c.k. with RNO; rel. to k(OH + X) = 4.4×10^9, X = phenyl–β–D–glucopyranoside.	71–0056
3.730	trimethyl phosphate OH + $(CH_3O)_3PO \rightarrow H_2O + CH_2O(CH_3O)_2PO$	—	1.2×10^8 (rel.)	$k/k_{CNS^-} = 0.011$	p.r.	opt.	c.k.	72–3008
3.731	2,4,6–trimethyl–1,3,5–trioxane	9	1×10^9 (rel.)	$k/k_{EtOH} = 0.546$	γ–r.	opt.	c.k. with RNO.	66–0423
3.732	1,3,5–trioxane	9	4.9×10^8 (rel.)	$k/k_{EtOH} = 0.264$	γ–r.	opt.	c.k. with RNO.	66–0423
	trypaflavin *See* acriflavin (3.141).							
3.733	trypsin	—	2.5×10^{10} (rel.)	—	X–r.	biol	effect on enzyme inact. compared with acetone, glycylglycine, glycerol, glucose, ethanol, formate ion.	67–3044
		~7	$(8.2 \pm 1.2) \times 10^{10}$	—	p.r.	opt.	p.b.k. at 330 nm. or c.k. with glucose ($k = 1 \times 10^9$).	71–3069
		6.3	3.9×10^{10} (rel.)	$k/k_{RNO} = 3.1$	γ–r.	opt.	c.k.	73–0548
3.734	trypsinogen	7.4	$(8.5 \pm 0.5) \times 10^{10}$ (rel.)	—	p.r.	opt.	c.k. with glucose ($k = 1 \times 10^9$); obs. 330 nm abs.	71–3069
3.735	tryptophan, positive ion	2–2.2	1.1×10^{10} (rel.)	$k/k_{CNS^-} = 0.985$	p.r.	opt.	c.k.	65–0388
		2–2.2	7.7×10^9 (rel.)	$k/k_{thym} = 1.42 \pm 0.15$	γ–r.	opt.	c.k.; k from initial slope of competition plot.	65–0388, 67–0461

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.736	L–tryptophan, positive ion	1	$(1.25 \pm 0.2) \times 10^{10}$	—	p.r.	opt.	p.b.k. at 560 nm.	69–0459
3.737	tryptophan, zwitterion	6.1–6.3	1.4×10^{10} (rel.)	$k/k_{CNS^-} = 1.29$	p.r.	opt.	c.k.	65–0388
		6.2	7.8×10^{9} (rel.)	$k/k_{RNO} = 0.62$	γ–r.	opt.	c.k.	73–0548
3.738	L–tryptophan, zwitterion	8.8	$(1.2 \pm 0.3) \times 10^{10}$	—	p.r.	opt.	p.b.k. at 310 nm.	69–0459
			For other ratios see: 3.211, 3.252, 3.273, 3.333, 3.334, 3.335, 3.454, 3.468, 3.470, 3.472, 3.517, 3.539, 3.540, 3.541, 3.542.					
3.739	omitted							
3.740	tyramine, negative ion	11.2	$(1.5 \pm 0.2) \times 10^{10}$	$k/k_{CNS^-} = 1.36$	p.r.	opt.	c.k.	73–0003
3.741	tyrosine, positive ion	2–2.2	1×10^{10} (rel.)	$k/k_{thym} = 1.87$	p.r.	opt.	c.k.	65–0388
3.742	L–(–)–tyrosine, positive ion	4.0	1.5×10^{10} (rel.)	$k/k_{HCOO^-} = 4.2$	p.r.	opt.	c.k.; meas. transient at 310–320 nm.	68–0062
3.743	tyrosine, negative ion	5.2	$(1.4 \pm 0.3) \times 10^{10}$ (rel.)	$k/k_{CNS^-} = 1.3$	p.r.	opt.	c.k.	73–0003
		6.5	1.05×10^{10} (rel.)	$k/k_{RNO} = 0.84$	γ–r.	opt.	c.k.	73–0548
3.744	tyrosine, dinegative ion	11.2	$(1.3 \pm 0.3) \times 10^{10}$ (rel.)	$k/k_{CNS^-} = 1.2$	p.r.	opt.	c.k.	73–0003
3.745	L–(–)–tyrosine, negative ion	10.6	2×10^{10} (rel.)	$k/k_{carb} = 53.7$	p.r.	opt.	c.k.	68–0062
3.746	uracil $OH + C_5H_6N_2O_2 \rightarrow C_5H_6N_2O_2{\cdot}OH$	9.0	6.8×10^{9} (rel.)	$k/k_{RNO} = 0.542 \pm 0.027$	γ–r.	opt.	c.k.	65–0356, 67–0555
		2–2.2	4.8×10^{9} (rel.)	$k/k_{CNS^-} = 0.44$	p.r.	opt.	c.k.	65–0388
		5–5.2	5.2×10^{9} (rel.)	$k/k_{CNS^-} = 0.469$	p.r.	opt.	c.k.	65–0388
		7.3–7.5	5.2×10^{9} (rel.)	$k/k_{CNS^-} = 0.477$	p.r.	opt.	c.k.	65–0388
		7.0	$(7.4 \pm 1.0) \times 10^{9}$	—	p.r.	opt.	d.k. at 270 nm.	68–0316
		6.5	7.4×10^{9} (rel.)	$k/k_{CNS^-} = 0.67$	p.r.	opt.	c.k.; cor. for e^-_{aq} not scav. by 10^{-2} *M* H_2O_2.	68–0316, 69–0571
		7	$(6.0 \pm 0.3) \times 10^{9}$	—	p.r.	opt.	d.k. at 270 nm.	69–0571
		7	$(6.5 \pm 0.7) \times 10^{9}$	—	p.r.	opt.	p.b.k. at 385 nm.	69–0571
		5.9	$(5.8 \pm 0.2) \times 10^{9}$	—	p.r.	opt.	p.b.k. at 400 nm.	70–3069
		nat.	4.2×10^{9} (rel.)	$k/k_{ferro} = 0.452$	p.r.	opt.	c.k.	71–0578
		—	6.0×10^{9}	—	p.r.	opt.	p.b.k. as well as as d.k.	73–3016
		6–7	4.5×10^{9} (rel.)	$k/k_{RNO} = 0.36$	γ–r.	opt.	c.k.; 17°C.	75–0294
			For other ratios see: 3.289, 3.290.					
3.747	uracil dinucleotide (UpU)	7	$(3.8 \pm 0.2) \times 10^{9}$	—	p.r.	opt.	d.k. at 270 nm.	69–0571
		7	5.3×10^{9} (rel.)	$k/k_{CNS^-} = 0.48 \pm 0.08$	p.r.	opt.	c.k.; rates calcd. per nucleotide base.	69–0571
	uracil mononucleotides *See* uridine monophosphate (3.751).							
3.748	uracil oligonucleotide (oligo U)	7	$(4.3 \pm 0.2) \times 10^{9}$	—	p.r.	opt.	d.k. at 270 nm.	69–0571
		7	4×10^{9} (rel.)	$k/k_{CNS^-} = 0.36 \pm 0.07$	p.r.	opt.	c.k.; rate calcd. per nucleotide base.	69–0571
	uracil polynucleotide (poly U) *See* polyuridylic acid (3.631).							
3.749	urea	9.0	$< 1.25 \times 10^{6}$	$k/k_{RNO} < 10^{-4}$	γ–r.	opt.	c.k.	65–0356
3.749a	uric acid	6–7	7.2×10^{9} (rel.)	$k/k_{RNO} = 0.58$	γ–r.	opt.	c.k.; 17°C.	75–0294
3.750	uridine	7	4.2×10^{9} (rel.)	$k/k_{CNS^-} = 0.38 \pm 0.08$	p.r.	opt.	c.k.; cor. for incomplete scavenging of e^-_{aq} by H_2O_2.	68–0316, 69–0571
		7	$(6.5 \pm 0.5) \times 10^{9}$	—	p.r.	opt.	d.k. at 270 nm.	69–0571
		7	$(4.1 \pm 0.2) \times 10^{9}$	—	p.r.	opt.	p.b.k.; OH adduct obs. at 385 nm.	69–0571
		6.5	2.4×10^{9} (rel.)	$k/k_{RNO} = 0.19$	γ–r.	opt.	c.k.	69–0580

TABLE 4. Reactions of OH with organic solutes – Continued

No.	Solute and Reaction	pH	k	Ratio	Source	Method	Comment	Ref.
3.750 cont.		5.4	$(4.5 \pm 0.3) \times 10^9$	—	p.r.	opt.	p.b.k. at 400 nm.	70–3069
		7	4.1×10^9 (rel.)	$k/k_{CNS^-} = 0.36$	p.r.	opt.	c.k.; unpubl. data.	73–1071
3.751	uridine monophosphate (uridylic acid)	7	5.2×10^9 (rel.)	$k/k_{CNS^-} = 0.47 \pm 0.1$	p.r.	opt.	c.k.; cor. for incomplete scav. of e_{aq}^- by H_2O_2.	68–0316, 69–0571
		7	$(4.6 \pm 0.3) \times 10^9$	—	p.r.	opt.	d.k. at 270 nm.	69–0571
		7	$(4.0 \pm 0.4) \times 10^9$	—	p.r.	opt.	p.b.k.; OH adduct obs. at 385 nm.	69–0571
		6.5	2.5×10^9 (rel.)	$k/k_{RNO} = 0.2 \pm 0.02$	γ–r.	opt.	c.k.	69–0580
		7.0	$(5.1 \pm 0.3) \times 10^9$	—	p.r.	opt.	p.b.k. at 400 nm.	70–3069
		7	4.5×10^9	—	p.r.	opt.	p.b.k. at 390 nm.	73–1071
3.752	valerate ion	9	2.9×10^9 (rel.)	$k/k_{EtOH} = 1.55$	γ–r.	opt.	c.k. with RNO.	66–0423
3.753	valine	2–2.2	7.2×10^8 (rel.)	$k/k_{thym} = 0.134$	γ–r.	opt.	c.k.	65–0388
		6.6	6.6×10^8 (rel.)	$k/k_{RNO} = 0.053$	γ–r.	opt.	c.k.	73–0548
3.754	vinyl chloride $OH + CH_2{=}CHCl \rightarrow CH_2OHCHCl$	—	$(7.1 \pm 0.5) \times 10^9$ (rel.)	—	p.r.	opt.	c.k. with CNS^-; reference rate not given.	71–0709
	vinyl methyl ketone *See* 1–butene–3–one (3.229).							
	Vitamin B12 *See* cyanocobalamin (3.272a).							
	Vitamin B12a *See* hydroxocobalamin (3.447).							
3.754a	xanthine	8.0	8.9×10^9 (rel.)	$k/k_{RNO} = 0.71$	γ–r.	opt.	c.k.; 17°C.	75–0294
3.755	*o*–xylene	~7	6.7×10^9	—	p.r.	opt.	p.b.k.; OH addn. and H abstr.; rate for H abstr. = 8.0×10^8.	75–1009
3.756	*m*–xylene	~7	7.5×10^9	—	p.r.	opt.	p.b.k.; OH addn. and H abstr.; rate for H abstr. 9.0×10^8.	75–1009
3.757	*p*–xylene	~7	7.0×10^9	—	p.r.	opt.	p.b.k.; OH addn. and H abstr.; rate for H abstr. 8.4×10^8.	75–1009
3.758	xylenol orange	11	2.2×10^{10} (rel.)	$k/k_{MeOH} = 24.5$	γ–r.	opt.	c.k.	71–0437

TABLE 5. Reactions of O^- with water, transients from water, inorganic solutes, and organic solutes

