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U.S. DEPARTMENT OF COMMERCE / National Bureau of Standards



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

Hydrated Electron, Supplemental Data

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Selected Specific Rates of Reactions of Transients from Water in Aqueous Solution. Hydrated Electron, Supplemental Data

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Foreword

The National Standard Reference Data System provides access to the quantitative data of physical science, critically evaluated and compiled for convenience and readily accessible through a variety of distribution channels. The System was established in 1963 by action of the President's Office of Science and Technology and the Federal Council for Science and Technology, and responsibility to administer it was assigned to the National Bureau of Standards.

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 is 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.



RICHARD W. ROBERTS, *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.

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Selected Specific Rates of Reactions of Transients from Water in Aqueous Solution. Hydrated Electron, Supplemental Data.

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A compilation of rates of reactions of hydrated electrons with other transients and with organic and inorganic solutes in aqueous solution appeared in NSRDS-NBS 43, and covered the literature up to early 1971. This supplement includes additional rates which have been published through July 1973.

Keywords: Aqueous solution; chemical kinetics; data compilation; hydrated electron; radiation chemistry; rates.

Introduction

When the preparation of NSRDS-NBS 43 (73-0030) was completed two and one half years ago, rates of nearly 700 reactions of the hydrated electron with various organic and inorganic ions and molecules in aqueous solution had been collected. Since that time rates of about 300 additional reactions have been reported in the literature bringing the total number of hydrated electron reactions which have been studied quantitatively to nearly one thousand. This supplement includes all of the data on reactions not previously reported as well as new rate determinations for reactions included in the earlier compilation.

The selection criteria and arrangement of the tables are similar to those used in the earlier work. Each reaction is numbered and the numbers in this supplement are prefixed by an S. A correlation between the reaction numbers in the main work and in the supplement is included at the end of this section. Reactions of the hydrated electron with transient ions and radicals derived from water are included in table 1. Reactions of e_{aq}^- with inorganic ions and molecules in table 2 are listed alphabetically by main element, and reactions of e_{aq}^- with organic ions and molecules in table 3 are listed alphabetically by name. A formula index follows the tables and refers to reactants listed in both this supplement and the main work, NSRDS-NBS 43.

The rates listed, in most cases, are observed values. In some cases, however, rates for the individual ionic forms of compounds which have acid-base equilibria have been calculated by the author of the original paper and are reported along with the observed rates at varying pH. Usually, however, the rates are listed under the uncharged parent compound, along with any available information on pH and pK. The equation for the reaction has been included only when evidence for product determination has been reported.

*The Radiation Laboratory is operated under contract with The Atomic Energy Commission. The work of the Center is supported jointly by The National Bureau of Standards, Office of Standard Reference Data and The Atomic Energy Commission. This AEC Document COO-38-905.

In most of the studies cited the hydrated electron has been generated by pulse radiolysis and the specific rate, k , has been determined by measuring the rate of decay of the optical absorption of the hydrated electron in a solution of 10^{-3} mol/dm³ or less of reactant. When a correction was made for ionic strength effect, the rate is marked (cor.). In some cases ratios of rates have been determined by competition kinetics and they are listed in the column under *Ratio* in the form k/k_x ; $k_x = k(e_{aq}^- + X)$ where X is the competing reactant. The relative rate, k , obtained in this way using the assumed value of k_x given under *Comments*, is listed under the k column and marked (rel.). The assumed values of k_x are the same as those used in the main work, NSRDS-NBS 43, except where noted in these tables. Abbreviations used throughout the tables are listed at the end of this section.

It is expected that data will continue to appear and that further supplements to these tables will be prepared. If any data which have already been published have been omitted, the author would be very grateful to know of those omissions.

Abbreviations and Symbols

A	frequency factor	G	radiation yield (molecules or ions per 100 eV absorbed)
abs.	absorption	γ -r.	gamma-radiolysis
alk.	alkaline	k	specific rate
bipy	2,2'-bipyridine	μ	ionic strength
BrPhOH	bromophenol	M	mol/dm ³
calcd.	calculated	mol. wt.	molecular weight
chem.	chemical	obs.	observed
c.k.	competition kinetics	opt.	optical spectroscopy
concn.	concentration	oxy	oxygen
condy.	conductivity	pol.	polarography
cor.	corrected	p.b.k.	product buildup kinetics
d.k.	decay kinetics	p.r.	pulse radiolysis
ϵ	extinction coefficient	rel.	relative
E_a	activation energy	satd.	saturated
estd.	estimated	soln.	solution
formn.	formation	terpy	2,2',6',2''-terpyridine
f. phot.	flash photolysis		

Correlation of Reaction Numbers in NSRDS-NBS 43 and this Supplement

Consecutive numbers were assigned to the reactions listed in both NSRDS-NBS 43 and the Supplement. The reactions in the original work for which additional data are available in this supplement are listed below along with the corresponding reaction number in this supplement.

NSRDS-NBS 43	Supplement	NSRDS-NBS 43	Supplement	NSRDS-NBS 43	Supplement
1.3	S1.1	1.115	S1.25	1.188	S1.43
1.4	S1.2	1.127	S1.26	1.189	S1.44
1.5	S1.3	1.137	S1.30	1.193	S1.45
1.6	S1.4	1.143	S1.31	1.205	S1.47
1.9	S1.5	1.146	S1.32	1.211	S1.48
1.37	S1.9	1.156	S1.35	1.213	S1.50a
1.38	S1.10	1.165	S1.36	1.223	S1.51
1.54	S1.11	1.179	S1.38	1.225	S1.52
1.55	S1.13	1.180	S1.39	1.226	S1.53
1.59	S1.14	1.181	S1.40	1.231a	S1.55
1.76	S1.15	1.182	S1.41	1.233	S1.57
1.78	S1.19	1.186	S1.42	1.236	S1.61

Correlation of Reaction Numbers—Continued

NSRDS-NBS 43	Supplement	NSRDS-NBS 43	Supplement	NSRDS-NBS 43	Supplement
1.237	S1.62	1.367a	S1.174	1.513	S1.301
1.238	S1.63	1.388	S1.192	1.514	S1.304
1.240	S1.65	1.389	S1.193	1.517	S1.365
1.242	S1.68	1.390-2	S1.194	1.518	S1.309
1.250	S1.71	1.393	S1.196	1.522	S1.314
1.265	S1.72	1.394	S1.197	1.523	S1.318
1.272	S1.73	1.395	S1.199	1.530	S1.323
1.274	S1.74	1.395a	S1.203	1.532	S1.327
1.286	S1.75	1.396	S1.204	1.551	S1.341
1.287	S1.77	1.403	S1.218	1.553	S1.348
1.288	S1.78	1.405	S1.227	1.554	S1.349
1.289	S1.80	1.409a	S1.231	1.559	S1.352
1.291	S1.81	1.409b	S1.232	1.568	S1.358
1.296	S1.87	1.417	S1.237	1.572	S1.359
1.298a	S1.98	1.421a	S1.239	1.573	S1.361
1.299	S1.99	1.422	S1.242	1.573a	S1.367
1.300	S1.105	1.425	S1.243	1.575	S1.369
1.301	S1.108	1.433	S1.245	1.576	S1.370
1.302	S1.109	1.435	S1.246	1.577	S1.372
1.303-4	S1.110	1.437a	S1.251	1.578	S1.374
1.305	S1.111	1.439a	S1.252	1.592	S1.385
1.310	S1.116	1.441	S1.254	1.593a	S1.388
1.313b	S1.121	1.442	S1.255	1.595	S1.389
1.314	S1.123	1.443	S1.256	1.596	S1.391
1.321-2	S1.128	1.444	S1.257	1.604	S1.393
1.323	S1.131	1.445	S1.258	1.613-4	S1.401
1.324	S1.132	1.451	S1.261	1.615	S1.403
1.325	S1.133	1.452	S1.262	1.615b	S1.405
1.327a	S1.135	1.454	S1.266	1.616	S1.406
1.329	S1.137	1.455	S1.267	1.616a	S1.407
1.330	S1.138	1.458	S1.270	1.621	S1.416
1.331	S1.144	1.465a	S1.278	1.627	S1.418
1.332	S1.146	1.465c	S1.279	1.632	S1.420
1.343	S1.157	1.481	S1.287	1.633b	S1.411
1.344	S1.158	1.483a	S1.382	1.643	S1.434
1.348	S1.159	1.487	S1.289	1.645-6	S1.436
1.354	S1.164	1.501	S1.296	1.647-8	S1.437
1.356	S1.166	1.507	S1.298	1.649	S1.438
1.366	S1.173	1.511-2	S1.299		

TABLE 1. Reactions of hydrated electrons with transients from water

No.	Solute and Reaction	pH	$k(\text{dm}^3 \text{mol}^{-1} \text{s}^{-1})$	Ratio	Source	Method	Comment	Ref.
S1.1	$e_{\text{aq}}^- + e_{\text{aq}}^- \rightarrow \text{H}_2 + 2\text{OH}^-$	alk.	$(5.8 \pm 0.2) \times 10^9$ ^a	—	f.phot.	opt.	d.k.; H_2 -satd.; $\epsilon = 10,900$ $\text{dm}^3 \text{mol}^{-1} \text{cm}^{-1}$ at 578 nm.	69-7106
		7-14	—	$k_{\text{H}}/k_{\text{D}} = 6.0 \pm 0.1$	p.r.	chem.	obs. H_2 , D_2 and HD yields in $\text{H}_2\text{O} - \text{D}_2\text{O}$; dose rate $10^{26} - 10^{28} \text{eV/g.s.}$	72-0013
		alk.	$\sim (1.5 \text{ to } 2) \times 10^9$	—	p.r.	opt.	d.k.; 6M NaOH; $\epsilon = 1.6 \times 10^4$ $\text{dm}^3 \text{mol}^{-1} \text{cm}^{-1}$ at 600 nm.	72-0437
		~ 11	$(2.5 \pm 0.1) \times 10^9$ See also 1.3.	—	f.phot.	opt.	d.k.; H_2 -satd.	72-7158
S1.2	e_{d}^-		See S1.1; see also 1.4.					
S1.3	H $e_{\text{aq}}^- + \text{H} \rightarrow \text{H}_2 + \text{OH}^-$	7-14	—	$k_{\text{H}}/k_{\text{D}} = 1.3 \pm 0.2$	p.r.	chem.	see comment under S1.1.	72-0013
			See also 1.5.					
S1.4	D $e_{\text{d}}^- + \text{D} \rightarrow \text{D}_2 + \text{OD}^-$		See S1.3; See also 1.6.					
S1.5	O^- $e_{\text{aq}}^- + \text{O}^- \rightarrow \text{O}^{2-}$	alk.	$\sim 1.2 \times 10^{10}$		p.r.	opt.	d.k.; 6M NaOH; assumed ratio of O^- to e_{aq}^- concn. $= 0.8 - 0.9$.	72-0437
			See also 1.9.					

^a The rate law is $-d[e_{\text{aq}}^-]/dt = 2k[e_{\text{aq}}^-]^2$; values of k are given here (not $2k$).

TABLE 2. Reactions of hydrated electrons with inorganic solutes

No.	Solute and Reaction	pH	$k(\text{dm}^3 \text{mol}^{-1} \text{s}^{-1})$	Ratio	Source	Method	Comment	Ref.
S1.6	BrO_4^- $e_{\text{aq}}^- + \text{BrO}_4^- \rightarrow \text{BrO}_3^- + \text{O}^-$	~7	$(7.0 \pm 0.7) \times 10^9$	—	p.r.	opt.	d.k.; counter ion K^+ .	73-0106
S1.7	HCN	—	2×10^8 (rel.)	$k/k_{\text{nitrate}} = 0.019$	γ -r.	chem.	c.k.; assume $k(e_{\text{aq}}^- + \text{NO}_3^-) = 1.1 \times 10^{10}$.	68-0593
		7.7-9.1	$(4.3 \pm 0.8) \times 10^8$	—	p.r.	opt.	d.k.; cor. for pK_a .	73-0071
S1.8	C_2N_2 $e_{\text{aq}}^- + (\text{CN})_2 \rightarrow (\text{CN})_2^-$	6	$(2.1 \pm 0.2) \times 10^{10}$	—	p.r.	opt.	d.k. (e_{aq}^-) as well as p.b.k. (adduct).	71-0038
S1.9	CNS^-	~5.7	7×10^6 ($\pm 40\%$)	—	p.r.	opt.	d.k.; cor. for reaction of e_{aq}^- with matrix; k_{obs} decreases with concn.; no abs. by e_{aq}^- ; obs. $\geq 1 \text{ mol/dm}^3$; counter ion K^+ .	72-0475
S1.10	Cd^{2+} $e_{\text{aq}}^- + \text{Cd}^{2+} \rightarrow \text{Cd}^+$	See also 1.37. acid	$\sim 2.5 \times 10^{10}$ (rel.)	$k/k_{\text{H}^+} \cong 1.1$	p.r.	condy.	c.k.; assume $k_{\text{H}^+} = 2.3 \times 10^{10}$; counter ions ClO_4^- , SO_4^{2-} .	70-0512
		6.1	6.0×10^{10}	—	p.r.	opt.	d.k.; k also detd. at 6.4 kbar ($6.4 \times 10^8 \text{ N/m}^2$); counter ion SO_4^{2-} .	72-0102
S1.11	ClO^- $e_{\text{aq}}^- + \text{ClO}^- \rightarrow \text{Cl}^- + \text{O}^-$	—	$(5.3 \pm 1.0) \times 10^{10}$	—	p.r.	opt.	d.k.; counter ion Na^+ .	72-0301
S1.12	ClO_2^- $e_{\text{aq}}^- + \text{ClO}_2^- \rightarrow \text{ClO}^- + \text{O}^-$	—	$(4.5 \pm 0.5) \times 10^{10}$	—	p.r.	opt.	d.k.; counter ion Na^+ .	72-0301
S1.13	ClO_3^-	—	$< 10^6$	—	p.r.	opt.	solute has no effect on d.k. of e_{aq}^- .	72-0301
S1.14	$\text{Co}(\text{CN})_5^{3-}$ $e_{\text{aq}}^- + \text{Co}(\text{CN})_5^{3-} \rightarrow \text{Co}(\text{CN})_5^{4-}$	See also 1.55. ~ 13	$(1.2 \pm 0.2) \times 10^{10}$	—	p.r.	opt.	d.k.; $k_{\text{H}}/k_{\text{D}} \cong 1.2$.	71-0097
S1.15	$\text{Co}(\text{CN})_6^{3-}$	See also 1.59. 7, 13	$(5.4 \pm 1.7) \times 10^9$	—	p.r.	opt.	d.k.; H_2 -satd.; counter ion K^+ .	71-0364
S1.16	$\text{Co}(\text{CN})_5\text{H}^{3-}$	See also 1.76. 13	$(6.7 \pm 0.7) \times 10^9$	—	p.r.	opt.	d.k.; H_2 -satd.; in D_2O $k = 5.6 \times 10^9$; counter ion K^+ .	71-0364
S1.17	$\text{Co}(\text{CN})_5\text{NCS}^{3-}$	7	$(1.6 \pm 0.2) \times 10^{10}$	—	p.r.	opt.	d.k.; H_2 -satd.; contains formate ion; counter ion $(\text{C}_4\text{H}_9)_4\text{N}^+$.	71-0364
S1.18	$\text{Co}(\text{CN})_5\text{H}_2\text{O}^{2-}$	7	1.2×10^{10}	—	p.r.	opt.	d.k.; counter ion K^+ ; $pK \cong 10$.	71-0364
S1.19	$\text{Co}(\text{CN})_5\text{OH}^{3-}$	13	1.1×10^{10}	—	p.r.	opt.	d.k.; H_2 -satd.; in D_2O $k = 1.07 \times 10^{10}$; counter ion K^+ .	71-0364
		See also 1.78.						

TABLE 2. Reactions of hydrated electrons with inorganic solutes — Continued

No.	Solute and Reaction	pH	$k(\text{dm}^3 \text{mol}^{-1} \text{s}^{-1})$	Ratio	Source	Method	Comment	Ref.
S1.20	$\text{Co}(\text{CN})_5\text{I}^{3-}$	7	$(2.1 \pm 0.2) \times 10^{10}$	—	p.r.	opt.	d.k. at 478 nm; H_2 -satd.; contains formate ion; counter ion K^+ .	71-0364
S1.21	$\text{Co}(\text{CN})_5\text{NO}^{3-}$	—	$(9.7 \pm 0.5) \times 10^9$	$k/k_{\text{nitrate}} = 0.88$	γ -r.	chem.	c.k.; assume $k_{\text{nitrate}} = 1.1 \times 10^{10}$; counter ion K^+ .	71-0407
S1.22	$\text{Co}(\text{terpy})_2^{3+}$	—	6.5×10^{10}	—	p.r.	opt.	p.b.k. (transient precursor to $\text{Co}(\text{terpy})_2^{2+}$).	72-0381
S1.23	$\text{Cr}(\text{CN})_5\text{NO}^{3-}$	—	$(3.6 \pm 0.4) \times 10^9$	$k/k_{\text{nitrate}} = 0.33$	γ -r.	chem.	c.k.; assume $k_{\text{nitrate}} = 1.1 \times 10^{10}$; counter ion K^+ .	71-0407
S1.24	$\text{Cr}(\text{C}_2\text{O}_4)_3^{3-}$	6.7	6.5×10^9	—	p.r.	opt.	d.k.; k also detd. at 6.4 kbar ($6.4 \times 10^8 \text{ N/m}^2$); counter ion K^+ .	72-0102
S1.25	Cu^{2+} $e_{\text{aq}}^- + \text{Cu}^{2+} \rightarrow \text{Cu}^+$	acid	$\sim 4 \times 10^{10}$	—	p.r.	condy.	d.k.; counter ions ClO_4^- , SO_4^{2-} .	70-0512
		—	3.0×10^{10}	—	p.r.	opt.	d.k.; $k = 4.4 \times 10^9$ in sodium dodecyl sulfate soln. and 1.6×10^{10} in hexadecyl-trimethylammonium bromide soln.	73-1004
S1.26	Eu^{3+}	See also 1.102.		—	p.r.	opt.	d.k.	71-0311
		~ 6	$(6.1 \pm 0.3) \times 10^{10}$ (cor.)					
S1.27	Fe^{3+} $e_{\text{aq}}^- + \text{Fe}^{3+} \rightarrow \text{Fe}^{2+}$	See also 1.127.		$k/k_{\text{H}^+} \cong 2$	γ -r.	chem.	c.k.; in H_2SO_4 or HClO_4 ; assume $k_{\text{H}^+} = 2.3 \times 10^{10}$.	71-0203
		1.8	$\sim 5 \times 10^{10}$ (rel.)					
S1.28	FeSO_4^+ $e_{\text{aq}}^- + \text{Fe}(\text{III}) \rightarrow \text{Fe}(\text{II})$	2.1–2.9	$\sim 2 \times 10^{10}$ (rel.)	$k/k_{\text{H}^+} = 0.95 \pm 0.1$	γ -r.	chem.	c.k.; soln. contains 0.5 mol/dm ³ Na_2SO_4 in H_2SO_4 .	71-0203
S1.29	$\text{HFe}(\text{CN})_6^{3-}$ $e_{\text{aq}}^- + \text{HFe}(\text{CN})_6^{3-} \rightarrow \text{H} + \text{Fe}(\text{CN})_6^{4-}$	~ 3	$(2 \pm 0.8) \times 10^9$ (rel.) (cor.)	$k/k_{\text{N}_2\text{O}} = 0.25 \pm 0.1$ (cor.)	phot.	chem.	c.k.; ratio = 0.75 at $\mu = 0.042$; assumed $k(e_{\text{aq}}^- + \text{N}_2\text{O}) = 8.7 \times 10^9$.	66-7025
S1.30	$\text{Fe}(\text{CN})_6^{3-}$ $e_{\text{aq}}^- + \text{Fe}(\text{CN})_6^{3-} \rightarrow \text{Fe}(\text{CN})_5(\text{H}_2\text{O})^{3-} + \text{CN}^- (1)$ $e_{\text{aq}}^- + \text{Fe}(\text{CN})_6^{3-} \rightarrow \text{Fe}(\text{CN})_6^{4-} (2)$	—	—	$k_1/k_2 \cong 0.1 - 0.2$	p.r. Al-NaOH	condy.	estd.	70-0254 70-0465
		alk.	3×10^9 (rel.)			chem.	obs. effect of solute on H_2 evolution.	
S1.31	H^+ $e_{\text{aq}}^- + \text{H}^+ \rightarrow \text{H}$	See also 1.137.		—	p.r.	opt.	d.k.	71-0475 71-0580
		acid	3.0×10^{10}					
		acid	2.2×10^{10}	—	p.r.	opt.	d.k.; $k(1.6 \text{ to } 2.2) \times 10^{10}$ and E_a (1.4 – 2.4 kcal/mol or 5.9 – 10.0 kJ/mol) vary with concn. of added ethanol, KI, and MgCl_2 .	