No.	Solute and reaction	pH	k	Ratio	Source	Method	Comment	Ref.
4.1	H_2O							
	$O^- + H_2O \rightarrow OH^- + OH$	11	2×10^6 (rel.)	$k/k_{EtOH} = (9.6 \pm 1.0) \times 10^{-2}$ $M[H_2O]$	p.r.	opt.	c.k. with CO_3^{2-}; N_2O and O_2–satd. solns.	70–0511
		11	1.5×10^6 (rel.)	$k/k_{MeOH} = (1.3 \pm 0.1) \times 10^{-1}$ $M[H_2O]$	p.r.	opt.	c.k. with CO_3^{2-}; N_2O and O_2–satd. solns.	70–0511
		8–8.8	$(1.75 \pm 0.4) \times 10^6$ (rel.)	—	p.r.	opt.	c.k.; soln. contains ferrocyanide with methanol or ethanol; assumed $k(O^- + \text{ferro}) \leq 3 \times 10^7$, $k(O^- + EtOH) = 9.8 \times 10^8$, $k(O^- + MeOH) = 5.3 \times 10^8$.	71–0137
4.2	O^- → 1st order decay	13–13.7	$4.3 \times 10^4\ s^{-1}$ (rel.)	$k/k_{oxy} = (1.2 \pm 0.24) \times 10^{-5} dm^{-3}mol$	f.phot.	opt.	d.k. of O_3^-.	68–7277
		>13	$4.3 \times 10^4\ s^{-1}$ (rel.)	$k/k_{oxy} = (1.2 \pm 0.4) \times 10^{-5}$ $dm^{-3}mol$	p.r.	opt.	d.k. of O_3^-.	69–0002
4.3	e^-_{aq}							
	$O^- + e^-_{aq} \rightarrow 2OH^-$	alk.	$\sim 2 \times 10^{10}$	—	—	—	See 1.9, S1.5, NSRDS–NBS 43 and supplement.	73–0030 75–0002
4.4	OH							
	$O^- + OH \rightarrow HO_2^-$	alk.	$< 2.6 \times 10^{10}$	—	—	—	See 3.4 (Table 2)	—
4.5	O^-							
	$O^- + O^- \rightarrow O_2^{2-}$	12–13	$\sim 1 \times 10^9$	—	p.r.	opt.	curve fitting; N_2O–$Fe(CN)_6^{4-}$ soln.	64–0213
		13	8.3×10^9 (rel.)	$k/k_{oxy} = 2.3$	p.r.	opt.	c.k.; obs. O_3^-.	66–0001
		>12	$\leq 9 \times 10^8$ (rel.)	—	p.r.	opt.	c.k. with $Fe(CN)_6^{4-}$; est. based on numerous assumptions; $pK_a(OH) = 11.9$.	66–0424
4.6	BH_4^-							
	$O^- + BH_4^- + (H_2O) \rightarrow BH_4 + 2OH^-$	11–12.83	$< 4 \times 10^8$	—	p.r.	opt.	calcd. from p.b.k.; assumed $pK_a(OH) = 11.8$ and $k(OH + BH_4^-) = 1.2 \times 10^{10}$.	70–1046
4.7	Br^-							
	$O^- + Br^- \rightleftharpoons BrO^{2-}$ $BrO^{2-}(+H_2O) \rightleftharpoons$	13	4.5×10^7 (rel.)	$k/k_{2\text{-PrOH}} = 0.03$	γ–r.	chem.	c.k.; obs. G(acetone).	68–0602
	$Br + 2OH^-$	6–7	2×10^8 (rel.)	$k/k_{EtOH} = 0.18$ $k/k_{MeOH} = 0.34$	p.r.	opt.	c.k.; soln. contains N_2O ($e^-_{aq} + N_2O \rightarrow N_2 + O^-$).	71–0137
4.8	BrO^-							
	$O^- + BrO^-(+H_2O) \rightarrow BrO + O^{2-}$ or	11–13	4.4×10^9 (rel.)	$k/k(OH + CO_3^{2-}) = 11$	p.r.	opt.	c.k.; $pK_a(OH) = 11.9$; $\mu = 0.4$.	68–0153
	$\rightarrow BrO + 2OH^-$	12–13	$(2.0 \pm 0.4) \times 10^9$ (rel.)	—	f.phot.	opt.	d.k. of O_3^-; anal. of data is complex.	69–7340

TABLE 5. Reactions of O^- with water, transients from water, inorganic solutes, and organic solutes – Continued

No.	Solute and reaction	pH	k	Ratio	Source	Method	Comment	Ref.
4.9	BrO_2^-							
	$O^- + BrO_2^- (+ H_2O) \rightarrow BrO_2 + 2OH^-$	13	1.7×10^9 (rel.)	$k/k(OH + CO_3^{2-}) = 4.5$	p.r.	opt.	c.k.; assume $k(OH + BrO_2^-) = 1.9 \times 10^9$ and $pK_a(OH) = 11.9$; $\mu = 0.4$.	68–0153
		12–13	$(1.1 \pm 0.2) \times 10^9$ (rel.)	—	f.phot.	opt.	d.k. of O_3^-; data anal. is complex.	69–7340
4.10	BrO_3^-							
	$O^- + BrO_3^- (+ H_2O) \rightarrow BrO_3 + 2OH^-$	12–13	$(1.2 \pm 0.2) \times 10^6$ (rel.)	—	f.phot.	chem.	c.k. of O_3^-; more than one rate involved in calcn.; may be up to 30% lower.	69–7340
4.11	BrO_4^-	7	$< 10^7$	—	p.r.	opt.	very slow or no reaction.	73–0106
4.12	CNS^-							
	$O^- + CNS^- (+ H_2O) \rightarrow CNSOH^- + OH^-$	13.5	1.0×10^9	—	p.r.	opt.	p.b.k.; assume product is CNS.	65–0386
	$CNSOH^- + CNS^- \rightleftharpoons (CNS)_2^- + OH^-$	6–7	1.6×10^9 (rel.) 1.6×10^9 (rel.)	$k/k_{EtOH} = 1.5$ $k/k_{MeOH} = 2.8$	p.r.	opt.	c.k.	71–0137
	$CNSOH^- \rightleftharpoons CNS + OH^-$ $CNS + CNS^- \rightleftharpoons (CNS)_2^-$	alk.	1.1×10^9	—	p.r.	opt.	p.b.k. at 0.36 *M* NaOH; $k = 1.3 \times 10^9$ at 1.08 *M* NaOH.	71–0137
		13	$(3.7 \pm 0.3) \times 10^9$	—	p.r.	opt.	p.b.k.	72–0126
4.13	CO_3^{2-}							
	$O^- + CO_3^{2-} (+ H_2O)$	—	$\leq 10^7$	—	p.r.	opt.	no details given.	66–0139
	$\rightarrow CO_3^- + 2OH^-$	14	$\leq 5 \times 10^5$	—	p.r.	opt.	p.b.k.	70–0247
4.14	Ce^{3+}							
	$O^- + Ce^{3+} \rightarrow Ce^{4+} + 2OH^-$	2.3–2.6	6.6×10^8 (rel.)	$k/k_{EtOH} = 0.6 \pm 0.2$	p.r.	opt.	c.k.; assuming $k(O^- + H_2O) = 1.75 \times 10^6$.	71–0137
4.15	ClO^-							
	$O^- + ClO^- \rightarrow ClO + O^{2-}$	13	$(2.2 \pm 0.1) \times 10^8$ (rel.)	$k/k(OH + CO_3^{2-}) = 0.6$	p.r.	opt.	c.k.	72–0301
4.16	ClO_2^-							
	$O^- + ClO_2^- \rightarrow ClO_2 + O^{2-}$	13	$(1.7 \pm 0.1) \times 10^8$ (rel.)	$k/k(OH + CO_3^{2-}) = 0.48$	p.r.	opt.	c.k.	72–0301
4.17	ClO_3^-	13	$< 10^6$	—	p.r.	opt.	no effect on CO_3^- formn. in carbonate soln.	72–0301
4.18	Fe^{2+}							
	$O^- + Fe^{2+} \rightarrow Fe^{3+} + 2OH^-$	4.4–4.8	3.5×10^9 (rel.)	$k/k_{EtOH} = 3.2 \pm 1.2$	p.r.	opt.	c.k.	71–0137
4.19	$Fe(CN)_6^{4-}$							
	$O^- + Fe(CN)_6^{4-} (+ H_2O) \rightarrow Fe(CN)_6^{3-} + 2OH^-$	13	5.8×10^8 (rel.)	$k/k_{MeOH} = 0.98$	γ–r.	chem.	c.k.; assuming that at pH = 13 most of OH is present as O^-; not cor. for OH.	63–0072
		13	1.5×10^9 (rel.)	$k/k_{EtOH} = 1.36$	p.r.	opt.	c.k.; $k_{EtOH}/k_{oxy} = 0.35$; not cor. for OH.	65–0007
		13	9×10^8 (rel.)	$k/k_{HCOO^-} = 0.9 \pm 0.1$	X–r.	chem.	c.k.; assuming $k(O^- + HCOO^-) = 1 \times 10^9$; not cor. for OH.	67–0064
		—	$\leq 3 \times 10^7$	—	p.r.	opt.	estd. from $k_{obs} = 2.57 \times 10^8$ and	71–0137

TABLE 5. Reactions of O^- with water, transients from water, inorganic solutes, and organic solutes – Continued

No.	Solute and reaction	pH	k	Ratio	Source	Method	Comment	Ref.
4.19 cont.							1.6 x 10^8 for 0.366 and 1.11 M NaOH, resp.	
4.20	FeO_4^{2-}, FeO_2^- (I) $O^- + FeO_4^{2-}$ (+ H_2O) → $HFeO_4^{2-}$ + HO_2^- (II) $O^- + FeO_2^-$ → FeO_3^{2-}	14	—	$k_I/k_{II} \cong 0.03$	γ–r.	chem.	c.k.; $K \cong 10^{-4}$ for $Fe(OH)_3 + OH^- \rightleftharpoons Fe(OH)_4^-$ is involved in calcn.	67–0614
4.21	H_2 $O^- + H_2 \rightarrow H + OH^-$	13.3	$(8 \pm 4) \times 10^7$ (rel.)	—	p.r.	opt.	rel. to $2k = 1.1 \times 10^{10}$ for $e^-_{aq} + e^-_{aq} \rightarrow H_2 + 2OH^-$	65–0009
4.22	HO_2^- $O^- + HO_2^- \rightarrow OH^- + O_2^-$	13.0	$(1.0 \pm 0.4) \times 10^9$ (rel.)	$k/k_{oxy} = 0.28 \pm 0.12$	p.r.	opt.	c.k.; k is a composite of $O^- + HO_2^-$, $O^- + H_2O_2$ and $OH + HO_2^-$ (69–0002).	67–0132
		alk.	3.9×10^8 (rel.)	—	p.r.	opt.	p.b.k. at 260 nm; anal. of data is complex.	68–0298
		13–13.7	7×10^8 (rel.)	$k/k_{oxy} = 0.2$	f.phot.	opt.	c.k.; obs. O_3^- at 430 nm.	68–7277
		11–13	$(7.2 \pm 0.8) \times 10^8$ (rel.)	$k/k(OH + CO_3^{2-}) = 1.98$	p.r.	opt.	c.k.; $\mu = 0.4$; cor. for OH and HCO_3^-.	69–0379
4.23	H_2O_2 $O^- + H_2O_2 \rightarrow H_2O + O_2^-$	alk.	$\cong 5 \times 10^7$	—	p.r.	opt.	p.b.k. at 260 nm; more than one rate constant is involved in calcn.	68–0298
		11	$k + 1.4\ k(OH + HO_2^-) = (8 \pm 0.8) \times 10^9$ (rel.)	—	p.r.	opt.	c.k. with CO_3^{2-}; rel. to $k(OH + CO_3^{2-}) = (4 \pm 0.2) \times 10^8$ and $pK_a(OH) = 11.9$; $\mu = 0.4$.	69–0379
4.24	I^- $O^- + I^-$ (+ H_2O) → $2OH^- + I$	13	$(8.6 \pm 1) \times 10^8$ (rel.)	$k/k(OH + CO_3^{2-}) = 2.3$	p.r.	opt.	c.k. with CO_3^{2-}; cor. for HCO_3^- and OH present.	69–0379
		13 14	2.8×10^9 (rel.) 2.6×10^9 (rel.)	$k/k_{2\text{-PrOH}} = 1.82$ $k/k_{2\text{-PrOH}} = 1.70$	γ–r.	chem.	c.k.; obs. G(acetone); $\mu = 0.1$; ratio increases with μ.	68–0602
		6–7	2.6×10^9 (rel.) 2.5×10^9 (rel.)	$k/k_{EtOH} = 2.35$ $k/k_{MeOH} = 4.35$	p.r.	opt.	c.k.	71–0137
		alk.	2.0×10^9	—	p.r.	opt.	p.b.k. at 0.58 M NaOH; $k = 1.9 \times 10^9$ at 1.1 M NaOH.	71–0137

TABLE 5. Reactions of O^- with water, transients from water, inorganic solutes, and organic solutes – Continued

No.	Solute and reaction	pH	k	Ratio	Source	Method	Comment	Ref.
4.24 cont.		alk.	2.2×10^9 (rel.)	$k/k_{EtOH} = 2.04$	p.r.	opt.	c.k.	71–0137
			2.3×10^9 (rel.)	$k/k_{MeOH} = 3.85$	p.r.	opt.	c.k.	71–0137
4.25	IO^-							
	$O^- + IO^- (+ H_2O) \rightarrow 2OH^- + IO$	13.6	6×10^9 (rel.)	$k/k_{oxy} = 1.84$	f.phot.	opt.	c.k.; effect of IO^- on decay of O_3^-.	70–0018
4.26	IO_3^-							
	$O^- + IO_3^- (+ H_2O) \rightarrow IO_3 + 2OH^-$	12.4	2.9×10^8 (rel.)	$k/k_{oxy} = 0.08$	f.phot.	opt.	c.k.; effect of IO_3^- on decay of O_3^-.	70–0018
	or $\rightarrow IO_4^{2-}$	12.6	$(3 \pm 0.5) \times 10^9$	—	p.r.	opt.	p.b.k. at 360 nm (IO_4^{2-}); cor. for OH reaction.	72–0017
		12.05	1.6×10^9	—	p.r.	opt.	p.b.k. at 360 nm (IO_3).	73–0027
4.27	NO_2^-							
	$O^- + NO_2^- (+ H_2O) \rightarrow 2OH^- + NO_2$	13	$(2.4 \pm 0.3) \times 10^8$ (rel.)	$k/k(OH + CO_3^{2-}) = 0.67$	p.r.	opt.	c.k. with CO_3^{2-}; cor. for OH and HCO_3^-.	69–0379
		12	3.6×10^8 (rel.)	$k/k_{oxy} \cong 10^{-1}$	f.phot.	opt.	c.k.; obs. O_3^- at 430 nm; based on $k(OH + NO_2^-)/k_{oxy} = 4.0 \pm 0.4$.	70–7264
			For other ratios see: 4.32.					
4.28	Ni(dimethylglyoxime)$^{2+}$	>13	$(2.5 \pm 0.3) \times 10^9$	—	p.r.	opt.	p.b.k. at 440 nm; incl. oxid. of free ligand.	72–0584
4.29	O_2 (oxy)							
	$O^- + O_2 \rightarrow O_3^-$	13	2.5×10^9	—	p.r.	opt.	p.b.k. at 430 nm.	66–0001
		alk.	4×10^9	—	—	—	unpubl. data cited.	66–0424
		~11	3.6×10^9	—	p.r.	opt.	p.b.k. at 430 nm.	69–0379
			For other ratios see: 4.2, 4.5, 4.22, 4.25–7, 4.33, 4.48, 4.65, 4.80, 4.89, 4.103.					
4.30	O_3^-							
	$O^- + O_3^- \rightarrow O_4^{2-}$ or $\rightarrow O_2 + O_2^{2-}$	13–13.7	$(8 \pm 2) \times 10^8$ (rel.)	—	f.phot.	opt.	d.k. at 430 nm; complex anal. uses other rate constants.	68–7277
		>13	$\sim 5 \times 10^8$	—	p.r.	opt.	d.k.; k estd.	69–0002
4.31	HPO_4^{2-}	12.35	2.7×10^6 (rel.)	$k/k_{MeOH} = 0.0046$	p.r.	—	c.k.; $\mu \cong 0.75$.	73–1049
4.32	RuO_4^{2-}							
	$O^- + RuO_4^{2-} (+ H_2O) \rightarrow RuO_4^- + 2OH^-$	>13	—	$k/k_{nitrite} = 7.6$	γ–r.	chem.	c.k.	68–0063
4.33	SO_3^{2-}							
	$O^- + SO_3^{2-} \rightarrow SO_3^- + 2OH^-$	14	3×10^8 (rel.)	$k/k_{oxy} = 0.083$	r.	opt.	c.k.; obs. O_3^- at 430 nm.	71–0461
4.34	acetate ion $O^- + CH_3COO^- \rightarrow OH^- + CH_2COO^-$	14	5×10^7 (rel.)	$k/k_{3HX} = 0.077$	p.r.	opt.	c.k.	75–1003
4.35	acetonitrile	14	2.2×10^8 (rel.)	$k/k_{3HX} = 0.34$	p.r.	opt.	c.k.	75–1003
4.36	acetylenedicarboxylate ion	14	$\leq 10^7$ (rel.)	$k/k_{3HX} = 0.063$	p.r.	opt.	c.k.; cor. for OH reactions; $k_{obs} = 4 \times 10^7$.	75–1003
4.37	aconitate ion	14	$\sim 1.5 \times 10^8$	—	p.r.	opt.	p.b.k. (allylic radicals from H abstr.).	75–1003
4.38	acrylamide	~12	$(6.4 \pm 0.8) \times 10^8$ (rel.)	$k/k(OH + CO_3^{2-}) = 1.75$	p.r.	opt.	c.k. with CO_3^{2-}; $\mu = 0.4$; assume $pK_a(OH) = 11.9$.	70–0052

TABLE 5. Reactions of O^- with water, transients from water, inorganic solutes, and organic solutes – Continued

No.	Solute and reaction	pH	k	Ratio	Source	Method	Comment	Ref.
4.39	acrylate ion	14	1.5×10^8 (rel.) (cor.)	$k/k_{3HX} = 0.307$	p.r.	opt.	c.k.;cor. for OH + acrylate ion.	75–1003
4.40	adipate ion	14	4.5×10^8 (rel.)	$k/k_{3HX} = 0.69$	p.r.	opt.	c.k.	75–1003
4.41	allyl alcohol	14.0	$(2.9 \pm 0.5) \times 10^9$	—	p.r.	opt.	p.b.k.; H abstr.	73–1070
		14	2.2×10^9 (rel.)	$k/k_{3HX} = 3.4$	p.r.	opt.	c.k. with ethanol $k_{3HX}/k_{EtOH} = 0.53$.	75–1003
4.42	allylbenzene	14	5×10^8	—	p.r.	opt.	p.b.k. (allylic radicals).	75–1003
4.43	allyl cyanide	14	1.05×10^9 (rel.)	$k/k_{3HX} = 1.61$	p.r.	opt.	c.k.	75–1003
4.44	amylamine	—	1.6×10^{10} (rel.) 1.42×10^{10} (rel.) 9.0×10^9 (rel.)	$k/k_{ferro} = 1.7$ $k/k_{CNS^-} = 1.3$ $k/k_{NB} = 2.8$	p.r.	opt.	c.k.; calcd. from obs. values at pH 8–13.1 assuming equal OH and O^- rates for ferro, CNS^- and NB.	73–0016
4.45	aniline $O^- + C_6H_5NH_2 \rightarrow OH^- + C_6H_5NH$	13.3	$(3.1 \pm 0.6) \times 10^9$	—	p.r.	opt.	p.b.k. at 300 and 400 nm.	72–0289
		14	1.6×10^9	—	p.r.	opt.	p.b.k.; cor. for OH; $k_{obs.} = 1.7 \times 10^9$.	75–1002
4.46	9–anthroate ion	14	4.8×10^8	—	p.r.	opt.	p.b.k.; cor. for OH.	73–0110
4.47	benzene	13	7.5×10^7 (rel.)	$k/k_{2-PrOH} = 0.05$	γ–r.	chem.	c.k.	68–0602
4.48	benzoate ion $O^- + C_6H_5COO^- \rightarrow OHC_6H_5COO^- + OH^-$	>13	$< 8 \times 10^6$ (rel.)	$k/k_{oxy} < 0.0024$	p.r.	opt.	c.k.; obs O_3^- at 430 nm; $pK_a(OH) = 11.8 \pm 2$; assume $k(OH + C_6H_5COO^-) = 6 \times 10^9$.	69–0002
		14	4×10^7	—	p.r.	opt.	p.b.k.; cor. for OH; $k_{obs} = 8.5 \times 10^7$.	72–0047
4.49	benzonitrile $O^- + C_6H_5CN (+ H_2O) \rightarrow OH^- + C_6H_5(OH)CN$	14	7×10^7 (rel.)	$k/k_{3HX} = 0.154$	p.r.	opt.	c.k.; cor. for OH contribution $k_{obs} = 1.0 \times 10^8$.	75–1003, 75–1002
4.50	4–biphenylcarboxylate ion	14	7.0×10^7	—	p.r.	opt.	p.b.k.; cor. for OH.	73–0110
4.51	2,2′–biphenyldicarboxylate ion (diphenate ion)	14	$\leq 2.9 \times 10^7$	—	p.r.	opt.	p.b.k.; cor. for OH.	73–0110
4.52	4,4′–biphenyldicarboxylate ion	14	$\leq 2.8 \times 10^7$	—	p.r.	opt.	p.b.k.; cor. for OH.	73–0110
4.53	2–butene–1,4–diol	14	2.3×10^9 (rel.)	$k/k_{3HX} = 3.54$	p.r.	opt.	c.k. with ethanol, $k_{3HX}/k_{EtOH} = 0.53$.	75–1003
	2–butenenitrile *See* crotononitrile (4.60).							
	3–butenenitrile *See* allyl cyanide (4.43).							
	2–butenoate ion *See* crotonate ion (4.59).							
4.54	3–butenoate ion	14	7.2×10^8 (rel.)	$k/k_{3HX} = 1.1$	p.r.	opt.	c.k.	75–1003
4.55	butylamine	—	1.3×10^{10} (rel.) 1.34×10^{10} (rel.) 7.7×10^9 (rel.)	$k/k_{ferro} = 1.4$ $k/k_{CNS^-} = 1.2$ $k/k_{NB} = 2.4$	p.r.	opt.	c.k.; k calcd. frm obs. values at pH = 8–13.1 assuming $k_{O^-} = k_{OH}$ for ferro, CNS^- and NB.	73–0016
4.56	butyrate ion	14	6.5×10^8 (rel.)	$k/k_{3HX} = 1.0$	p.r.	opt.	c.k.; H abstr.	75–1003
4.57	citrate ion	14	4.2×10^7 (rel.)	$k/k_{3HX} = 0.0645$	p.r.	opt.	c.k.	75–1003
4.58	*o*–cresol *See* *o*–methylphenoxide ion (4.82a)							

TABLE 5. Reactions of O^- with water, transients from water, inorganic solutes, and organic solutes – Continued

No.	Solute and reaction	pH	k	Ratio	Source	Method	Comment	Ref.
4.59	crotonate ion	14	9.0×10^8	—	p.r.	opt.	p.b.k. at 250 nm (allylic radical); also c.k. with ethanol and 3HX.	75–1003
4.60	crotononitrile	14	9.9×10^8 (rel.)	$k/k_{3HX} = 1.53$	p.r.	opt.	c.k.	75–1003
4.61	cyanoacetate ion	14	4.1×10^8 (rel.)	$k/k_{3HX} = 0.63$	p.r.	opt.	c.k.	75–1003
4.62	*p*–cyanophenoxide ion $O^- + CNC_6H_4O^- (+ H_2O) \rightarrow 2OH^- + CNC_6H_4O$	14	6.2×10^8	—	p.r.	opt.	p.b.k.; cor. for OH; $k_{obs} = 6.8 \times 10^8$.	75–1002
4.63	*p*–cyanotoluene *See* *p*–tolunitrile (4.112).							
4.64	diphenylacetate ion $O^- + (C_6H_5)_2CHCOO^- \rightarrow (C_6H_5)_2CCOO^- + OH^-$	14	6×10^7	—	p.r.	opt.	p.b.k.; cor. for OH; $k_{obs} = 9 \times 10^7$.	72–0047
4.65	ethanol	>13	1.2×10^9 (rel.)	$k/k_{oxy} = 0.35$	p.r.	opt.	c.k.	65–0007
	$O^- + C_2H_5OH \rightarrow OH^- + \cdot C_2H_4OH \rightleftharpoons \cdot C_2H_4O^- + H^+$	>13	1.2×10^9 (rel.)	$k/k_{oxy} = 0.337 \pm 0.028$	p.r.	opt.	c.k.	69–0002
		13	1.1×10^9 (rel.)	$k/k_{oxy} = 0.324$	f.phot.	opt.	c.k.; soln. contains NO_3^-.	69–7218
		13.92	$(11.3 \pm 1.7) \times 10^8$	—	p.r.	opt.	p.b.k. at 360 nm ($\cdot C_2H_4O^-$).	70–0080
		11	9.5×10^8 (rel.)	$k/k(OH + CO_3^{2-}) = 2.6$	p.r.	opt.	c.k.	70–0511
		14	4.5×10^8 (rel.)	$k/k(OH + EtOH) \cong 0.24$	X–r.	lum.	obs. effect of quenching chemiluminescence from fluorescein at pH 10.4 and 14.	73–6068
		14	1.22×10^9 (rel.)	$k/k_{3HX} = 1.89$	p.r.	opt.	c.k.; obs. reduction in allylic radical formn. from 3HX by addn. of EtOH.	75–1003
			For other ratios see: 4.1, 4.7, 4.12, 4.14, 4.18, 4.19, 4.24, 4.95, 4.114.					
4.66	ethylamine	—	5.8×10^9 (rel.)	$k/k_{NB} = 1.8$	p.r.	opt.	c.k.; calcd. k from obs. values at pH 8–13.1 assuming equal OH and O^- rates for NB and CNS^-.	73–0016
			8.9×10^9 (rel.)	$k/k_{CNS^-} = 8.1$				
4.67	ethyl ether	13	1.2×10^9 (rel.)	$k/k_{2\text{-PrOH}} = 0.79$	γ–r.	chem.	c.k.	68–0602
4.68	formate ion	—	—	$k/k_{oxalate} = 410$	γ–r.	chem.	c.k.	66–0621, 66–0151
		13	9×10^8 (rel.)	$k/k_{2\text{-PrOH}} = 0.60$	γ–r.	chem.	c.k.	68–0602
		14	1.0×10^9 (rel.)	$k/k_{2\text{-PrOH}} = 0.68$				
		11–13	1.3×10^9 (rel.)	$k/k(OH + CO_3^{2-}) = 3.5$	p.r.	opt.	c.k.; $\mu = 0.4$; assume $pK_a(OH) = 11.9$.	69–0379
			For other ratios see: 4.19.					
4.69	fumarate ion	14	$\leq 10^7$ (rel.)	$k/k_{3HX} = 0.063$	p.r.	opt.	c.k.;cor. for OH, $k_{obs} = 4 \times 10^7$.	75–1003
4.70	glutaconate ion	14	3.0×10^8	—	p.r.	opt.	p.b.k. at 250–270 nm (allylic radical); also c.k. with EtOH.	75–1003