TABLE 2. Reactions of hydrated electrons with inorganic solutes — Continued

No.	Solute and Reaction	pH	$k(\text{dm}^3 \text{mol}^{-1} \text{s}^{-1})$	Ratio	Source	Method	Comment	Ref.
S1.31	H^+ (contd.)	~3	1.3×10^{10} (rel.)	$k/k_{\text{N}_2\text{O}} = 1.54$	photo-effect	pol.	c.k.; assume $k(e_{\text{aq}}^- + \text{N}_2\text{O}) = 8.7 \times 10^9$; 0.2 M KCl; indirect method.	71-7393
		—	2.2×10^{10}	—	p.r.	opt.	d.k.; k increases with pressure $\rightarrow 3.5$ kbar, then remains constant $\rightarrow 6.4$ kbar ($6.4 \times 10^8 \text{ N/m}^2$).	72-0298
		—	2.3×10^{10}	—	p.r.	opt.	d.k.; $k = 7.5 \times 10^9$ in sodium dodecyl sulfate soln.	73-1004
		—	2.4×10^{10} (cor.)	—	p.r.	opt.	d.k.; k unchanged in mixtures up to 99% ethanol.	73-1008
<i>See also 1.143; the value 2.3×10^{10} has been used to calculate specific rates from relative rates for the following reactions: S1.10, S1.27, S1.28, S1.45, S1.80, S1.157, S1.193, S1.194, S1.256, S1.294, S1.304, S1.306, S1.307, S1.365. The value 1.57×10^{10} has been used to calculate specific rates from relative rates at $\mu = 0.05$ for the following reactions: S1.78, S1.135, S1.246, S1.260, S1.273, S1.297, S1.303, S1.386, S1.402.</i>								
S1.32	H_2O_2	alk.	7.0×10^9 (rel.)	—	Al-NaOH	chem.	obs. effect of solute on H_2 formation.	70-0465
		6.1	1.6×10^{10}	—	p.r.	opt.	d.k.; k also detd. at 6.4 kbar ($6.4 \times 10^8 \text{ N/m}^2$).	72-0102
<i>See also 1.146.</i>								
S1.33	HgCl_2 $e_{\text{aq}}^- + \text{HgCl}_2 \rightarrow \text{HgCl} + \text{Cl}^-$	5.0	$(4.0 \pm 0.3) \times 10^{10}$	—	p.r.	opt.	d.k.	73-0043
S1.34	I^-	7	$< 2.4 \times 10^5 (\pm 15\%)$	—	p.r.	opt.	d.k.	70-1226
S1.35	I_2	—	5.1×10^{10}	—	p.r.	opt.	d.k.; $k = 1.5 \times 10^{10}$ in sodium dodecyl sulfate soln.	73-1004
<i>See also 1.156.</i>								
S1.36	K^+ $e_{\text{aq}}^- + \text{K}^+ \rightarrow (\text{K}^+ - e^-)$	>14	2.4×10^5	—	p.r.	opt.	d.k. and p.b.k. at 720 nm in 14.5 M KOH; k for decay of $(\text{K}^+ - e^-) = 2.6 \times 10^7 \text{ s}^{-1}$.	72-0555
<i>See also 1.165.</i>								
S1.37	Omitted							
S1.38	NH_2NH_2	10.5	$2.3 \times 10^6 (\pm 15\%)$	—	p.r.	opt.	d.k.	72-0003
<i>See also 1.179.</i>								
S1.39	NH_2NH_3^+	6.0	$2.2 \times 10^8 (\pm 15\%)$	—	p.r.	opt.	d.k.	72-0003
<i>See also 1.180.</i>								
S1.40	NH_2OH	9.0	9.2×10^8	—	p.r.	opt.	d.k.	71-0493
<i>See also 1.181.</i>								
S1.41	NH_3OH^+	4.8	1.2×10^{10}	—	p.r.	opt.	d.k.	71-0493
<i>See also 1.182.</i>								

TABLE 2. Reactions of hydrated electrons with inorganic solutes — Continued

No.	Solute and Reaction	pH	$k(\text{dm}^3 \text{mol}^{-1} \text{s}^{-1})$	Ratio	Source	Method	Comment	Ref.
S1.42	N_2O	— —	8.0×10^9 4×10^9	— —	p.r. photo-effect	opt. pol.	d.k. indirect method; contains 1 M KCl.	71-0587 71-7393
See also 1.186; the value 8.7×10^9 has been used to calculate specific rates of the following reactions from relative rates: S1.29, S1.31, S1.43, S1.44, S1.47, S1.48, S1.62, S1.420.								
S1.43	NO_2^-	9	6×10^9 (rel.)	$k/k_{\text{N}_2\text{O}} = 0.73$	photo-effect	pol.	c.k.; assume $k(e_{\text{aq}}^- + \text{N}_2\text{O}) = 8.7 \times 10^9$; 0.2 M KCl; indirect method.	71-7393
See also 1.188.								
S1.44	NO_3^- $e_{\text{aq}}^- + \text{NO}_3^- \rightarrow \text{NO}_2 + 2\text{OH}^-$	alk.	1.0×10^{10} (rel.)	—	Al-NaOH	chem.	obs. effect of solute on H_2 evolution.	70-0465
		—	9.5×10^9 (rel.)	$k/k_{\text{oxy}} = 0.5$	γ -r.	chem.	c.k.; assume $k(e_{\text{aq}}^- + \text{O}_2) = 1.9 \times 10^{10}$.	71-0166
		—	9.3×10^9	—	p.r.	opt.	d.k.; $k(0.7$ to $1.5 \times 10^{10})$ and E_a (2.5 – 3.5 kcal/mol or 10.5 – 14.6 kJ/mol) vary with concn. of added ethanol, KI, and MgCl_2 .	71-0580
		—	2.5×10^{10} (rel.)	$k/k_{\text{N}_2\text{O}} = 2.86$	photo-effect	pol.	c.k.; assume $k(e_{\text{aq}}^- + \text{N}_2\text{O}) = 8.7 \times 10^9$; 0.2 M KCl; indirect method.	71-7393
		6.4	1.0×10^{10}	—	p.r.	opt.	d.k.; k also detd. at 6.4 kbar ($6.4 \times 10^8 \text{ N/m}^2$). counter ion Na^+ .	72-0102
		11.5	1.1×10^{10}	—	f.phot.	opt.	d.k.	72-7158
		—	1.1×10^{10}	—	p.r.	opt.	d.k.; k unchanged in anionic or cationic surfactant soln.	73-1004
		—	8.6×10^9 (cor.)	—	p.r.	opt.	d.k.; k decreases with added ethanol to 3×10^7 at 99% ethanol.	73-1008
See also 1.189; the value 1.1×10^{10} has been used to calculate specific rates of the following reactions from relative rates: S1.7, S1.21, S1.23, S1.43, S1.203.								
S1.45	Ni^{2+} $e_{\text{aq}}^- + \text{Ni}^{2+} \rightarrow \text{Ni}^+$	acid	1.2×10^{10} (rel.)	$k/k_{\text{H}^+} = 0.54$	p.r.	condy.	c.k.; assume $k_{\text{H}^+} = 2.3 \times 10^{10}$; counter ions ClO_4^- , SO_4^{2-} .	70-0512
See also 1.193.								
S1.46	$\text{Ni}(\text{NH}_3)_6^{2+}$	11.3	$(8.4 \pm 1.2) \times 10^9$	—	p.r.	opt.	d.k.; contains 0.67 mol/dm ³ NH_3 .	72-0460
S1.47	O_2	6.4	2.2×10^{10}	—	p.r.	opt.	d.k.; k also detd. at 6.4 kbar ($6.4 \times 10^8 \text{ N/m}^2$).	72-0102

TABLE 2. Reactions of hydrated electrons with inorganic solutes — Continued

No.	Solute and Reaction	pH	$k(\text{dm}^3 \text{mol}^{-1} \text{s}^{-1})$	Ratio	Source	Method	Comment	Ref.
S1.47	O_2 (contd.)	11	1.9×10^{10} (rel.)	$k/k_{\text{N}_2\text{O}} = (2.3 \pm 0.2)$	γ -r.	chem.	c.k.; assume $k(e_{\text{aq}}^- + \text{N}_2\text{O}) = 8.7 \times 10^9$; preirradiated NaCl was added to the soln. to produce the e_{aq}^- ; higher ratios are obtained at higher O_2 concn.	72-0430
		12	1.6×10^{10}		f.phot.	opt.	d.k.	72-7036
		See also 1.205; the value 1.9×10^{10} has been used to calculate specific rates of the following reactions from relative rates: S1.44, S1.393.						
S1.48	H_2PO_4^- $e_{\text{aq}}^- + \text{H}_2\text{PO}_4^- \rightarrow$ $\text{H} + \text{HPO}_4^{2-}$	7-9	2.2×10^7 (rel.) (cor.)	$k/k_{\text{N}_2\text{O}} = (8.8 \pm 0.7) \times 10^{-3}$	phot.	chem.	c.k. at $\mu = 1.45$; k calcd. assuming $k(e_{\text{aq}}^- + \text{N}_2\text{O}) = 8.7 \times 10^9$ and cor. to $\mu = 0$.	66-7190
		6.8	1.0×10^7	—	p.r.	opt.	d.k.	72-0380
		4	$(6.6 \pm 0.8) \times 10^6$ (cor.)	—	p.r.	opt.	d.k.; $k_{\text{obs}} = (11.7 \pm 8) \times 10^5$ at $\mu = 0.1$.	73-1049
		See also 1.211.						
S1.49	HPO_4^{2-}	9-	$(1.8 \pm 0.8) \times 10^4$ (cor.)	—	p.r.	opt.	d.k.; $k_{\text{obs}} = (1.4 \pm 0.6) \times 10^5$ at $\mu = 0.6$.	73-1049
S1.50	$\text{HP}_2\text{O}_7^{3-}$	9.7- 10.3	$(1.1 \pm 0.3) \times 10^5$ (cor.)	—	p.r.	opt.	d.k.; $k_{\text{obs}} = (24 \pm 6) \times 10^5$ at $\mu = 0.8$.	73-1049
		See also 1.212.						
S1.50a	$\text{P}_2\text{O}_4^{4-}$	See 1.213. The rate listed is unpublished and did not appear in the reference cited.						
S1.51	Pr^{3+}	5.5	$(6 \pm 1) \times 10^6$	—	p.r.	opt.	d.k.; concn. 10^{-1}M .	72-0066
		See also 1.223.						
S1.52	PtCl_4^{2-} $e_{\text{aq}}^- + \text{Pt(II)} \rightarrow$ Pt(I)	7	9.3×10^9	—	p.r.	opt.	p.b.k. at 310 nm.	69-0144
		See also 1.225.						
S1.53	Pt(CN)_4^{2-} $e_{\text{aq}}^- + \text{Pt(II)} \rightarrow$ electron adduct	11	$(4.4 \pm 1.1) \times 10^9$	—	p.r.	opt.	p.b.k. at 360 nm.	69-0144
		See also 1.226.						
S1.54	Ru(bipy)_3^{2+}	—	8.2×10^{10}	—	p.r.	opt.	d.k.	72-0381
S1.55	$\text{Ru(NH}_3)_5\text{N}_2^{2+}$ $e_{\text{aq}}^- + \text{Ru(NH}_3)_5\text{N}_2^{2+}$ $\rightarrow \text{Ru(NH}_3)_5\text{N}_2^{2+}$	—	4.2×10^9	—	p.r.	opt.	d.k.	71-0234
		See also 1.231a.						
S1.56	$\text{Ru(NH}_3)_5\text{Br}^{2+}$	—	5.0×10^{10}	—	p.r.	opt.	d.k.	73-0107
S1.57	$\text{Ru(NH}_3)_5\text{Cl}^{2+}$	—	6.0×10^{10}	—	p.r.	opt.	d.k.	73-0107
		See also 1.231a.						
S1.58	$\text{Ru(NH}_3)_5\text{I}^{2+}$	—	$\sim 6 \times 10^{10}$	—	p.r.	opt.	d.k.	73-0107
S1.59	$\text{Ru(NH}_3)_5\text{OH}^{2+}$	6	5.9×10^{10}	—	p.r.	opt.	d.k.	73-0107
S1.60	Ru(bipy)_3^{3+} $e_{\text{aq}}^- + \text{Ru(bipy)}_3^{3+}$ $\rightarrow \text{Ru(bipy)}_3^{2+} +$ $h\nu$	4.5	$\sim 6 \times 10^{10}$	—	p.r.	opt.	d.k.; the reaction produces chemiluminescence, $\phi = 0.015 \pm 0.004$.	72-0462
S1.61	HS^-	10.9- 12.7	$(3.0 \pm 0.4) \times 10^7$	—	p.r.	opt.	d.k.	73-1012
		See also 1.236.						