TABLE 5. Reactions of O^- with water, transients from water, inorganic solutes, and organic solutes – Continued

No.	Solute and reaction	pH	k	Ratio	Source	Method	Comment	Ref.
4.71	glycine, negative ion	14	5.6×10^8 (rel.)	$k/k_{3HX} = 0.865$	p.r.	opt.	c.k.	75–1003
4.72	2,4–hexadien–1–ol	14.0	$(4.3 \pm 0.8) \times 10^9$	—	p.r.	opt.	p.b.k.; H abstr.	73–1070
4.72a	hexamethylbenzene $O^- + C_6(CH_3)_6 \rightarrow OH^- + C_6(CH_3)_5(CH_2)$	~13	$\sim 2.5 \times 10^9$	—	p.r.	opt.	p.b.k.	75–1009
4.73	hexanoate ion	14	1.44×10^9 (rel.)	$k/k_{3HX} = 2.2$	p.r.	opt.	c.k.	75–1003
4.74	2–hexene–1,6–dioate ion	14	6.9×10^8	—	p.r.	opt.	p.b.k. at 250–270 nm (allylic radical); also c.k. with EtOH.	75–1003
4.75	3–hexene–1,6–dioate ion (3HX) $O^- + {}^-O_2CCH_2CH{=}CHCH_2CO_2^- \rightarrow OH^- + {}^-O_2CCH_2CHCHCHCO_2^-$	14	$(6.5 \pm 0.3) \times 10^8$	—	p.r.	opt.	p.b.k. at 266 nm (allylic radicals); cor. for background reactions; $k_{obs} = 6.3 \times 10^8$.	75–1003
			For other ratios see: 4.34, 4.35, 4.36, 4.39, 4.40, 4.41, 4.43, 4.49, 4.53, 4.54, 4.56, 4.57, 4.60, 4.61, 4.65, 4.69, 4.71, 4.73, 4.76, 4.77, 4.78, 4.79, 4.83, 4.84, 4.94, 4.95, 4.96, 4.97, 4.102.					
	o–hydroxybenzaldehyde *See* salicylaldehyde (4.100).							
	o–hydroxybenzoate ion *See* salicylate ion (4.101).							
4.76	maleate ion	14	$\sim 3 \times 10^7$ (rel.)	$k/k_{3HX} = 0.123$	p.r.	opt.	c.k.; cor. for OH, k_{obs} 8×10^7.	75–1003
4.77	malonate ion	14	2.1×10^7 (rel.)	$k/k_{3HX} = 0.0323$	p.r.	opt.	c.k.	75–1003
4.78	methacrylonitrile	14	1.76×10^9 (rel.)	$k/k_{3HX} = 2.7$	p.r.	opt.	c.k.	75–1003
4.79	methacrylate ion	14	4.8×10^8 (rel.)	$k/k_{3HX} = 0.74$	p.r.	opt.	c.k.	75–1003
4.80	methanol	>13	7×10^8 (rel.)	$k/k_{oxy} = 0.209 \pm 0.014$	p.r.	opt.	c.k.	69–0002
	(I) $O^- + CH_3OH \rightarrow OH^- + {\cdot}CH_2OH \rightleftharpoons {\cdot}CH_2O^- + H^+$	13.92	$(5.8 \pm 0.8) \times 10^8$	—	p.r.	opt.	p.b.k. at 360 nm ($\cdot CH_2O^-$).	70–0080
	(II) $O^- + CH_3OH \rightarrow OH^- + CH_3O{\cdot}$	>13	—	$k_{II}/k_I = 0.075$	p.r.	opt.	detd. % of α–alcohol and alkoxy radicals by reactions with TNM and I^-, resp.	73–0126
			For other ratios see: 4.1, 4.7, 4.12, 4.18, 4.24, 4.31, 4.95.					
4.81	*o*–methoxyphenoxide ion	13	7×10^8 (rel.)	$k/k_{2\text{-PrOH}} = 0.46 \pm 0.09$	γ–r.	chem.	c.k.	72–0837
4.82	methylamine	13.1	7.5×10^9 (rel.)	$k/k_{CNS^-} = 0.71$	p.r.	opt.	c.k. assuming $k_{CNS^-} = 1.1 \times 10^{10}$.	71–0595
4.82a	*o*–methylphenoxide ion	13	5×10^8 (rel.)	$k/k_{2\text{-PrOH}} = 0.33 \pm 0.03$	γ–r.	chem.	c.k.	72–0837
4.82b	*p*–methylphenoxide ion	14	1.6×10^9 (I + II)	—	p.r.	opt.	p.b.k.; cor. for OH; $k_{obs} = 1.65 \times 10^9$.	75–1002
	(I) $O^- + CH_3C_6H_4O^- \rightarrow OH^- + CH_2C_6H_4O^-$		1.0×10^9 (I)					
	(II) $O^- + CH_3C_6H_4O^- (+ H_2O) \rightarrow 2OH^- + CH_3C_6H_5O$							
4.83	2–methyl–2–propanol (*tert*–butanol)	14	3.3×10^8 (rel.)	$k/k_{3HX} = 0.51$	p.r.	opt.	c.k.	75–1003
4.84	muconate ion	14	$\sim 2 \times 10^9$ (rel.)	$k/k_{3HX} \cong 3.1$	p.r.	opt.	c.k.	75–1003
4.85	1–naphthoate ion	14	1.2×10^8	—	p.r.	opt.	p.b.k.; cor. for OH.	73–0110
4.86	2–naphthoate ion	14	1.3×10^8	—	p.r.	opt.	p.b.k.; cor. for OH.	73–0110

TABLE 5. Reactions of O^- with water, transients from water, inorganic solutes, and organic solutes – Continued

No.	Solute and reaction	pH	k	Ratio	Source	Method	Comment	Ref.
4.87	nitrobenzene $O^- + C_6H_5NO_2 (+ H_2O) \rightarrow C_6H_5(OH)NO_2 + OH^-$	14	$< 7 \times 10^7$	—	p.r.	opt.	p.b.k.; cor. for OH; $k_{obs} \leq 1 \times 10^8$.	75–1002
4.88	*p*–nitrotoluene $O^- + CH_3C_6H_4NO_2 \rightarrow OH^- + CH_2C_6H_4NO_2$	14	7.6×10^8	—	p.r.	opt.	p.b.k.; cor. for OH; $k_{obs} = 8 \times 10^8$; k for abstr. from methyl group = 7×10^8.	75–1002
4.89	oxalate ion $O^- + C_2O_4^{2-} (+ H_2O) \rightarrow CO_2^- + 2OH^- + CO_2$.	13	2.6×10^7 (rel.)	$k/k_{oxy} = 7.2 \times 10^{-3}$	γ–r.	chem.	c.k.; ratio in $D_2O = 9.4 \times 10^{-3}$.	66–0068, 66–0621 68–0015
			For other ratios see: 4.68.					
4.89a	1,4–pentadien–3–ol	14.0	$(2.4 \pm 05) \times 10^9$	—	p.r.	opt.	p.b.k.	
4.89b	pentamethylbenzene $O^- + C_6H(CH_3)_5 \rightarrow OH^- + C_6H(CH_3)_4(CH_2)$	~13	2.6×10^9	—	p.r.	opt.	p.b.k.	75–1009
4.90	phenoxide ion	13	1.1×10^9 (rel.)	$k/k_{2\text{–PrOH}} = 0.75$	γ–r.	chem.	c.k.	68–0602
	$O^- + C_6H_5O^- (+ H_2O) \rightarrow 2OH^- + C_6H_5O$	14	6.5×10^8	—	p.r.	opt.	p.b.k. at 402 nm (phenoxyl radical); cor. for OH addn.; $k_{obs} = 7.1 \times 10^8$.	75–1001, 75–1002
4.91	phenoxybenzoate ion	14	1.6×10^8	—	p.r.	opt.	p.b.k. at 337 nm (hydroxycyclo–hexadienyl radical); cor. for OH; $k_{obs} = 2.1 \times 10^8$.	75–1001, 75–1002
4.92	phenylacetate ion $O^- + C_6H_5CH_2COO^- (+ H_2O) \rightarrow OH^- + HOC_6H_5CH_2COO^-$	14	$(2 \pm 0.6) \times 10^8$	—	p.r.	opt.	p.b.k. at 290 nm; $k_{obs} = 2.2 \times 10^8$; assume OH contri–bution is 6.2×10^7.	72–0047
4.93	phthalate ion, dianion	14	$\leq 1.8 \times 10^7$	—	p.r.	opt.	p.b.k.; cor. for OH.	73–0110
4.94	1–propanol	14	1.51×10^9 (rel.)	$k/k_{3HX} = 2.32$	p.r.	opt.	c.k.	75–1003
4.95	2–propanol	13	1.7×10^9 (rel.)	$k/k_{EtOH} = 1.56$	γ–r.	chem.	c.k.	68–0602
	(I) $O^- + (CH_3)_2CHOH \rightarrow OH^- + (CH_3)_2COH$	13	1.5×10^9 (rel.)	$k/k_{MeOH} = 2.56$	γ–r.	chem.	c.k.	68–0602
		14	1.6×10^9 (rel.)	$k/k_{EtOH} = 1.43$	γ–r.	chem.	c.k.	68–0602
		14	1.2×10^9 (rel.)	$k/k_{MeOH} = 2.13$	γ–r.	chem.	c.k.	68–0602
	(II) $O^- + (CH_3)_2CHOH \rightarrow OH^- + CH_2(CH_3)CHOH$	13.5	—	$k_1/k_{11} = 5.6 \pm 0.3$	γ–r.	chem.	c.k.; k_H/k_D(I) = 1.35 ± 0.10 and k_H/k_D(II) = 3.26 ± 0.23.	72–0167
		14	1.22×10^9 (rel.)	$k/k_{3HX} = 1.88$	p.r.	opt.	c.k.	75–1003
			For other ratios see: 4.7, 4.23, 4.34, 4.40–2, 4.48.					
4.96	propionate ion	14	3.3×10^8 (rel.)	$k/k_{3HX} = 0.51$	p.r.	opt.	c.k.	75–1003
4.97	propionitrile	14	1.0×10^9 (rel.)	$k/k_{3HX} = 1.54$	p.r.	opt.	c.k.	75–1003
4.98	propylamine	—	1.02×10^{10} (rel.) 6.4×10^9 (rel.)	$k/k_{CNS^-} = 0.93$ $k/k_{NB} = 2.0$	p.r.	opt.	c.k., calcd. from obs. values at pH 8–13.1 assuming equal O^- and OH rates for CNS^- and NB.	73–0016
4.99	pyridine $O^- + C_5H_5N (+ H_2O) \rightarrow OH^- + C_5H_5N(OH)$	14	$< 7 \times 10^7$	—	p.r.	opt.	p.b.k.; cor. for OH; $k_{obs} \leq 1 \times 10^8$.	75–1002
4.99a	pyrrolidine	13.2	2.1×10^{10} (rel.)	$k/k_{CNS^-} = 1.9$	p.r.	opt.	c.k. assuming $k_{CNS^-} = 1.1 \times 10^{10}$.	75–1016

TABLE 5. Reactions of O^- with water, transients from water, inorganic solutes, and organic solutes – Continued