TABLE 2. Reactions of hydrated electrons with inorganic solutes — Continued

No.	Solute and Reaction	pH	$k(\text{dm}^3 \text{mol}^{-1} \text{s}^{-1})$	Ratio	Source	Method	Comment	Ref.
S1.62	SF_6	—	1.7×10^{10} (rel.)	$k/k_{\text{N}_2\text{O}} = 2.0 \pm 0.2$	phot.	chem.	c.k.; I^- soln. ($\mu = 0.05$); ferrocyanide soln. ($\mu = 0.0035$); assume $k(e_{\text{aq}}^- + \text{N}_2\text{O}) = 8.7 \times 10^9$.	71-7395
S1.63	SO_3^{2-} $e_{\text{aq}}^- + \text{SO}_3^{2-} \rightarrow \text{prod.}$ ($\text{HSO}_3^{2-} + \text{OH}^-$?)	See also 1.237.	—	—	—	—	—	—
		—	$\leq 2 \times 10^6$ (rel.)	—	f.phot.	opt.	concn. 10^{-2} mol/dm ³ ; N_2 -satd.; c.k. with NO_3^- .	68-7072
		alk.	$\leq 1.5 \times 10^6$	—	p.r.	opt.	d.k.; Ar-satd.; half-life of e_{aq}^- increases with sulfite concn.	71-0461
		> 9	no reaction	—	f.phot.	opt.	first order e_{aq}^- decay unchanged in sulfite concn. 10^{-4} – 10^{-2} mol/dm ³ .	72-7008
S1.64	HSO_3^- $e_{\text{aq}}^- + \text{HSO}_3^- \rightarrow \text{H} + \text{SO}_3^{2-}$	See also 1.238. 8.0–8.5	$(2 \pm 1) \times 10^7$ (cor.)	—	f.phot. and p.r.	opt.	d.k.; concn. $(3-8) \times 10^{-3}$ mol/dm ³ ($\text{pK} = 7.2$).	72-7008
S1.65	$\text{S}_2\text{O}_3^{2-}$ $e_{\text{aq}}^- + \text{S}_2\text{O}_3^{2-} \rightarrow \text{S}^- + \text{SO}_3^{2-}$ (72-5050)	—	3.8×10^7	—	p.r.	opt.	d.k.; single pulse to minimize colloidal S formn.	72-0611
S1.66	$\text{S}_2\text{O}_4^{2-}$	—	$(1.3 \pm 0.1) \times 10^9$	—	p.r.	opt.	d.k.	72-0611
S1.67	$\text{S}_2\text{O}_6^{2-}$	—	$(2.7 \pm 0.2) \times 10^6$	—	p.r.	opt.	d.k.	72-0611
S1.68	$\text{S}_2\text{O}_8^{2-}$	5.7	1.4×10^{10}	—	p.r.	opt.	d.k.; k also detd. at 6.4 kbar ($6.4 \times 10^8 \text{ N/m}^2$); counter ion K^+ .	72-0102
S1.69	$\text{S}_3\text{O}_6^{2-}$	See also 1.242. 6.8	$(3.3 \pm 0.2) \times 10^9$	—	p.r.	opt.	d.k.	72-0611
S1.70	$\text{S}_4\text{O}_6^{2-}$	—	$(5.4 \pm 0.2) \times 10^9$	—	p.r.	opt.	d.k.	72-0611
S1.71	Sm^{3+}	—	$(5.8 \pm 1) \times 10^9$	—	p.r.	opt.	d.k.	73-1027
		~ 6	$(2.7 \pm 0.3) \times 10^{10}$ (cor.)	—	p.r.	opt.	d.k.	71-0311
		5.6	2.2×10^{10}	—	p.r.	opt.	d.k.; k also detd. at 6.4 kbar ($6.4 \times 10^8 \text{ N/m}^2$); counter ion SO_4^{2-} .	72-0102
S1.72	Ti^+	See also 1.250. —	2.8×10^{10}	—	p.r.	opt.	d.k.; addn. of 0.1–0.3 mol/dm ³ ethanol gave $k = (3.0 \text{ to } 3.7) \times 10^{10}$ and $E_{\text{a}} \cong 3-5$ kcal/mol (12–21 kJ/mol) detd. at 10–75°C.	71-0580
		6.1	5.4×10^{10}	—	p.r.	opt.	d.k.; k also detd. at 6.4 kbar ($6.4 \times 10^8 \text{ N/m}^2$); counter ion SO_4^{2-} .	72-0102
S1.73	Yb^{3+}	See also 1.265. ~ 6	$(4.7 \pm 0.3) \times 10^{10}$ (cor.)	—	p.r.	opt.	d.k.	71-0311
S1.74	Zn^{2+}	See also 1.272. —	10^9 (cor.)	—	p.r.	opt.	d.k.; k increases in mixtures up to 60% ethanol.	73-1008
		See also 1.274.						

TABLE 3. Reactions of hydrated electrons with organic solutes

No.	Solute and Reaction	pH	$k(\text{dm}^3/\text{mol}\cdot\text{s})$	Ratio	Source	Method	Comment	Ref.
S1.75	acetamide $e_{\text{aq}}^- + \text{CH}_3\text{CONH}_2 \rightarrow$ $\text{CH}_3\dot{\text{C}}(\text{O}^-)\text{NH}_2$	9.2	3.5×10^7	—	p.r.	opt.	d.k.	71-0414,
		5.2	4.5×10^7	—	p.r.	opt.	d.k.; k increases with pressure 0-6.4 kbar ($6.4 \times 10^8 \text{ N/m}^2$).	73-0091 72-0298
		See also 1.286.						
S1.76	2-acetamido-2-deoxy-D-galactose	—	1.1×10^7	—	p.r.	opt.	d.k.	70-3081
S1.77	acetate ion	—	4.3×10^4	—	p.r.	opt.	d.k.; concn. 1.8 mol/dm ³ Na acetate.	71-0475
		See also 1.287.						
S1.78	acetic acid $e_{\text{aq}}^- + \text{CH}_3\text{COOH} \rightarrow$ $\text{OH}^- + \text{CH}_3\dot{\text{C}}\text{O}$ (1) $e_{\text{aq}}^- + \text{CH}_3\text{COOH} \rightarrow$ $\text{H} + \text{CH}_3\text{COO}^-$ (2)	2.0	5.8×10^8	—	p.r.	opt.	d.k.	72-0187
		3-4	1.72×10^7 (rel.)(1)	$k/k_{\text{H}^+} = 1.1 \times 10^{-3}$	γ -r.	chem.	c.k.; $\mu = 0.05$; assume $k_{\text{H}^+} = 1.57 \times 10^{10}$ at that μ .	72-0057
			1.51×10^7 (rel.)(2)	$k_2/k_1 = 0.88$				
		See also 1.288.						
S1.79	acetoacetate ion	8.9	$(4.8 \pm 0.5) \times 10^9$	—	p.r.	opt.	d.k.	73-0073
S1.80	acetone	0-2	1×10^{10} (rel.)	$k/k_{\text{H}^+} = 0.42$	phot.	chem.	c.k.; I ⁻ soln.; ratio increases to 1.02 with concn. 0.1 → 2 M; ratio is for lowest concn.	71-0462
		—	1×10^{10} (rel.)	$k/k_{\text{H}^+} = 0.48$	γ -r.	chem.	c.k.; ratio increases to 2.40 with concn. 0.02 - 2 M; ratio given is for lowest concn.	71-0462
		—	6.5×10^9	—	p.r.	opt.	d.k.; $\mu = 0$; k unchanged in water-ethanol mixtures.	73-1008
		See also 1.289; the value 6×10^9 has been used to calculate a specific rate for S1.158 from a relative rate.						
S1.81	acetone oxime	7.0	3.5×10^8	—	p.r.	opt.	d.k.; k increases with pressure → 6.4 kbar ($6.4 \times 10^8 \text{ N/m}^2$).	72-0298
		See also 1.291.						
S1.82	acetophenone	~9.2	2.8×10^{10} ($\pm 10\%$)	—	p.r.	opt.	d.k.	72-0171
S1.83	N-acetylalanyl-alanylalanine	9.2	6.8×10^8	—	p.r.	opt.	d.k.	74-1058
S1.84	N-acetylalanyl-alanylalanyl-alanylalanine	9.2	8.2×10^8	—	p.r.	opt.	d.k.	74-1058
S1.85	N-acetylcysteamine	7.1	9.1×10^9 ($\pm 10\%$)	—	p.r.	opt.	d.k.; $pK_a \cong 9.5$.	73-0090
		12.6	1.9×10^9 ($\pm 10\%$)	—				
S1.86	N-acetylcysteine	7.1	5.6×10^9 ($\pm 10\%$)	—	p.r.	opt.	d.k.; $pK_a \cong 2$, 9.5.	73-0090
		12.5	3.3×10^8 ($\pm 10\%$)	—				
S1.87	N-acetylglycine	11.5	2.6×10^6	—	p.r.	opt.	d.k. at 700 nm.	71-3052
		See also 1.296.						
S1.88	N-acetylglycine amide	9.2	2.1×10^8	—	p.r.	opt.	d.k. at 700 nm.	71-3052
S1.89	N-acetylglycine methyl ester	8.7	3.3×10^8	—	p.r.	opt.	d.k. at 700 nm.	71-3052
S1.90	N-acetylglycylglycine	11.2	6.4×10^7	—	p.r.	opt.	d.k. at 700 nm.	71-3052
S1.91	N-acetylglycylglycine amide	9.2	4.2×10^8	—	p.r.	opt.	d.k. at 700 nm.	71-3052