No.	Solute and reaction	pH	k	Ratio	Source	Method	Comment	Ref.
4.100	salicylaldehyde, anion	13	4.0×10^8 (rel.)	$k/k_{2\text{-PrOH}} = 0.27 \pm 0.06$	γ–r.	chem.	c.k.	72–0837
4.101	salicylate ion $O^- + {}^-O_2CC_6H_4O^- (+ H_2O) \rightarrow 2OH^- + {}^-O_2CC_6H_4O$	13	4.8×10^8 (rel.)	$k/k_{2\text{-PrOH}} = 0.32 \pm 0.05$.	γ–r.	chem.	c.k.	72–0837
		14	4.5×10^8	—	p.r.	opt.	p.b.k.; cor. for OH; $k_{obs} = 5.1 \times 10^8$.	75–1002
4.102	succinate ion	14	1.35×10^8 (rel.)	$k/k_{3HX} = 0.207$	p.r.	opt.	c.k.	75–1003
4.103	1,2,3,4–tetramethylbenzene (prehnitine) $O^- + C_6H_2(CH_3)_4 \rightarrow OH^- + C_6H_2(CH_3)_3CH_2$	~13	2.4×10^9	—	p.r.	opt.	p.b.k.	75–1009
4.104	1,2,3,5–tetramethylbenzene (isodurene)	~13	2.6×10^9	—	p.r.	opt.	p.b.k.	75–1009
4.105	1,2,4,5–tetramethylbenzene (durene)	~13	2.3×10^9	—	p.r.	opt.	p.b.k.	75–1009
4.106	2,2,6,6–tetramethyl–4–piperidone *N*–oxyl (TAN)	13	1.6×10^9 (rel.)	$k/k_{oxy} = 0.46$	p.r.	opt.	c.k.	71–0618
4.107	thymine	>13	4×10^8	—	p.r.	opt.	p.b.k.	72–0047
4.108	*o*–toluate ion $O^- + CH_3C_6H_4CO_2^- \rightarrow OH^- + CH_2C_6H_4CO_2^-$	14	3.4×10^8	—	p.r.	opt.	p.b.k.; cor. for OH; $k_{obs} = 3.8 \times 10^8$; $k_{abstr} = 3 \times 10^8$.	75–1002
4.109	*m*–toluate ion	14	7.5×10^8	—	p.r.	opt.	p.b.k.; cor. for OH; $k_{obs} = 7.9 \times 10^8$; $k_{abstr} = 7 \times 10^8$.	75–1002
4.110	*p*–toluate ion	14	5×10^8	—	p.r.	opt.	p.b.k. at 280 nm; contribution of OH reaction < 10%.	72–0047
		14	8.2×10^8	—	p.r.	opt.	p.b.k.; cor. for OH; $k_{obs} = 8.6 \times 10^8$; $k_{abstr} = 8 \times 10^8$.	75–1002
4.111	toluene $O^- + C_6H_5CH_3 \rightarrow C_6H_5CH_2 + OH^-$	~13	$(2.1 \pm 0.3) \times 10^9$	—	p.r.	opt.	p.b.k.	73–0089, 75–1009
4.112	*p*–tolunitrile $O^- + CH_3C_6H_4CN \rightarrow OH^- + CH_2C_6H_4CN$	14	8.8×10^8	—	p.r.	opt.	p.b.k.; cor. for OH; $k_{obs} = 9.2 \times 10^8$; $k_{abstr} = 8 \times 10^8$.	75–1002
4.113	*p*–toluidine (I) $O^- + CH_3C_6H_4NH_2 \rightarrow OH^- + CH_2C_6H_4NH_2$ (II) $O^- + CH_3C_6H_4NH_2 \rightarrow OH^- + CH_3C_6H_4NH$	14	3.0×10^9 (I + II) 1.5×10^9 (I)	—	p.r.	opt.	p.b.k.; cor. for OH; $k_{obs} = 3.1 \times 10^9$.	75–1002
4.114	triethylamine	12	2.4×10^9 (rel.)	$k/k_{EtOH} = 2$	γ–r.	chem.	c.k.; may be OH reaction.	71–0590
4.115	1,2,3–trimethylbenzene $O^- + C_6H_3(CH_3)_3 \rightarrow OH^- + C_6H_3(CH_3)_2(CH_2)$	~13	2.1×10^9	—	p.r.	opt.	p.b.k.	75–1009

TABLE 5. Reactions of O^- with water, transients from water, inorganic solutes, and organic solutes – Continued

No.	Solute and reaction	pH	k	Ratio	Source	Method	Comment	Ref.
4.116	1,2,4–trimethyl benzene	~13	2.1×10^9	—	p.r.	opt.	p.b.k.	75–1009
4.117	1,3,5–trimethyl–benzene	~13	2.4×10^9	—	p.r.	opt.	p.b.k.	75–1009
4.118	uracil	13.5	4.1×10^9 (rel.)	$k/k(OH + CNS^-) = 0.374$	p.r.	opt.	c.k.; authors doubtful about value.	68–0316, 69–0571
		12	1.8×10^9	—	p.r.	opt.	d.k.; double bond bleaching; value from graph.	69–0571
4.119	*o*–xylene $O^- + C_6H_4(CH_3)_2 \rightarrow OH^- + C_6H_4(CH_3)(CH_2)$	~13	1.8×10^9	—	p.r.	opt.	p.b.k.	75–1009
4.120	*m*–xylene	~13	2.2×10^9	—	p.r.	opt.	p.b.k.	75–1009
4.121	*p*–xylene	~13	1.8×10^9	—	p.r.	opt.	p.b.k.	75–1009

TABLE 6. Reactions of HO_2 ($H_2O_2^+$ and O_2^-) with transients from water, inorganic solutes, and organic solutes

No.	Solute and reaction	pH	k	Ratio	Source	Method	Comment	Ref.
$H_2O_2^+$ Reactions								
5.1	OH							
	$H_2O_2^+ + OH \rightarrow H_3O^+ + O_2$	—	—	—	—	—	See 3.6, Table 2.	—
HO_2 Reactions								
5.2	H							
	$HO_2 + H \rightarrow H_2O_2$	—	—	—	—	—	See 2.4, NSRDS–NBS 51.	75–0001
5.3	OH							
	$HO_2 + OH \rightarrow H_2O + O_2$ or $\rightarrow H_2O_3$	—	—	—	—	—	See 3.5, Table 2.	—
5.4	HO_2							
	$HO_2 + HO_2 \rightarrow H_2O_2 + O_2$	nat.	$(3.4 \pm 2.5) \times 10^6$	—	phot.	chem.	k at 25°C.	53–0014
		nat.	3.1×10^6	—	γ–r.	chem.	k at 0°C; no pH effects discussed; rates are probably for $O_2^- + O_2^-$.	53–0014
		2.7	2.5×10^6	—	f.phot.	opt.	d.k.; ϵ(254 nm) = 350 $mol^{-1}cm^2$.	62–0050
		0.5–1.55	$(2.4 \pm 0.4) \times 10^6$	—	therm.	esr	d.k.; flow system; $Ce^{4+} + H_2O_2$ soln.; $E_a = 5.9 \pm 0.4$ kcal/mol(25kJ/mol).	62–0054
		2	2.3×10^6, 2.2×10^6 (rel.)	—	e–r.	chem.	c.k.; obs. reaction of HO_2 with tetranitromethane.	63–0075
		1.7–3.0	2.7×10^6	—	p.r.	opt.	d.k.; ϵ(253.7 nm) = 830 ± 125 $dm^3mol^{-1}cm^{-1}$.	64–0064
		1	$\sim 2 \times 10^6$	—	γ–r.	chem.	c.k.; rotating sector method; H_2O_2 soln.	65–0046
		2	$(2.5 \pm 0.5) \times 10^6$	—	p.r.	opt.	d.k.	66–0001
		2.8–2.9	2.5×10^6	—	e–r.	chem.	c.k.; also from Ce(IV) + H_2O_2; k decreases below pH 2 and increases above pH 3.	66–0614
		—	2.65×10^6	—	therm.	esr	d.k.; from Ce(IV) + H_2O_2; E_a = 4.7 kcal/mol (19.6 kJ/mol).	68–9083
		0.3–2	0.7×10^6	—	p.r.	opt.	d.k.; ϵ(254 nm) = 540 $dm^3mol^{-1}cm^{-1}$; more than one rate constant is involved in calcn.; $k = 2.8 \times 10^9 \exp(-4900/RT)$.	68–0382
		2–5	6.7×10^5	—	p.r.	opt.	d.k.; ϵ(240 nm) = 1150 $dm^3mol^{-1}cm^{-1}$; $pK_a(HO_2) = 4.8$.	69–0418
		0–7.7	7.6×10^5	—	p.r.	opt.	d.k.; $pK_a(HO_2)$ = 4.88.	70–0304
		0	—	$k_H/k_D = 7$	—	—	E_a in D_2O = 7.1 ± 0.4 kcal/mol (29.7 kJ/mol); unpubl. data.	70–0642
		5.5	—	$k_H/k_D = 3$				

TABLE 6. Reactions of HO_2 ($H_2O_2^+$ and O_2^-) with transients from water, inorganic solutes, and organic solutes —Continued

No.	Solute and reaction	pH	k	Ratio	Source	Method	Comment	Ref.
		0	$(9 \pm 1) \times 10^5$	—	Ce(IV)	opt.	ϵ(230 nm) = 1100	70–0920,
		1.1	2.8×10^6		+ H_2O_2		$dm^3mol^{-1}cm^{-1}$.	69–9139
		0–2	$(1.35 \pm 0.3) \times 10^6$	—	f.phot.	opt.	d.k.; ϵ(240 nm) = $10^3 dm^3 mol^{-1} cm^{-1}$.	70–0920
		2.6–7	$10^6 - 10^7$	—	e–r.	chem.	obs. HO_2 reaction with tetra–nitromethane in formate soln.	72–0308
5.5	O_2^-							
	$HO_2 + O_2^- \rightarrow HO_2^- + O_2$	7	$\sim 2 \times 10^8$	—	f.phot.	opt.	c.k.	62–0050
		7	1×10^7	—	f.phot.	opt.	d.k.; data of 53–0014.	62–0050
		—	$< 7 \times 10^7$	—	e–r.	chem.	flow technique; pH effects, c.k.	63–0075
		7	5.3×10^7	—	p.r.	opt.	d.k.	66–0001
		0–5	3×10^7	—	p.r.	opt.	d.k.; more than one rate constant is involved in calcn.	68–0382
		2–9.7	7.9×10^7	—	p.r.	opt.	d.k.; $pK_a(HO_2)$ = 4.8.	69–0418
		0–7.7	8.5×10^7	—	p.r.	opt.	d.k.; $pK_a(HO_2)$ = 4.88.	70–0304
5.6	Br_2							
	$HO_2 + Br_2 \rightarrow H^+ + Br^- + Br + O_2$	~1	$(1.5^{+1.5}_{-0.8}) \times 10^8$ (rel.)	—	p.r.	opt.	c.k.; indirect estimation; more than one rate constant is involved.	65–0382
		2	$< 4 \times 10^6$	—	p.r.	opt.	p.b.k. and d.k.; mechanistic anal. of data.	65–0383
		2–7	$(1.1^{+0.6}_{-0.4}) \times 10^8$ (rel.)	—	e–r	chem.	c.k. in formate–Br_2 soln.; rel. to $k(O_2^- + C(NO_2)_4) = 2 \times 10^9$.	72–0308
5.7	Br_2^-							
	$HO_2 + Br_2^- \rightarrow Br_2 + HO_2^-$	2		$k/k_X = 4 \times 10^{-4}$	γ–r.	chem.	c.k.; $k_X = k(HO_2 + Br_2) \times k(Br_2^- + Br_2^- \rightarrow Br_3^- + Br^-)^{1/2}$.	65–0055
		2	$(3.8 \pm 0.9) \times 10^9$ (rel.)	—	p.r.	opt.	d.k.; $k/\epsilon(Br_2^-) = (4.6 \pm 0.4) \times 10^5$ cm/s; more than one rate constant is involved in calcn.	65–0382
		2	$(1.6 \pm 0.5) \times 10^9$ (rel.)	—	p.r.	opt.	c.k.; obs. decay of $Br_2^- + Br_2^- \rightarrow Br_3^- + Br^-$ at 360 nm; data fitting.	65–0383
5.8	Br_3^-							
	$HO_2 + Br_3^- \rightarrow H^+ + Br_2^- + Br^- + O_2^-$	2	$(1 \pm 0.5) \times 10^8$ (rel.)	—	p.r.	opt.	c.k.; mechanistic anal.	65–0383
		2–7	$< 10^7$ (rel.)	—	e–r.	chem.	c.k. in formate–Br_2 soln.; rel. to $k(O_2^- + C(NO_2)_4) = 2 \times 10^9$.	72–0308

TABLE 6. Reactions of HO_2 ($H_2O_2^+$ and O_2^-) with transients from water, inorganic solutes, and organic solutes—Continued

No.	Solute and reaction	pH	k	Ratio	Source	Method	Comment	Ref.
5.9	CNS							
	$HO_2 + CNS \rightarrow CNS^- + H^+ + O_2$	1	1.6×10^9 (rel.)	—	p.r.	opt.	c.k.; pH effect on decay CNS + CNS → $(CNS)_2$.	65–0386
5.10	Ce^{3+}							
	$HO_2 + Ce^{3+} (+ H^+) \rightarrow Ce^{4+} + H_2O_2$	0.4	$(2.1 \pm 0.2) \times 10^5$	—	p.r.	opt.	p.b.k. at 320 nm, Ce(IV).	74–1107
5.11	Ce^{4+}							
	$HO_2 + Ce^{4+} \rightarrow$	0.4		$k/k_{Ce^{3+}} = 7.7$	therm.	chem.	0°C.	57–9009
	$Ce^{3+} + H^+ + O_2$	0.4		$k/k_{Ce^{3+}} = 13 \pm 2$	therm.	chem.	d.k.; flow technique; Ce(IV) + H_2O_2.	63–9017
5.12	Cu^+							
	(I) $HO_2 + Cu^+ (+H_2O) \rightarrow Cu^{2+} + H_2O_2 + OH^-$	2.3	6×10^8 (I)	— $k_I/k_{II} = 2.4$	phot.	opt.	rotating sector; $\mu = 0.1$; soln. contains Cu^{2+} and 4.5 *M* H_2O_2; see also 73–7514.	69–7082, 69–7083
	(II) $H_2O_2^+ + Cu^+ \rightarrow Cu^{2+} + H_2O_2$							
	(III) $H_2O_2 + Cu^+ \rightarrow Cu^{2+} + OH + OH^-$	0.8–2	$> 10^9$ (I)	—	p.r.	opt.	d.k. at 245 nm; Cu^{2+} soln.	73–0112
		2.3	2.3×10^9 (I)	$k_I/k_{III} = 0.015 \times k(HO_2 + Cu^{2+})$ *M*s	phot.	opt.	rotating sector; assume $k_{III} = 4.7 \times 10^3$; $k(HO_2 + Cu^{2+}) = 3.4 \times 10^7$.	73–7514
5.13	Cu^{2+}							
	(I) $HO_2 + Cu^{2+} \rightarrow Cu^+ + H^+ + O_2$	1.35–2.65		$k_I/k_{Fe^{2+}} = 3.5 - 103$	Fenton	chem.	c.k.; pH dependent; O°C.	51–9004
	(II) $O_2^- + Cu^{2+} \rightarrow Cu^+ + O_2$	~2		$k_I/k_{Fe^{2+}} = 55$	γ–r.	chem.	c.k.; 0.01 *M* H^+	55–0039
		2.3	1.5×10^7 (I)	—	f.phot.	opt.	d.k. at 254 nm.	62–0050
		0.4		$k_I/k_{Fe^{2+}} = 0.4$	γ–r.	chem.	c.k.	66–0334, 68–0355
		2.3	—	$k_I/k_{II} = 0.06$	phot.	opt.	rotating sector.	69–7083
		0.8–2	~ 10^8 (I)	—	p.r.	opt.	d.k. at 245 nm.	73–0112
		>2.5	—	$k_I/k_{II} = 0.024$	phot.	opt.	rotating sector.	73–7514
5.14	Fe^{2+}							
	$HO_2 + Fe^{2+} \rightarrow Fe^{3+} \cdot HO_2^-$ or $Fe^{2+} + HO_2^- (+ H^+) \rightarrow Fe(OH)_2^+ + H_2O_2$	1.35–2.65		$k/k_{Fe^{3+}} = 1.0–7$	Fenton	chem.	c.k.; pH dependent; at O°C ratio = 1.1–8.	51–9004
		2.7		$k/k_{Fe^{3+}} = 3.3$	γ–r.	chem.	c.k.; at pH 2.0 ratio = 9, at pH ~ 0.5 ratio > 100.	57–0010 58–0004
		~2		$k/k_{Fe^{3+}} = 160–190$	γ–r.	chem.	c.k.; at pH 0.8 ratio is 300.	60–0102
		0.3	7.3×10^5	—	p.r.	opt.	p.b.k. at 305 nm; several reactions are involved in analysis.	64–0090
		0–2.1	$(2.1 \pm 0.4) \times 10^6$	—	p.r.	opt.	p.b.k.; obs. $(Fe^{3+} \cdot HO_2^-)$; supercedes value in 64–0090.	69–0434
		0.38–2		$k/k_{Fe^{3+}} = 30[H^+]M$	γ–r.	chem.	c.k.	69–0642
		1	$(1.2 \pm 0.5) \times 10^6$ (25°C)	—	p.r.	opt.	p.b.k. at 250 nm; $\mu = 1.0$; $k = 9.1 \times 10^5$ at 20°C; $E_a = 10.0 \pm 1.0$ kcal/mol (42 kJ/mol).	73–0038

For other ratios see: 5.13, 5.28, 5.44.

TABLE 6. Reactions of HO_2 ($H_2O_2^+$ and O_2^-) with transients from water, inorganic solutes, and organic solutes—Continued

No.	Solute and reaction	pH	k	Ratio	Source	Method	Comment	Ref.
5.15	$Fe(CN)_6^{4-}$							
	$HO_2 + Fe(CN)_6^{4-} \rightarrow HO_2^- + Fe(CN)_6^{3-}$	~2	1.64×10^5	—	p.r.	opt.	p.b.k. at 420 nm (ferricyanide).	65–0007
		0.46–4.37	$(3.0 \pm 1.5) \times 10^4$	—	p.r.	opt.	p.b.k. at 420–460 nm; pH effects obs.	72–0431
	$HO_2 + HFe(CN)_6^{3-}$		$(1.4 \pm 0.1) \times 10^5$					
	$HO_2 + H_2Fe(CN)_6^{2-}$		$(1.0 \pm 0.3) \times 10^4$					
	$HO_2 + KFe(CN)_6^{3-}$		$(3.0 \pm 1.5) \times 10^4$					
5.16	Fe^{3+}							
	$HO_2 + Fe^{3+} \rightarrow Fe^{2+} + H^+ + O_2$	1		$k/k_{H^+} = 1.20$	γ–r.	chem.	c.k.	69–0642
			For other ratios see:	5.14, 5.43.				
5.17	H^+							
	$HO_2 + H^+ \rightleftharpoons H_2O_2^+$		*For ratio see*: 5.16.					
5.18	H_2O_2							
	$HO_2 + H_2O_2 \rightarrow H_2O + O_2 + OH$	—	530	—	γ–r.	chem.	no pH effects considered; termination rate $k(2HO_2 + H_2O_2) = 2.7 \times 10^{10} dm^6 mol^{-2} s^{-1}$.	52–0018
		nat.	3.7 ± 1.6	—	phot.	chem.	propagation step in chain reaction; k at 25°C; no pH effects considered; see 5.46.	53–0014
		nat.	1.1	—	γ–r.	chem.	k at 0°C. no pH effects considered; probably for $O_2^- + H_2O_2$.	53–0014
		1	1×10^{-2}	—	γ–r.	chem.	mechanistic fit; k at 10°C; concn. $H_2O_2 \sim 1$–35 M.	65–0046
		0.8–1.5	0.20 ± 0.01 (rel.)	$k/k(HO_2 + HO_2) = 1.8 \times 10^{-7}$	γ–r.	chem.	c.k.; obs. $G(-H_2O_2)$; includes $k(H_2O_2 + H_2O_2 \rightarrow H_3O^+ + O_2 + OH)$; $k(HO_2 + HO_2) = 1.1 \times 10^6$.	69–0643
5.19	MnO_4^-							
	$HO_2 + MnO_4^- \rightarrow H^+ + O_2 + MnO_4^{2-}$	2	8×10^6	—	p.r.	opt.	d.k.	65–0385
5.20	OsO_4							
	$HO_2 + OsO_4 \rightarrow OsO_4^- + H^+ + O_2$	<1	5.7×10^5 (rel.)	$k/k(HO_2 + HO_2) = 0.24$	γ–r.	chem.	c.k.; obs. $G(H_2O_2)$; $k(HO_2 + HO_2) = 2.35 \times 10^6$; dose rate 9.7×10^{18} $eVcm^{-3}h^{-1}$.	64–0050
5.21	Te(IV)							
	$HO_2 + Te(IV) \rightarrow Te(VI) + OH$	0.4	$\sim 7.5 \times 10^3$ (rel.)	$k/k(HO_2 + HO_2) \cong 3 \times 10^{-3}$	γ–r.	chem.	c.k.; preliminary value; assume $k(HO_2 + HO_2) = 2.5 \times 10^6$.	67–0553
		0.4	> 50 (rel.)	$k/k(HO_2 + HO_2) \geq 2 \times 10^{-5}$	γ–r.	chem.	c.k.; more than one rate involved in calcn.; $k(HO_2 + HO_2) = 2.5 \times 10^6$.	68–0356

TABLE 6. Reactions of HO_2 ($H_2O_2^+$ and O_2^-) with transients from water, inorganic solutes, and organic solutes—Continued

No.	Solute and reaction	pH	k	Ratio	Source	Method	Comment	Ref.
5.22	Th(IV)							
	(I) HO_2 + Th(IV) $\rightleftharpoons$ Th(IV)–HO_2	~1	$\geq 5 \times 10^6$ (I) $(8.0 \pm 2.0) \times 10^5$ (II)	—	therm.	esr	$K_1 = (1.7 \pm 0.4) \times 10^5 M^{-1}$; d.k. as well as p.b.k.; Ce^{4+} + H_2O_2 soln.	73–9071
	(II) HO_2 + Th(IV)–HO_2 → Th(IV) + H_2O_2 + O_2		$(5 \pm 2) \times 10^2$ (III)					
	(III) 2Th(IV)–HO_2 → 2Th(IV) + H_2O_2 + O_2		$(1.8 \pm 0.2) \times 10^6$ (I)	—	p.r.	opt.	p.b.k.; $K_1 = (4 \pm 1) \times 10^4 M^{-1}$.	74–1107
5.23	Tl^{2+}							
	$HO_2 + Tl^{2+} \rightarrow Tl^+ + H^+ + O_2$	1	$(2.5 \pm 1) \times 10^9$ (rel.)	—	p.r.	opt.	d.k. (Tl^{2+}); rel. to $k(Tl^{2+} + Tl^{2+}) = 2.3 \times 10^9$.	66–0097
5.24	UO_2^{2+}							
	(I) $HO_2 + UO_2^{2+} \rightleftharpoons$ U(VI)–HO_2	~1	$\geq 1 \times 10^5$ (I) $(9.0 \pm 1.5) \times 10^5$ (II)	—	therm.	esr	d.k. as well as p.b.k.; Ce^{4+} + H_2O_2; $K_1 = (2.7 \pm 0.4)\ 10^3 M^{-1}$.	73–9071
	(II) U(VI)–HO_2 + HO_2 → U(VI) + H_2O_2 + O_2							
	(III) 2U(VI)–HO_2 → 2U(VI) + H_2O_2 + O_2	1	$(1.5 \pm 0.1) \times 10^5$ (I) $(5 \pm 1) \times 10^5$ (II) $(8 \pm 2) \times 10^4$ (III)		p.r.	opt.	p.b.k. and d.k.; $K_1 = (1.7 \pm 0.3) \times 10^3 M^{-1}$.	74–1107
5.25	$VO(O_2)^+$							
	$HO_2 + VO(O_2)^+ \rightarrow$ complex	—	$(9.4 \pm 1) \times 10^4$ (rel.)	$k/k(HO_2 + HO_2) = 0.1$	therm.	esr	flow technique; Ce^{4+} + H_2O_2; assume $k(HO_2 + HO_2) = 9 \times 10^5$.	70–9058
5.26	cyclohexaneperoxy radical (RO_2) $HO_2 + RO_2 \rightarrow O_2 + RO_2H$	—	2.26×10^6	—	γ–r.	chem.	detd. H_2O_2 and RO_2H yields; assume $k(RO_2 + RO_2) = 2.7 \times 10^6$; see also 5.49.	67–0737
5.26a	cytochrome C (ferro)	5.3	$5 \times 10^5 - 5 \times 10^6$	—	p.r.	opt.	d.k. at 550 nm.	75–3093
5.27	cytochrome C	1.84	—	—	p.r.	opt.	no reaction obs.	71–0327
	$HO_2 + Fe^{3+}$–cyt → no reaction	1.2–6.2	—	—	p.r.	opt.	no reaction.	75–3093
5.28	ethylene $HO_2 + C_2H_4$ C_2H_4OOH	—		$k/k_{Fe^{2+}} = 0.167$	γ–r.	chem.	c.k.	67–0037
5.28a	horseradish peroxidase Compound I	—	2.2×10^8	—	p.r.	opt.	d.k.; detd. k at pH 3.8 to 8.8.	74–1148
5.29	indigodisulfonate HO_2 + dye → decoloration	0.4	8.5×10^3 (rel.)	$k/k(HO_2 + HO_2) = 3.9 \times 10^{-3}$	γ–r.	opt.	c.k.; assume $k(HO_2 + HO_2) = 2.2 \times 10^6$; $G(HO_2) = 3.6$.	68–0059
5.30	indigotrisulfonate HO_2 + dye → decoloration	0.4	4.5×10^3 (rel.)	$k/k(HO_2 + HO_2) = 2 \times 10^{-4}$	γ–r.	opt.	c.k.; assume $k(HO_2 + HO_2) = 2.2 \times 10^6$; $G(HO_2) = 3.6$.	68–0059
5.31	indigotetrasulfonate HO_2 + dye → decoloration	0.4	7.7×10^2 (rel.)	$k/k(HO_2 + HO_2) = 3.5 \times 10^{-4}$	γ–r.	opt.	c.k.; assume $k(HO_2 + HO_2) = 2.2 \times 10^6$; $G(HO_2) = 3.6$.	68–0059
5.31a	NADH–lactate dehydrogenase	—	$\sim 1.2 \times 10^6$	—	p.r.	opt.	d.k.; detd. from k_{obs} at pH 4.4 to 9; see also 5.61a.	74–1159