TABLE 3. Reactions of hydrated electrons with organic solutes — Continued

No.	Solute and Reaction	pH	$k(\text{dm}^3 \text{mol}^{-1} \text{s}^{-1})$	Ratio	Source	Method	Comment	Ref.
S1.92	<i>N</i> -acetylglycylglycylglycine	9.2	4.4×10^8	—	p.r.	opt.	d.k.	74-1058
S1.93	<i>N</i> -acetylphenylalanine	9.2	5.3×10^7	—	p.r.	opt.	d.k.	73-0076
S1.94	<i>N</i> -acetylphenylalanine amide	9.3	2.5×10^8	—	p.r.	opt.	d.k.	73-0076
S1.95	<i>N</i> -acetylphenylglycine	9.2	1.7×10^8	—	p.r.	opt.	d.k.	73-0076
S1.96	<i>N</i> -acetylsarcosine	12.5	9×10^6	—	p.r.	opt.	d.k.	74-1058
S1.97	<i>N</i> -acetylsarcosylsarcosylsarcosine	9.0	3.9×10^8	—	p.r.	opt.	d.k.	74-1058
S1.98	4-(2-acetylsulfamoyl)phthalanilic acid See thalamyd (S1.413). acriflavine	13 See also 1.298a.	$(3.3 \pm 0.3) \times 10^{10}$	—	p.r.	opt.	d.k.	67-6053, 67-0239
S1.99	acrylamide	11 6.3	$9.7 \times 10^9 (\pm 15\%)$ 2.0×10^{10}	— —	f.phot. p.r.	opt. opt.	d.k.; H_2 -satd. d.k.; k also detd. at 6.4 kbar ($6.4 \times 10^8 \text{ N/m}^2$).	71-7345 72-0102
		9.2	$(3.1 \pm 0.1) \times 10^{10}$ See also 1.299.	—	p.r.	opt.	d.k.	73-0072
S1.100	acrylate ion	9.2	$(5.3 \pm 0.5) \times 10^9$	—	p.r.	opt.	d.k.	73-0072
S1.101	acrylic acid	1.5– 3.5	$(2.2 \pm 0.2) \times 10^{10}$	—	p.r.	opt.	d.k.; also c.k.	73-0072
S1.102	acrylonitrile	11	$1 \times 10^{10} (\pm 15\%)$	—	f.phot.	opt.	d.k.; H_2 -satd.	71-7345
S1.103	ACTH, porcine	—	2.1×10^{10}	—	—	—	—	70-1056
S1.104	ACTH, synthetic	—	1.5×10^{10}	—	—	—	—	70-1056
S1.105	adenine	7 11 —	9.0×10^9 1.1×10^9 9×10^9	— — —	p.r. p.r.	opt. opt.	d.k.; $\mu = 0.1$; $\text{p}K_a = 9.8$. d.k. (e_{aq}^-) or p.b.k. (radical anion).	71-0375 73-3016
		See also 1.300.						
S1.106	adenine poly-nucleotides (poly A)	7	2.5×10^8	—	p.r.	opt.	d.k.; mol. wt. 2×10^5 ; k per base unit.	71-0375
S1.107	adenine + uracil polynucleotides (poly A + U)	7	1.3×10^8	—	p.r.	p.r.	d.k.; mol. wt. 5×10^5 ; k per base unit.	71-0375
S1.108	adenosine	6–11	9.2×10^9	—	p.r.	opt.	d.k.; $\mu = 0.1$; $\text{p}K_a = 12.5$.	71-0375
		See also 1.301.						
S1.109	adenosine 5'-phosphate ion	6–12	3.6×10^9	—	p.r.	opt.	d.k.; $\mu = 0.1$.	71-0375
		See also 1.302.						
S1.110	alanine	7.4	1.2×10^7	—	p.r.	opt.	d.k.	74-1058
		See also 1.303–4.						
S1.111	β -alanine	6.9	4.2×10^6	—	p.r.	opt.	d.k.	74-1058
		See also 1.305.						
S1.112	alanine anhydride	9.2	$(2.0 \pm 0.1) \times 10^9$	—	p.r.	opt.	d.k.	71-0554
S1.113	β -alanyl-glycylglycine	6.4 12.2	2.8×10^8 7.1×10^7	— —	p.r. p.r.	opt. opt.	d.k. d.k.	74-1058 74-1058
S1.113a	albumin (bovine serum)	6.0	$(4.07 \pm 0.15) \times 10^{10}$	—	p.r.	opt.	d.k.	73-3020
S1.114	alcohol dehydrogenase	7	$2.4 \times 10^9 (\pm 15\%)$	—	p.r.	opt.	d.k.	70-1226
S1.115	2-aminoacetamide (glycine amide)	6.5	2.1×10^9	—	p.r.	opt.	d.k.; 90% deamination.	71-3052
		$e_{aq}^- + \text{NH}_3^+ \text{CH}_2 \text{CONH}_2$	2.8×10^8	—	p.r.	opt.	d.k.	71-3052
		$\rightarrow \cdot \text{CH}_2 \text{CONH}_2 + \text{NH}_3$						
S1.116	<i>p</i> -aminobenzoate ion	11	$(1.8 \pm 0.3) \times 10^9$	—	f.phot.	opt.	d.k.	72-0423
		See also 1.310.						

TABLE 3. Reactions of hydrated electrons with organic solutes — Continued

No.	Solute and Reaction	pH	$k(\text{dm}^3 \text{mol}^{-1} \text{s}^{-1})$	Ratio	Source	Method	Comment	Ref.
S1.117	7-aminocephalo- sporanic acid	6.0	8.6×10^9	—	p.r.	opt.	d.k.	73-3020
S1.118	2-amino-2-deoxy- D-galactose	—	8.4×10^7	—	p.r.	opt.	d.k.	70-3081
S1.119	6-aminopenicill- anic acid	6.0	3.6×10^9	—	p.r.	opt.	d.k.	73-3020
S1.120	ampicillin	6.0	5.7×10^9	—	p.r.	opt.	d.k.	73-3020
S1.121	amylamine	13	$(1.0 \pm 0.1) \times 10^6$	—	p.r.	opt.	d.k.	73-0016
			See also 1.313b.					
S1.122	amylammonium ion	8.5	$(2.7 \pm 0.1) \times 10^6$	—	p.r.	opt.	d.k.	73-0016
S1.123	aniline $e_{\text{aq}}^- + \text{C}_6\text{H}_5\text{NH}_2 \rightarrow$ $\text{C}_6\text{H}_5\text{NH}_2 + \text{OH}^-$	10	$(2.6 \pm 0.3) \times 10^7$	—	p.r.	opt.	d.k.	72-0289
			See also 1.314.					
S1.124	9,10-anthraqui- none-1-sulfonate ion	—	2.3×10^{10}	—	p.r.	opt.	d.k.	72-0391
S1.125	9,10-anthraqui- none-2-sulfonate ion	~9.2 —	$2.2 \times 10^{10} (\pm 10\%)$ 2.8×10^{10}	— —	p.r. p.r.	opt. opt.	d.k. d.k.	72-0171 72-0391
S1.126	anthrone	~9.2	$3.3 \times 10^{10} (\pm 10\%)$	—	p.r.	opt.	d.k.	72-0171
S1.127	ascorbate ion	7	4×10^8	—	p.r.	opt.	d.k.	72-0266
S1.128	aspartic acid	3.0 7.0		$k/k_{\text{BrPhOH}} = 0.147$ $k/k_{\text{BrPhOH}} = 2.5 \times 10^{-3}$	γ-r.	chem.	c.k.; assumed $k_{\text{BrPhOH}} = 6.0 \times 10^9$ to calculate k for various ionic forms; $\text{p}K_{\text{a}} =$ 2.10, 3.86.	72-0027
	positive ion		5×10^9 (calcd.)					
	zwitterion		5×10^8 (calcd.)					
	negative ion		1.5×10^7 (calcd.)					
			See also 1.321-2.					
S1.129	azurin	7.0	$(1.0 \pm 0.3) \times 10^{11}$	—	p.r.	opt.	d.k. at 550 nm. (e_{aq}^-) as well as at 625 nm. (Cu-II ion); mol. wt. 16,000; <i>pseudomonas</i> azurin.	71-3064, 72-1003
S1.130	barbituric acid	2.6 4.0 5.0 7.6		$k/k_{\text{BrPhOH}} = 1.55$ $k/k_{\text{BrPhOH}} = 0.733$ $k/k_{\text{BrPhOH}} = 0.167$ $k/k_{\text{BrPhOH}} = 0.0157$	γ-r.	chem.	c.k.; assume $k_{\text{BrPhOH}} = 6.0 \times 10^9$ to calculate k for ionic forms; $\text{p}K_{\text{a}} = 4.01$.	72-0027
	e_{aq}^- + acid		9.5×10^9 (calcd.)					
	e_{aq}^- + anion		9.0×10^7 (calcd.)					
S1.131	benzamide	5.7	1.9×10^{10}	—	p.r.	opt.	d.k.; k also detd. at 6.4 kbar ($6.4 \times 10^8 \text{ N/m}^2$).	72-0102
		~9.2	$1.9 \times 10^{10} (\pm 10\%)$	—	p.r.	opt.	d.k.	72-0171
			See also 1.323.					
S1.132	benzene	— — —	$1.46 \times 10^7 (\pm 15\%)$ 1.3×10^7 1.1×10^8 (in hexadecyltrimethylammonium bromide) 4×10^6 (in dodecyl sodium sulfate) 6×10^6 (in Igepal CO-730)	— — —	p.r. p.r.	opt. opt.	d.k. d.k.; also reported k in solutions of surfactants.	71-0475 71-0586
			See also 1.324.					
S1.133	benzenesul- fonamide	—	9.8×10^9	—	p.r.	opt.	d.k.	73-0094
			See also 1.325.					
S1.134	benzil	~9.2	$3.6 \times 10^{10} (\pm 10\%)$	—	p.r.	opt.	d.k.	72-0171
S1.135	benzoic acid $e_{\text{aq}}^- + \text{C}_6\text{H}_5\text{COOH} \rightarrow$ $\text{OH}^- + \text{C}_6\text{H}_5\text{CO} (1)$ $e_{\text{aq}}^- + \text{C}_6\text{H}_5\text{COOH} \rightarrow$ $\text{H} + \text{C}_6\text{H}_5\text{COO}^- (2)$	3-4 —	7.08×10^9 (rel.) 3.0×10^9	$k_1/k_{\text{H}^+} = 0.451$ $k_2/k_1 \leq 0.1$	γ-r.	chem.	c.k.; $\mu = 0.05$; assume $k_{\text{H}^+} =$ 1.57×10^{10} at that μ ; cor. for e_{aq}^- + anion.	72-0057
			See also 1.327a.		p.r.	opt.	d.k.	73-0094

TABLE 3. Reactions of hydrated electrons with organic solutes — Continued

No.	Solute and Reaction	pH	$k(\text{dm}^3 \text{mol}^{-1} \text{s}^{-1})$	Ratio	Source	Method	Comment	Ref.
S1.136	benzoin	~9.2	$1.7 \times 10^{10} (\pm 10\%)$	—	p.r.	opt.	d.k.	72-0171
S1.137	benzophenone	~9.2	$2.8 \times 10^{10} (\pm 10\%)$	—	p.r.	opt.	d.k.	72-0171
	See also 1.329.							
S1.138	benzoquinone	11	$(4.2 \pm 0.7) \times 10^9$	—	f.phot.	opt.	d.k.	71-0437
		~7	4.2×10^{10}	—	p.r.	opt.	d.k.	71-0619
	See also 1.330.							
S1.139	3-benzoyl-N-methylpyridinium ion	9.0	$(5.5 \pm 0.7) \times 10^{10}$	—	p.r.	opt.	d.k.	72-0359
S1.140	2-benzoylpyridine	9.0	$(2.5 \pm 0.3) \times 10^{10}$	—	p.r.	opt.	d.k.	72-0359
S1.141	3-benzoylpyridine	9.0	$(3.0 \pm 0.3) \times 10^{10}$	—	p.r.	opt.	d.k.	72-0359
S1.142	4-benzoylpyridine	9.0	$(2.8 \pm 0.3) \times 10^{10}$	—	p.r.	opt.	d.k.	72-0359
S1.143	benzyl acetate $e_{aq}^- + \text{C}_6\text{H}_5\text{CH}_2\text{OOCCH}_3 \rightarrow \text{C}_6\text{H}_5\text{CH}_2 + \text{CH}_3\text{COO}^-$	—	1.1×10^9	—	p.r.	opt.	p.b.k. (benzyl radical).	73-0089
S1.144	benzyl alcohol	6.5	2×10^8	—	p.r.	opt.	d.k.; k increases with pressure \rightarrow 6.4 kbar.	72-0298
	See also 1.331.							
S1.145	benzyl bromide $e_{aq}^- + \text{C}_6\text{H}_5\text{CH}_2\text{Br} \rightarrow \text{C}_6\text{H}_5\text{CH}_2 + \text{Br}^-$	—	1.5×10^9	—	p.r.	opt.	p.b.k. (benzyl radical).	73-0089
S1.146	benzyl chloride $e_{aq}^- + \text{C}_6\text{H}_5\text{CH}_2\text{Cl} \rightarrow \text{C}_6\text{H}_5\text{CH}_2 + \text{Cl}^-$	—	1.6×10^9	—	p.r.	opt.	p.b.k. (benzyl radical).	73-0089
		6-7	5×10^9	—	p.r.	opt.	d.k.	73-1041
	See also 1.332.							
S1.147	benzyl formate $e_{aq}^- + \text{C}_6\text{H}_5\text{CH}_2\text{OOCH} \rightarrow \text{C}_6\text{H}_5\text{CH}_2 + \text{HCOO}^-$	—	1.5×10^9	—	p.r.	opt.	p.b.k. (benzyl radical).	73-0089
S1.148	β -benzylglucoside	~7	$(7 \pm 1.5) \times 10^7$	—	p.r.	opt.	d.k.	71-0480
S1.149	benzyl mercaptan $e_{aq}^- + \text{C}_6\text{H}_5\text{CH}_2\text{SH} \rightarrow \text{C}_6\text{H}_5\text{CH}_2 + \text{HS}^-$	7.0	$8.7 \times 10^9 (\pm 10\%)$	—	p.r.	opt.	d.k.	73-0090
S1.150	benzylpenicillin	6.0	$(2.76 \pm 0.08) \times 10^9$	—	p.r.	opt.	d.k.	73-0134, 73-3020
S1.151	benzylpenicillin, methyl ester	6.0	7.0×10^9	—	p.r.	opt.	d.k.	73-3020
S1.152	benzylpenicilloic acid	—	1.4×10^9	—	p.r.	opt.	d.k.	73-0134
S1.153	benzyl thiocyanate $e_{aq}^- + \text{C}_6\text{H}_5\text{CH}_2\text{SCN} \rightarrow \text{C}_6\text{H}_5\text{CH}_2 + \text{SCN}^-$	—	2.0×10^9	—	p.r.	opt.	p.b.k. (benzyl radical).	73-0089
S1.154	biuret $e_{aq}^- + \text{NH}_2\text{CONHCONH}_2 \rightarrow \text{NH}_2\dot{\text{C}}(\text{O}^-)\text{NHCONH}_2$	10.3	2.5×10^8	—	p.r.	opt.	d.k.	73-0091
S1.155	5-bromoorotate ion	11	3×10^9	—	p.r.	opt.	d.k.	73-0002
S1.156	5-bromoorotic acid	7	1×10^{10}	—	p.r.	opt.	d.k.	73-0002
S1.157	<i>p</i> -bromophenol	5-6	7×10^9	—	p.r.	opt.	d.k.	72-0027
		4	5.5×10^9 (rel.)	$k/k_{\text{H}^+} = 0.24$	γ -r.	chem.	c.k.; assume $k_{\text{H}^+} = 2.3 \times 10^{10}$; also see S1.158.	72-0027
The value 6.0×10^9 has been used to calculate specific rates of the following reactions from relative rates: S1.128, S1.130, S1.256, S1.257, S1.296, S1.297, S1.401, S1.402. See also 1.343, in which 1.2×10^{10} was the standard value used.								
S1.158	<i>p</i> -bromophenoxide ion	7	6×10^9 (rel.)	$k/k_{\text{acetone}} = 1$	γ -r.	chem.	c.k.; assume $k_{\text{acetone}} = 6 \times 10^9$.	72-0027
		7	6.2×10^9 (rel.)	$k/k_{\text{orotate ion}} = 0.41$	γ -r.	chem.	c.k.; assume $k_{\text{orotate ion}} = 1.5 \times 10^{10}$.	72-0027
		11	3.4×10^9	—	p.r.	opt.	d.k.	72-0027
	See also 1.344.							

TABLE 3. Reactions of hydrated electrons with organic solutes — Continued

No.	Solute and Reaction	pH	$k(\text{dm}^3 \text{mol}^{-1} \text{s}^{-1})$	Ratio	Source	Method	Comment	Ref.
S1.159	5-bromouracil	7	1.6×10^{10}	—	p.r.	opt.	d.k.; $\mu = 0.05$.	72-0049
		9	8.2×10^9	—	p.r.	opt.	d.k.; $\mu = 0.05$.	72-0049
		11	7.0×10^9	—	p.r.	opt.	d.k.; $\mu = 0.05$.	72-0049
		See also 1.348.						
S1.160	<i>N</i> - <i>tert</i> -butyl-acetamide	9.2	1.2×10^7	—	p.r.	opt.	d.k.	71-0414
S1.161	butylamine	13	$(1.1 \pm 0.1) \times 10^6$	—	p.r.	opt.	d.k.	73-0016
S1.162	butylammonium ion	8.5	$(2.6 \pm 0.1) \times 10^6$	—	p.r.	opt.	d.k.	73-0016
S1.163	carbenicillin	6.0	1.1×10^9	—	p.r.	opt.	d.k.	73-3020
S1.164	carbon disulfide	—	3.1×10^{10}	—	p.r.	—	—	73-1015
	$e_{\text{aq}}^- + \text{CS}_2 \rightarrow \text{SCS}^-$	See also 1.354.						
S1.165	carboxymethyl-cellulose ion	—	1.8×10^7	—	p.r.	opt.	d.k.	68-0352
S1.166	catalase	6.0	$(2.0 \pm 0.2) \times 10^{11}$	—	p.r.	opt.	d.k. (e_{aq}^-); first-order d.k. (protein) or p.b.k., $k = 18 \pm 1 \text{ s}^{-1}$.	72-1003
		See also 1.356.						
S1.167	cephaloridine	6.0	2.8×10^{10}	—	p.r.	opt.	d.k.	73-3020
S1.168	cephalosporin C	6.0	8.9×10^9	—	p.r.	opt.	d.k.	73-3020
S1.169	cephalothin	6.0	1.1×10^{10}	—	p.r.	opt.	d.k.	73-3020
S1.170	ceruloplasmin	6.0	$(9 \pm 1) \times 10^{10}$	—	p.r.	opt.	d.k. (e_{aq}^-); first-order $k = (8.8 \pm 0.6) \times 10^2 \text{ s}^{-1}$ for d.k. (protein).	72-1003
S1.171	chloral hydrate	—	$(1.2 \pm 0.2) \times 10^{10}$	—	p.r.	opt.	d.k.	73-0062
S1.172	<i>N</i> -(2-chloro-acetyl)-phenylalanine	9.2	2.3×10^9	—	p.r.	opt.	d.k.	73-0076
S1.173	2-chloroethanol	6.2	6.4×10^8	—	p.r.	opt.	d.k.; k increases with pressure \rightarrow 6.4 kbar ($6.4 \times 10^8 \text{ N/m}^2$).	72-0298
		See also 1.366.						
S1.174	chloromethane	—	5×10^8	—	p.r.	opt.	d.k.	71-0587
		See also 1.367a.						
S1.175	2-chloro-2-phenyl-acetate ion	9.2	2.7×10^9	—	p.r.	opt.	d.k.	73-0076
S1.176	1-chloro-2-phenyl-ethane	9.2	6.0×10^8	—	p.r.	opt.	d.k.	73-0076
S1.177	<i>p</i> -chlorophenyl- β -D-glucopyranoside	—	2.57×10^9	—	p.r.	opt.	d.k.	71-0056
S1.178	5-chlorouracil	7	1.5×10^{10}	—	p.r.	opt.	d.k.; $\mu = 0.05$	72-0049
		9	6.3×10^9	—	p.r.	opt.	d.k.	72-0049
		11	5.5×10^9	—	p.r.	opt.	d.k.	72-0049
S1.179	chondroitin 4-sulfate I	—	2.6×10^7	—	p.r.	opt.	d.k.; rate per hexose unit.	70-3081
S1.180	chondroitin 4-sulfate II	—	1.3×10^7	—	p.r.	opt.	d.k.; rate per hexose unit.	70-3081
S1.181	chondroitin 6-sulfate I	—	4.2×10^7	—	p.r.	opt.	d.k.; rate per hexose unit.	70-3081
S1.182	chondroitin 6-sulfate II	—	1.1×10^7	—	p.r.	opt.	d.k.; rate per hexose unit.	70-3081
S1.183	cinnamamide	9.2	$(3.0 \pm 0.1) \times 10^{10}$	—	p.r.	opt.	d.k.	73-0072
S1.184	cloxacillin	6.0	7.5×10^9	—	p.r.	opt.	d.k.	73-3020
S1.185	copper oxidase (fungal laccase)	6	8.5×10^{10}	—	p.r.	opt.	d.k. at 550 nm (e_{aq}^-); contains 4 Cu(II) ions; d.k. of Cu(II) at 610 nm gave $k = 1.5 \times 10^8$.	71-3073 72-1003