TABLE 6. Reactions of HO_2 ($H_2O_2^+$ and O_2^-) with transients from water, inorganic solutes, and organic solutes—Continued

No.	Solute and reaction	pH	k	Ratio	Source	Method	Comment	Ref.
5.32	tetranitromethane $HO_2 + C(NO_2)_4 \rightarrow C(NO_2)_3^- + NO_2 + H^+ + O_2$	0–6	$< 10^5$	—	p.r.	opt.	p.b.k.	65–0183
O_2^- Reactions								
5.33	e_{aq}^- $O_2^- + e_{aq}^- \rightarrow O_2^{2-}$	—	1.3×10^{10}	—	—	—	See 1.10, NSRDS–NBS 43.	73–0030
5.34	OH $O_2^- + OH \rightarrow OH^- + O_2$	—	1×10^{10}	—	—	—	See 3.7, Table 2.	—
5.35	O_2^- $O_2^- + O_2^-(+ H_2O) \rightarrow HO_2^- + O_2 + OH^-$	5.5	1.45×10^7	—	p.r.	condy.	d.k.	60–0101 60–0121 62–0050
		11	2.7×10^5	—	f.phot.	opt.	d.k.	62–0050
		—	1.5×10^7	—	e–r.	chem.	c.k.; pH effects, flow techniques.	63–0075
		5–7	1.7×10^7	—	p.r.	opt.	d.k.; ϵ(253.7 nm) = 980 ± 140 $dm^3mol^{-1}cm^{-1}$.	64–0064
		7	5×10^7	—	γ–r.	chem.	rotating sector method; H_2O_2 soln.	65–0046
		5.5	1.45×10^7	—	p.r.	condy.	d.k.	67–0213
		5.5	2.2×10^7	—	f.phot.	opt.	d.k.; ϵ(260 nm) = 900 $dm^3mol^{-1}cm^{-1}$.	67–7012
		5.7	5.8×10^7	—	f.phot.	opt.	d.k.; ϵ(250 nm) = 1030 $dm^3mol^{-1}cm^{-1}$.	67–7012
		12.8	1.4×10^8	—	f.phot.	opt.	d.k.; ϵ(260 nm) = 900 $dm^3mol^{-1}cm^{-1}$.	67–7012
		10.5	5.8×10^7	—	f.phot.	opt.	d.k.; ϵ(260 nm) = 900 $dm^3mol^{-1}cm^{-1}$.	67–7012
		5	1.2×10^7	—	p.r.	opt.	d.k.; ϵ(241 nm) = 890 $dm^3mol^{-1}cm^{-1}$. $k = 4 \times 10^8 \exp(-2100/RT)$; more than one rate constant is involved in calcn.	68–0382
		~5–9.7	$< 10^5$	—	p.r.	opt.	d.k.; ϵ(240 nm) = 1970 $dm^3mol^{-1}cm^{-1}$; k probably $< 10^3$.	69–0418
		13	$< 10^2$	—	p.r.	opt.	d.k.; $pK_a(HO_2)$ = 4.88.	70–0304
		—	$< 10^2$	—	—	—	reaction with cytochrome C.	71–0327
		alk.	1.0×10^7	—	f.phot.	condy.	d.k. (20°C); k = 1.63×10^7 at 50°C; 9×10^{-5} M NaOH.	72–0404
5.36	Br_2 $O_2^- + Br_2 \rightarrow O_2 + Br_2^-$	2–7	$(5.6 \pm 0.7) \times 10^9$ (rel.)	—	e–r.	chem.	c.k. in formate–Br_2 soln.; rel. to $k(O_2^- + C(NO_2)_4) = 2 \times 10^9$.	72–0308
5.37	Br_3^- $O_2^- + Br_3^- \rightarrow O_2 + Br^- + Br_2^-$	2–7	$(3.8 \pm 0.7) \times 10^9$ (rel.)	—	e–r.	chem.	c.k. in formate–Br_2 soln.; rel. to $k(O_2^- + C(NO_2)_4) = 2 \times 10^9$; soln. contains 0.2 M Br^-.	72–0308

TABLE 6. Reactions of HO_2 ($H_2O_2^+$ and O_2^-) with transients from water, inorganic solutes, and organic solutes—Continued

No.	Solute and reaction	pH	k	Ratio	Source	Method	Comment	Ref.
5.38	HOBr							
	$O_2^- + HOBr \rightarrow OH^- + O_2 + Br$	2–7	$(9.5 \pm 0.8) \times 10^8$ (rel.)	—	e–r.	chem.	c.k. in formate–Br_2 soln.; rel. to $k(O_2^- + C(NO_2)_4) = 2 \times 10^9$.	72–0308
5.39	CO_3^-							
	$O_2^- + CO_3^- \rightarrow CO_5^{2-}$ or $\rightarrow O_2 + CO_3^{2-}$	~13	1.5×10^9	—	p.r.	opt.	d.k. at 600 as well as 260 nm; ϵ(600 nm) for $CO_3^- = 1.8 \times 10^3$, ϵ(260 nm) for $O_2^- = 1.22 \times 10^3 dm^3 mol^{-1} cm^{-1}$.	66–0001
		12.8	1.3×10^8	—	f.phot.	opt.	d.k.	67–7012
		—	$(4 \pm 1) \times 10^8$	—	f.phot.	opt.	d.k. at 260 nm and 600 nm; at 260 nm $\epsilon(CO_5^{2-}) = 410$ and $\epsilon(O_2^-) = 1850 dm^3 mol^{-1} cm^{-1}$.	70–0247
5.40	HCO_3^-							
	$O_2^- + HCO_3^- \rightarrow CO_3^- + HO_2^-$	5.5	$1–2 \times 10^6$	—	p.r.	condy.	d.k. (rotating sector); CO_2 soln.	72–0404
5.41	ClO_2							
	$O_2^- + ClO_2 \rightarrow O_2 + ClO_2^-$	5–7		$k/k(O_2^- + O_2^-)^{0.5} = 1.7 \pm 0.6$ $M^{-0.5} s^{-0.5}$	γ–r.	chem.	c.k.	67–0028
5.42	Cu^+							
	$O_2^- + Cu^+ + (2H_2O) \rightarrow Cu^{2+} + H_2O_2 + 2OH^-$	~3–6.5	10^{10}	—	p.r.	opt.	d.k. at 245 nm in Cu^{2+} soln.	73–0112
5.43	Cu^{2+}							
	$O_2^- + Cu^{2+} \rightarrow Cu^+ + O_2$	1.35–2.65		$k/k_{Fe^{3+}} = 25$	Fenton	chem.	c.k.	51–9002 51–9005
		~3–6.5	8×10^9	—	p.r.	opt.	d.k. at 245 nm.	73–0112
			For values of $k(HO_2 + Cu^{2+})/k(O_2^- + Cu^{2+})$ *See* 5.13.					
5.44	Fe^{3+}							
	$O_2^- + Fe^{3+} \rightarrow Fe^{2+} + O_2$	<3		$k\,K(HO_2)/k(HO_2 + Fe^{2+}) = 3.6 \times 10^{-3}$	γ–r.	chem.	c.k.	63–0004
		—		$k\,K(HO_2)/k(HO_2 + Fe^{2+}) = 7 \times 10^{-3}$	Fenton	chem.	c.k.	51–9004
5.45	$Fe(CN)_6^{3-}$							
	$O_2^- + Fe(CN)_6^{3-} \rightarrow O_2 + Fe(CN)_6^{4-}$	9.5–9.7	$(2.7 \pm 0.9) \times 10^2$	—	p.r.	opt.	p.b.k. at 420–440 nm; $\mu = 0$.	72–0431
	$O_2^- + KFe(CN)_6^{2-} \rightarrow O_2 + KFe(CN)_6^{3-}$		$(6.2 \pm 0.6) \times 10^3$					
5.46	H_2O_2 $O_2^- + H_2O_2 \rightarrow OH + OH^- + O_2$	~7	16.0 ± 3.3 (rel.)	$k/k(O_2^- + O_2^-) = 9.5 \times 10^{-7}$	phot.	chem.	obs. rate of H_2O_2 decompn.; assumed $k(O_2^- + O_2^-) = 1.7 \times 10^7$; recalcd. from 53–0014 $k = 9.0$, and from 62–0163 $k = 12.0$.	74–7351
5.47	benzoquinone	~7	9.6×10^8	—	p.r.	opt.	p.b.k. at 430 nm.	71–0619
	$O_2^- + O{=}C_6H_4{=}O \rightarrow O{=}C_6H_4O^- + O_2$	6.9	$(9.0 \pm 0.9) \times 10^8$	—	p.r.	opt.	p.b.k. at 430 nm.	73–0049
		7.0	9.8×10^8	—	p.r.	opt.	p.b.k. at 430 nm.	73–0068
5.48	cyanocobalamin (Vitamin B_{12})	—	—	—	p.r.	—	no reaction	73–0116

TABLE 6. Reactions of HO_2 ($H_2O_2^+$ and O_2^-) with transients from water, inorganic solutes, and organic solutes—Continued

No.	Solute and reaction	pH	k	Ratio	Source	Method	Comment	Ref.
5.49	cyclohexaneperoxy radical (RO_2) $O_2^- + RO_2(+H^+) \rightarrow RO_2H + O_2$	—	2.54×10^8	—	γ–r.	chem.	pH dependence of H_2O_2 and RO_2H yields; assume $k(RO_2 + RO_2) = 2.7 \times 10^6$; see 5.26.	67–0737
5.50	cysteine $O_2^- + RSH(+H^+) \rightarrow RS + H_2O_2$	7	$> 5 \times 10^4$	—	γ–r.	chem.	obs. $G(H_2O_2)$ as function of dose.	70–0882
		3–5.1	$\sim 1.8 \times 10^4$	—	γ–r.	chem.	obs. increase in $G(H_2O_2)$ with pH.	74–0188
5.50a	cytochrome C (ferro)	—	—	—	p.r.	opt.	no reaction.	75–3093
5.51	cytochrome C $O_2^- + Fe^{3+}$–cyt C $\rightarrow Fe^{2+}$–cyt C	8.4	1.6×10^5	—	therm.	esr	d.k.; O_2^- from tetraacetylriboflavin + O_2.	69–9128
		8.5	1.1×10^5	—	p.r.	opt.	p.b.k. at 550 nm.	71–0327
		10.4	8×10^3	—	p.r.	opt.	p.b.k. at 550 nm.	71–0327
		7	2.4×10^6	—	p.r.	opt.	p.b.k.	75–1012
		9.3	1.5×10^5	—	p.r.	opt.	p.b.k.	75–1012
		4.7–6.7	$(1.4 \pm 0.15) \times 10^6$	—	p.r.	opt.	p.b.k. at 550 nm; from pH effect pK_a(cyt C) = 7.45, 9.2; k=$(3.0 \pm 0.4) \times 10^5$ for the form present above pH 7.45; the form present above pH 9.2 does not react; E_a = 21.2 at pH 6.75 and 19.9 kJ/mol at pH 8.6.	75–3093
5.52	2,5–dichloro–*p*–benzoquinone	7.0	1.1×10^9	—	p.r.	opt.	p.b.k. at 430 nm.	73–0068
	1,2–dihydroxybenzene–3,5–disulfonate ion *See* tiron (5.64).							
5.52a	2,3–dimethylbenzoquinone	7	$(4.5 \pm 1) \times 10^8$	—	p.r.	opt.	p.b.k.	73–0125
5.53	2,5–dimethyl–*p*–benzoquinone	7.0	7.5×10^8	—	p.r.	opt.	p.b.k. at 430 nm.	73–0068
		7	$(3.6 \pm 1) \times 10^8$	—	p.r.	opt.	p.b.k.	73–0125
5.53a	2,6–dimethylbenzoquinone	7	$(5.8 \pm 1) \times 10^8$	—	p.r.	opt.	p.b.k.	73–0125
5.54	4,4′–dimethyl–1,1′–bipyridylium chloride (Paraquat radical)	—	6.5×10^8	—	p.r.	opt.	calcd. from d.k.; $k(O_2 + PQ^+) = 7.7 \times 10^8$.	73–1074
5.54a	2,3–dimethylnaphthoquinone	7	4×10^6	—	p.r.	opt.	detd. from equil. const. and d.k. of semiquinone.	73–0125
5.55	diphenoquinone	7.0	$(1.4 \pm 0.14) \times 10^9$	—	p.r.	opt.	p.b.k. at 400 nm	73–0068
5.55a	DNA	6.2, 9.2	$< 5 \times 10^6$	—	p.r.	—	—	75–3051
5.55b	duroquinone	7	5×10^6	—	p.r.	opt.	detd. from equil. const. and d.k. of semiquinone.	73–0125
5.55c	horseradish peroxidase Compound I	7–8.8	1.6×10^6	—	p.r.	opt.	d.k. as well as p.b.k., detd. k at pH 3.8 to 8.8.	74–1148, 74–3069
5.56	hydroquinone $O_2^- + OHC_6H_4OH \rightarrow HO_2^- + OHC_6H_4O\cdot \rightarrow O{=}C_6H_4O^- + H^+$	7.0	$(1.6 \pm 0.1) \times 10^7$	—	p.r.	opt.	p.b.k. at 430 nm.	73–0068