TABLE 3. Reactions of hydrated electrons with organic solutes — Continued

No.	Solute and Reaction	pH	$k(\text{dm}^3 \text{mol}^{-1} \text{s}^{-1})$	Ratio	Source	Method	Comment	Ref.
S1.186	<i>p</i> -cresol	7.9	$(4.2 \pm 0.5) \times 10^7$	—	p.r.	opt.	d.k.	73-0003
S1.187	cresol red	11	$(8.5 \pm 0.7) \times 10^9$	—	f.phot.	opt.	d.k.	71-0437
S1.188	<i>trans</i> -crotonate ion	9.2	$(1.3 \pm 0.1) \times 10^9$	—	p.r.	opt.	d.k.	73-0072
S1.189	<i>trans</i> -crotonic acid	1.5–3.5	$(2.9 \pm 0.4) \times 10^{10}$	—	p.r.	opt.	d.k.; also c.k.	73-0072
S1.190	cyanocobalamin (Vitamin B ₁₂)	6.1 11.1	$(5.2 \pm 0.1) \times 10^{10}$ $(3.5 \pm 0.2) \times 10^{10}$	—	p.r.	opt.	d.k. at 600 nm; also d.k. at other wavelengths 310–520 nm.	73-0116
S1.191	cycloheptatriene	—	$(6 \pm 2) \times 10^9$	—	p.r.	opt.	d.k.	71-0710
S1.192	cystamine, di-positive ion	6.7	$(4.2 \pm 0.4) \times 10^{10}$	—	p.r.	opt.	d.k.	72-0388
	free amine	11.1	$(1.8 \pm 0.2) \times 10^{10}$	—	p.r.	opt.	d.k.	72-0388
		See also 1.388.						
S1.193	cysteamine, positive ion	5.5	$3.0 \times 10^{10} (\pm 10\%)$	—	p.r.	opt.	d.k.; $pK_a = 8.6, 10.7$.	73-0090
		2.4–2.65	2.4×10^{10} (cor.) (rel.)	—	γ -r.	chem.	c.k. with H ⁺ ; assume $k_{H^+} = 2.3 \times 10^{10}$.	73-0286
	negative ion	12.5	$1.5 \times 10^9 (\pm 10\%)$	—	p.r.	opt.	d.k.	73-0090
		See also 1.389.						
S1.194	cysteine, positive ion	1	6.1×10^{10} (cor.) (rel.)	—	γ -r.	chem.	c.k. with H ⁺ ; assume $k_{H^+} = 2.3 \times 10^{10}$.	73-0286
	zwitterion	5.8	$1.3 \times 10^{10} (\pm 10\%)$	—	p.r.	opt.	d.k.; $pK_a = 1.8, 8.3, 10.8$.	73-0090
		3	1.0×10^{10} (rel.)	—	p.r.	opt.	c.k. with H ⁺ ; assume $k_{H^+} = 2.3 \times 10^{10}$.	73-0286
	negative ion	11.0	$(3.5 - 3.7) \times 10^8$	—	f.phot.	opt.	d.k.	71-7525
		12.5	$2.0 \times 10^8 (\pm 10\%)$	—	p.r.	opt.	d.k.	73-0090
		See also 1.390 – 1.392.						
S1.195	cysteine, methyl ester	5.1	$1.8 \times 10^{10} (\pm 10\%)$	—	p.r.	opt.	d.k.; $pK_a = 6.5, 9.0$.	73-0090
		10.1	$6.9 \times 10^9 (\pm 10\%)$	—				
	cysteine, <i>S</i> -methyl ether	See <i>S</i> -methylcysteine (S1.319)						
S1.196	cystine, zwitterion	5.6	1.6×10^{10}	—	p.r.	opt.	d.k.	72-0187
		6.2	$(1.5 \pm 0.2) \times 10^{10}$	—	p.r.	opt.	d.k.	72-0388
		See also 1.393.						
S1.197	cystine, dianion	11.0	$(2.46 \pm 0.3) \times 10^9$	—	f.phot.	opt.	d.k.	71-7525
		12.1	$(5.0 \pm 0.5) \times 10^9$	—	p.r.	opt.	d.k.	72-0388
		See also 1.394.						
S1.198	cystine, dimethyl ester	6.3	$(5.1 \pm 0.5) \times 10^{10}$	—	p.r.	opt.	d.k.; $pK_a = 6.9$.	72-0388
		9.2	$(2.1 \pm 0.2) \times 10^{10}$	—	p.r.	opt.	d.k.	72-0388
S1.199	cytidine	7	1.32×10^{10}	—	p.r.	opt.	d.k.; $\mu = 0.1$; $pK_a = 12.3$.	71-0375
		14	9.5×10^9	—				
		See also 1.395.						
S1.200	cytidine 5'-phosphate ion	7–14	6.8×10^9	—	p.r.	opt.	d.k.; $\mu = 0.1$.	71-0375
S1.201	cytidine 2',3'-cyclic phosphate ion	7	1.0×10^{10}	—	p.r.	opt.	d.k.; $\mu = 0.1$; $pK_a = 12.3$.	71-0375
		14	7.5×10^9	—				
S1.202	cytochrome-C, ferro-	7	$(1-2) \times 10^{10}$	—	p.r.	opt.	deduced that rate is similar to rate with ferri-cytochrome C; see below.	71-0327

TABLE 3. Reactions of hydrated electrons with organic solutes — Continued

No.	Solute and Reaction	pH	$k(\text{dm}^3\text{mol}^{-1}\text{s}^{-1})$	Ratio	Source	Method	Comment	Ref.
Sl.203	cytochrome-C, ferri- $e_{aq}^- + \text{Fe}^{3+}\text{cyt C} \rightarrow \text{Fe}^{2+}\text{cyt C}$	—	5.0×10^{10} (rel.)	$k/k_{\text{nitrate}} = 4.5$	γ -r.	opt.	c.k.; assume $k_{\text{nitrate}} = 1.1 \times 10^{10}$.	67-3020
		6	$\sim 2 \times 10^{10}$	—	p.r.	opt.	d.k.; soln. contains 0.1 M formate ion.	71-0327
		13	$\sim 1 \times 10^{10}$	—				
		6-11	$\sim (2-200) \times 10^9$ (cor.)	—	p.r.	opt.	d.k.; decreases with pH.	71-3049
		8.5	$< 1.1 \times 10^{11}$ (calcd.)	—	p.r.	opt.	d.k. as well as p.b.k.; $k_{\text{obs.}} = 3.3 \times 10^{10}$ and 2.6×10^{10} .	72-1002, 71-0930
		6.0	$(1.2 - 1.7) (\pm 0.3) \times 10^{11}$	—	p.r.	opt.	d.k.; similar values for d.k. (protein) and p.b.k.; k given for cyt C from several sources and several cyt C derivatives.	72-3010, 72-1003
		11	$(1.0 \pm 0.4) \times 10^{10}$	—	p.r.	opt.	d.k.	72-3010, 72-1003
		6.8	$(5.5 \pm 1.5) \times 10^{10}$	—	p.r.	opt.	d.k.; k is for e^- attachment; $k = 10^5\text{s}^{-1}$ detd. for Fe(II) cyt C formn.	73-0022
Sl.204	cytosine	See also 1.395a.						
		7	1.3×10^{10}	—	p.r.	opt.	d.k.; $\mu = 0.1$; $pK_a = 12.2$.	71-0375
		14	3.6×10^9					
		See also 1.396.						
Sl.205	deoxyribose	7	$(1 \pm 0.5) \times 10^7$	—	p.r.	opt.	d.k.; H_2 -satd.	71-0256
Sl.206	2-deoxy-2-sulfonamido-D-glucose	—	1.7×10^7	—	p.r.	opt.	d.k.	70-3081
Sl.207	dextran sulfate	—	$\leq 7 \times 10^6$	—	p.r.	opt.	d.k.; k calcd. per hexose unit.	70-3081
Sl.208	diacetamide	6.5	1.1×10^{10}	—	p.r.	opt.	d.k.	73-0091
	dibenzyl ketone See 1,3-diphenylacetone (Sl.228)							
Sl.209	1,4-dicyanobenzene	—	$(2.4 \pm 0.1) \times 10^{10}$	—	p.r.	opt.	d.k.	73-0121
Sl.210	<i>N,N</i> -diethylacetamide	9.2	8.0×10^6	—	p.r.	opt.	d.k.	71-0414
Sl.211	<i>N,N</i> -diethylhydroxylammonium ion	4.7	$\geq 1.2 \times 10^{10}$	—	p.r.	opt.	d.k.; could be 30% higher.	71-0493
Sl.212	<i>N,N</i> -diethylhydroxylamine	9.1	2.4×10^8	—	p.r.	opt.	d.k.; could be 30% higher.	71-0493
Sl.213	<i>o</i> -difluorobenzene	~ 6.5	1.2×10^9	—	p.r.	opt.	d.k.	73-0054
	$e_{aq}^- + \text{C}_6\text{H}_4\text{F}_2 \rightarrow \text{C}_6\text{H}_4\text{F} + \text{F}^-$ and $\cdot\text{C}_6\text{H}_5\text{F}_2$							
Sl.214	<i>p</i> -difluorobenzene	~ 6.5	2.0×10^9	—	p.r.	opt.	d.k.	73-0054
	$e_{aq}^- + \text{C}_6\text{H}_4\text{F}_2 \rightarrow \cdot\text{C}_6\text{H}_4\text{F} + \text{F}^-$ and $\cdot\text{C}_6\text{H}_5\text{F}_2$							
Sl.215	<i>N,N</i> -dimethylacetamide	9.2	2.1×10^7	—	p.r.	opt.	d.k.	71-0414
Sl.216	5,6-dimethylbenzimidazole	6.5	5.1×10^{10}	—	p.r.	opt.	d.k.	73-0116