TABLE 6. Reactions of HO_2 ($H_2O_2^+$ and O_2^-) with transients from water, inorganic solutes, and organic solutes—Continued

No.	Solute and reaction	pH	k	Ratio	Source	Method	Comment	Ref.
5.57	2-methyl-*p*-benzo-	7.0	8.0×10^8	—	p.r.	opt.	p.b.k. at 430 nm.	73-0068
	quinone	7	$(7.6 \pm 1) \times 10^8$	—	p.r.	opt.	p.b.k. (semiquinone).	73-0125
5.58	1,2-naphthoquinone	7.0	7.2×10^8	—	p.r.	opt.	p.b.k. at 365 nm.	73-0068
5.59	1,2-naphthoquinone 4-sulfonate ion	7.0	8.4×10^8	—	p.r.	opt.	p.b.k. at 365 nm.	73-0068
5.60	1,4-naphthoquinone 2-sulfonate ion	7.0	6.6×10^8	—	p.r.	opt.	p.b.k. at 400 nm.	73-0068
5.61	nicotinamide-adenine dinucleotide, reduced (NADH)							
	$O_2^- + NADH (+ H^+) \rightarrow H_2O_2 + NAD\cdot$	8.6	$<<27$	—	X-r.	biol.	upper limit estd. for soln. contg. KBr and O_2.	71-0158
5.61a	NADH-lactate dehydrogenase	7-9	3.6×10^4	—	p.r.	opt.	d.k.	74-1159
5.62	superoxide dismutase (E)	5.3-9.5	1.8×10^9	—	p.r.	opt.	d.k. at 250 nm (O_2^-) as well as 650 nm (Cu); enzyme from bovine blood.	72-3066
	Dismutation of O_2^- (see 5.35) is catalyzed by E.							
		7	$(1.4 \pm 0.2) \times 10^9$	—	p.r.	opt.	d.k. at 245 nm (O_2^-); enzyme from bovine blood.	72-1007, 72-3078
		7.5	$(1.2 \pm 0.2) \times 10^9$	—	p.r.	opt.	d.k. at 650 nm (E); soln. contains Na formate and EDTA; enzyme from bovine blood.	73-0109
		5.0-9.5	$\sim 2 \times 10^9$ (rel.)	—	chem., biol.	opt.	c.k. (bovine Cu-Zn enzyme); assume $k(O_2^- + \text{cyt C}) = 1.1 \times 10^5$ and $k(O_2^- + C(NO_2)_4) = 1.9 \times 10^9$; rel. rates at pH 6.0-10.2 also detd. for *E.coli* Mn and Fe enzymes and chicken liver mitochondria Mn enzyme.	73-3052
		5.7-10.5	1.5×10^9	—	p.r.	opt.	d.k. at 690 nm; Cu enzyme from human blood.	73-3132
		9.0-9.9	$(2.37 \pm 0.18) \times 10^9$	—	p.r.	opt.	d.k. at 250 nm; bovine Cu-Zn enzyme; supersedes 72-3066.	74-3017
		7.9	$(1.3 \pm 0.15) \times 10^9$	—	p.r.	opt.	d.k. at 248 nm; *E.coli* Mn enzyme.	74-3059
		9-10.2	2.3×10^9	—	elec.	pol.	obs. increased O_2 formn. with enzyme addn.	74-3132
	Paraquat radical *See* 4,4-dimethyl-1,1′-bipyridylium chloride (5.54).							
	2,3,5,6-tetramethylbenzoquinone *See* duroquinone (5.55a).							
5.63	tetranitromethane	—	$(2.0 \pm 0.4) \times 10^9$	—	p.r.	opt.	p.b.k.	64-0133
	$O_2^- + C(NO_2)_4 \rightarrow O_2 + C(NO_2)_3^- + NO_2$	5.6-6.2	$(1.9 \pm 0.4) \times 10^9$	—	p.r.	opt.	p.b.k.	65-0183
5.64	tiron	7	5×10^8	—	p.r.	opt.	p.b.k. at 400 nm.	75-1087
	(1,2-dihydroxybenzene-3,5-disulfonate ion)	7	1.5×10^8 (rel.)	$k/k_{\text{benzoquinone}} = 0.17$	p.r.	opt.	c.k.; assume $k_{\text{benzoquinone}} = 9 \times 10^8$.	75-1087
5.65	Vitamin K_1	7	$< 2 \times 10^5$	—	p.r.	opt.	detd. from equil. const. and d.k. of semiquinone.	73-0125

Formula index

The following formula list refers to entry numbers, not only in the preceding tables, but also in the tables of rates of hydrated electron and hydrogen atom reactions published as part I (and Supplemental data) and part II. The first digit of the entry number identifies the section of the tables where the entry can be found.

1. Part I. Hydrated electron 73–0030 (NSRDS–NBS 43)
S1. Hydrated electron, Supplemental data 75–0002 (NSRDS–NBS 43–Supp)
2. Part II. Hydrogen Atom 75–0001 (NSRDS–NBS 51)
3. Part III. Hydroxyl radical (this work, tables 2–4)
4. Part III. Oxide ion (this work, table 5)
5. Part III. Perhydroxyl radical and superoxide ion (this work, table 6).

Thus, there are entries for Ag^+ in the tables of hydrated electron reactions (1.11), hydrogen atom reactions (2.5) and hydroxyl radical reactions (3.8), while BrO_4^- entries are found in the supplemental tables for hydrated electrons (S1.6), hydroxyl radical reactions (3.17), and oxide ion reactions (4.11).

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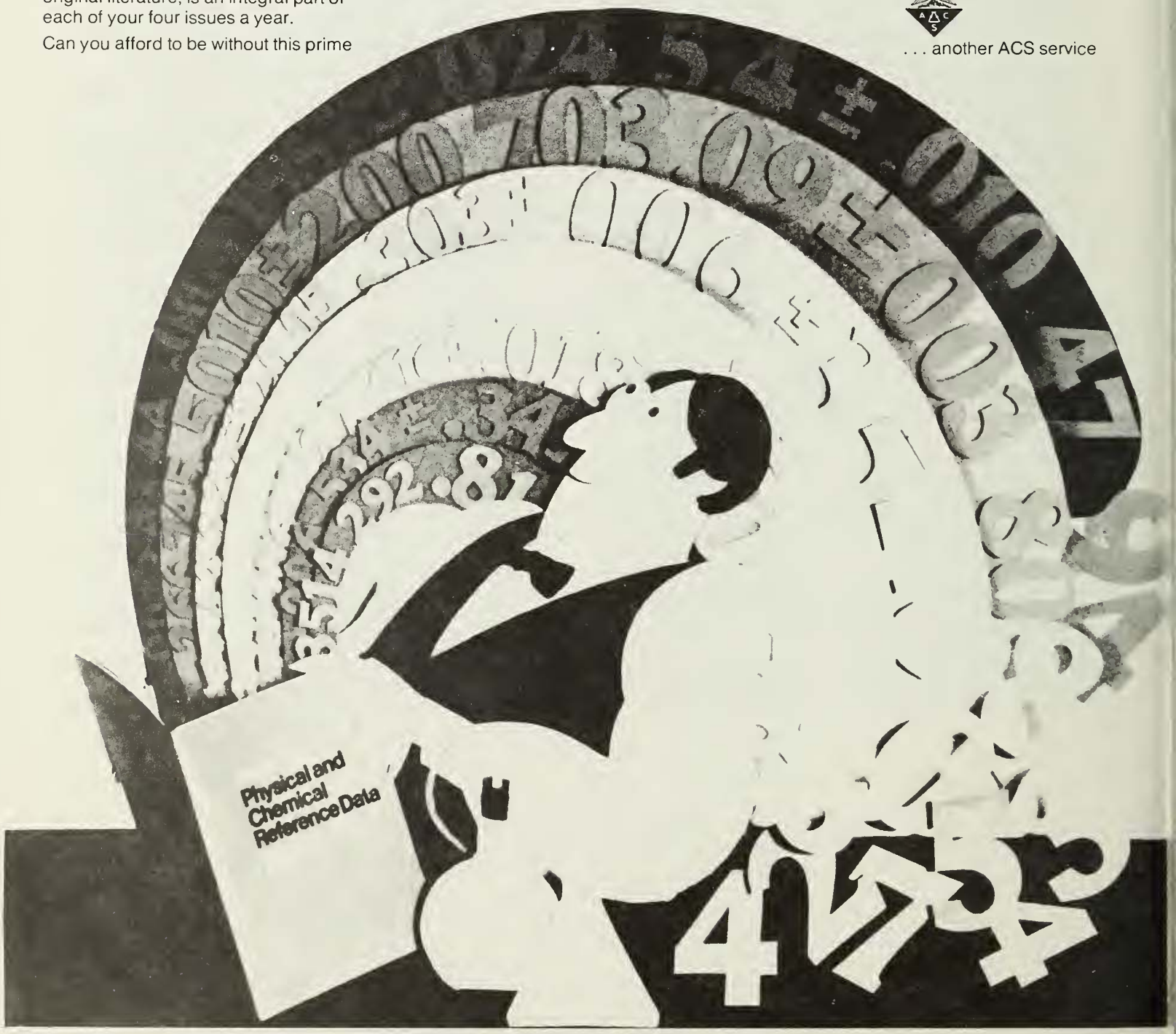

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16. ABSTRACT *(A 200-word or less factual summary of most significant information. If document includes a significant bibliography or literature survey, mention it here.)*

Rates of reactions of OH and HO_2 with organic and inorganic molecules, ions, and transients in aqueous solution have been tabulated, as well as the rates for the corresponding radical ions in aqueous solution (O^- and O_2^-). Most of the rates have been obtained by radiation chemistry methods, both pulsed and steady-state; data from photochemistry and thermal methods are also included. Rates for over one thousand reactions are listed.

17. KEY WORDS *(six to twelve entries; alphabetical order; capitalize only the first letter of the first key word unless a proper name; separated by semicolons)*

Aqueous solution; chemical kinetics; data compilation; hydroxyl radical; oxide radical ion; perhydroxyl radical; radiation chemistry; rates; superoxide ion.

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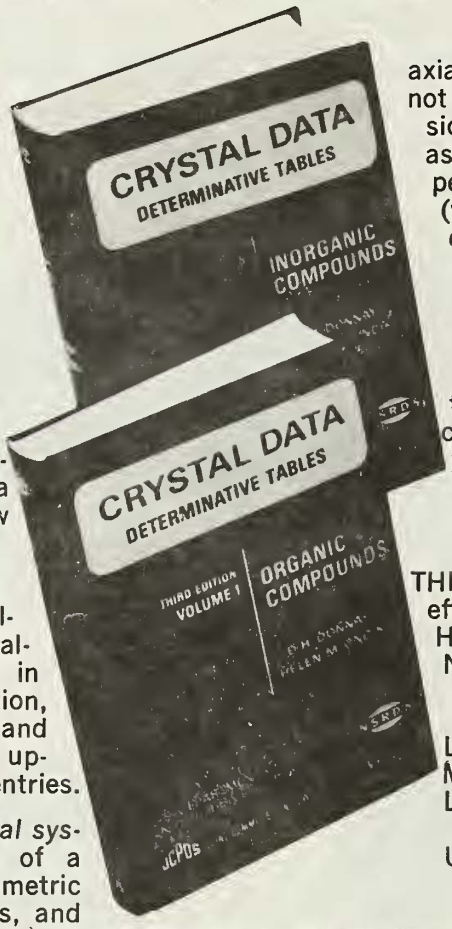

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