TABLE 3. Reactions of hydrated electrons with organic solutes — Continued

No.	Solute and Reaction	pH	$k(\text{dm}^3 \text{mol}^{-1} \text{s}^{-1})$	Ratio	Source	Method	Comment	Ref.
Sl.217	4,4-dimethyl-1,1-bipyridylum ion	—	8.4×10^{10}	—	p.r.	opt.	d.k.	73-1074
Sl.218	<i>N,N</i> -dimethyl-formamide	9.2	4.6×10^8	—	p.r.	opt.	d.k.; impurities might account for high k .	71-0414
		<i>See also</i> 1.403.						
Sl.219	dimethyl fumarate	9.2	3.3×10^{10}	—	p.r.	opt.	d.k.	73-0097
Sl.220	1,1-dimethyl-hydrazinium ion	5.6	$5.8 \times 10^9 (\pm 15\%)$	—	p.r.	opt.	d.k.	72-0003
Sl.221	1,2-dimethyl-hydrazinium ion	5.6	$2.3 \times 10^9 (\pm 15\%)$	—	p.r.	opt.	d.k.	72-0003
Sl.222	1,1-dimethyl-hydrazine	12.0	$2.4 \times 10^7 (\pm 15\%)$	—	p.r.	opt.	d.k.	72-0003
Sl.223	1,2-dimethyl-hydrazine	12.4	$6.1 \times 10^6 (\pm 15\%)$	—	p.r.	opt.	d.k.	72-0003
Sl.224	dimethyl maleate	9.2	3.2×10^{10}	—	p.r.	opt.	d.k.	73-0097
Sl.225	2,4-dimethyl-phenyl- β -D-glucopyranoside	—	5.0×10^7	—	p.r.	opt.	d.k.	71-0056
Sl.226	<i>N,N</i> -dimethylpivalamide	9.2	1.2×10^7	—	p.r.	opt.	d.k.	71-0414
Sl.227	dimethylsulfoxide	—	1.6×10^6	—	p.r.	opt.	d.k.; cor. for $e_{aq}^- + \text{H}_2\text{O}$.	71-0587
		<i>See also</i> 1.405.						
Sl.228	1,3-diphenyl-acetone (dibenzyl ketone)	~ 9.2	$1.1 \times 10^{10} (\pm 10\%)$	—	p.r.	opt.	d.k.	72-0171
Sl.229	2,2'-dithiobis-acetate ion	10.8	$(4.3 \pm 0.2) \times 10^9$	—	p.r.	opt.	d.k.	72-0388
Sl.230	2,2'-dithiobis-propionate ion	6.4	$(4.4 \pm 0.3) \times 10^9$	—	p.r.	opt.	d.k.	72-0388
		10.8	$(4.3 \pm 0.3) \times 10^9$	—	p.r.	opt.	d.k.	72-0388
Sl.231	DNA	7	1.4×10^8	—	p.r.	opt.	d.k.; k per base unit.	71-0375
		—	4.0×10^9	—	p.r.	opt.	d.k. (e_{aq}^-) or p.b.k. (radical anion); k per base unit.	73-3016
		<i>See also</i> 1.409a.						
Sl.232	dodecyl sodium sulfate	—	$\leq 2 \times 10^5$	—	p.r.	opt.	d.k.	71-0586
		7	$< 10^7$	—	p.r.	opt.	d.k.	73-3013
		<i>See also</i> 1.409b.						
Sl.233	erythrosin (tetraiodofluorescein)	8.0	$\geq 8 \times 10^9$ (rel.)	—	X-r.	opt.	c.k. with O_2 ; contains Br^- as OH scavenger; obs. $G(-\text{dye})$; assume $k(e_{aq}^- + \text{O}_2) = 1.9 \times 10^{10}$.	71-0295, 71-0354
Sl.234	ethanesulfonate ion	—	3.5×10^7	—	p.r.	opt.	d.k.	68-0352
Sl.235	ethyl acrylate	11	$8.7 \times 10^9 (\pm 15\%)$	—	f.phot.	opt.	d.k.; H_2 -satd.	71-7345
Sl.236	ethylamine	13	$(1.0 \pm 0.1) \times 10^6$	—	p.r.	opt.	d.k.	73-0016
Sl.237	ethylammonium ion	8.5	$(2.5 \pm 0.1) \times 10^6$	—	p.r.	opt.	d.k.	73-0016
		<i>See also</i> 1.417.						
Sl.238	<i>N</i> -ethylmaleamate ion	7.9	8.5×10^9	—	p.r.	opt.	d.k.	72-0144
Sl.239	<i>N</i> -ethylmaleimide	6.0	3.8×10^{10}	—	p.r.	opt.	d.k.	72-0144
		<i>See also</i> 1.421a.						
Sl.240	fluocinolone acetonide	—	3.0×10^{10}	—	p.r.	—	—	70-1056
Sl.241	fluorenone	~ 9.2	$3.3 \times 10^{10} (\pm 10\%)$	—	p.r.	opt.	d.k.	72-0171

TABLE 3. Reactions of hydrated electrons with organic solutes — Continued

No.	Solute and Reaction	pH	$k(\text{dm}^3 \text{mol}^{-1} \text{s}^{-1})$	Ratio	Source	Method	Comment	Ref.
S1.242	fluorescein	13	$(2.0 \pm 0.2) \times 10^{10}$ <i>See also</i> 1.422.	—	p.r.	opt.	d.k.	67-6053
S1.243	fluorobenzene $e_{aq}^- + \text{C}_6\text{H}_5\text{F} \rightarrow$ $(\text{C}_6\text{H}_5\text{F})^- \rightarrow$ $\cdot\text{C}_6\text{H}_5\text{F}$ or $\text{C}_6\text{H}_5\text{F}^- \rightarrow$ $\cdot\text{C}_6\text{H}_5 + \text{F}^-$	~ 6.5	7×10^7 <i>See also</i> 1.425.	—	p.r.	opt.	d.k.	73-0054
S1.244	5-fluorouracil	7 9 11	1.2×10^{10} 5.7×10^9 5.0×10^9	—	p.r.	opt.	d.k.; $\mu = 0.05$.	72-0049
S1.245	formamide	9.2 — 6.3	6.3×10^7 $(1.8 \pm 0.2) \times 10^7$ 1.8×10^7	— — —	p.r. laser p.r.	opt. opt. opt.	d.k. d.k.; concn. 2.5 – 12.6 mol/dm ³ . d.k.; k increases with pressure \rightarrow 6.4 kbar (6.4×10^8 N/m ²).	71-0414 71-0442 72-0298
S1.246	formic acid $e_{aq}^- + \text{HCOOH} \rightarrow$ $\text{OH}^- + \text{HCO} (1)$ $e_{aq}^- + \text{HCOOH} \rightarrow$ $\text{H} + \text{HCOO}^- (2)$	3-4	1.88×10^8 (rel.)(1) 1.52×10^8 (rel.)(2) <i>See also</i> 1.435.	$k/k_{\text{H}^+} = 1.20 \times 10^{-2}$ $k_2/k_1 = 0.80$	γ -r.	chem.	c.k.; $\mu = 0.05$; assume $k_{\text{H}^+} = 1.57 \times 10^{10}$ at that μ .	72-0057
S1.247	N-formylglycine	10.5	2.9×10^7	—	p.r.	opt.	d.k.	71-3052
S1.249	furadantin	7	3.35×10^{10}	—	p.r.	opt.	—	73-1018
S1.250	furamazine	7	3.25×10^{10}	—	p.r.	opt.	—	73-1018
S1.251	gelatin	6.18	—	—	p.r.	opt.	d.k.; k increases by 100% at 16 \rightarrow 40°C.	67-0776
S1.252	D-glucuronate ion	—	<i>See also</i> 1.437a. 2×10^6 <i>See also</i> 1.439a.	—	p.r.	opt.	d.k.	70-3081
S1.253	glutamylglutamyl- glutamic acid	6.3 9.6	2.3×10^9 5.8×10^8	— —	p.r. p.r.	opt. opt.	d.k. d.k.	74-1058 74-1058
S1.254	glutathione, reduced (GuSH)	11.0 7.2 12.7	1.5×10^8 4.5×10^9 ($\pm 10\%$) 4.7×10^8 ($\pm 10\%$) <i>See also</i> 1.441.	— — —	f.phot. p.r.	opt. opt.	d.k. d.k.; $pK_a = 2.1$, 3.6, 8.8, 9.7.	71-7525 73-0090
S1.255	glutathione, oxidized $e_{aq}^- + (\text{GuS})_2 \rightarrow$ $(\text{GuS})_2^-$	11.0 4.5- 7.9 6.8 12.6	$(1.15 \pm 0.1) \times 10^9$ $(2.7 \pm 0.3) \times 10^9$ $(3.4 \pm 0.3) \times 10^9$ $(2.1 \pm 0.2) \times 10^9$ <i>See also</i> 1.442.	— — —	f.phot. p.r. p.r.	opt. opt. opt.	d.k. d.k. d.k.; $pK = 3.15$, 4.03, 8.57, 9.54.	71-7525 72-0380 72-0388
S1.256	glycine, positive ion $e_{aq}^- + \text{NH}_3\text{CH}_2\text{COOH}$ $\rightarrow \text{NH}_3 + \text{CH}_2\text{COOH}$ + other products	3.0 4.0 1.0 2.3	5.4×10^8 (rel.) 4.6×10^7 (rel.) 6.0×10^9 4.1×10^9 (rel.) <i>See also</i> 1.443.	$k/k_{\text{BzPhOH}} = 9 \times 10^{-2}$ $k/k_{\text{BzPhOH}} = 7.6 \times 10^{-3}$ — $k/k_{\text{H}^+} = 0.18$	γ -r. p.r. p.r.	chem. opt. opt.	c.k.; assume $k_{\text{BzPhOH}} = 6 \times 10^9$; $pK_a = 2.35$; calcd. $k = 4 \times 10^9$ for positive ion. d.k. c.k.; assume $k_{\text{H}^+} = 2.3 \times 10^{10}$; obs. CH_2COOH at 320 nm.	72-0027 72-0187 72-1012

TABLE 3. Reactions of hydrated electrons with organic solutes — Continued

No.	Solute and Reaction	pH	$k(\text{dm}^3\text{mol}^{-1}\text{s}^{-1})$	Ratio	Source	Method	Comment	Ref.
S1.257	glycine, zwitterion	6.2	8.3×10^6	$k/k_{\text{BrPhOH}} = 1.5$ $\times 10^{-3}$	p.r. γ -r.	opt. chem.	d.k.	71-0782
		7.0	9×10^6 (rel.)				d.k.; assume $k_{\text{BrPhOH}} = 6 \times 10^9$; obs. $G(\text{Br}^-)$.	72-0027
S1.258	glycine, negative ion	11.8	1.7×10^6	—	p.r.	opt.	d.k.	71-0782
		<i>See also</i> 1.444. <i>See also</i> 1.445.						
S1.259	glycine amide <i>See</i> 2-aminoacetamide (S1.115). glycine anhydride	9.2	$(1.7 \pm 0.1) \times 10^9$	—	p.r.	opt.	d.k.	71-0554
		glycine methyl ester <i>See</i> methyl 2-aminoacetate (1.523, S1.318). glycolamide <i>See</i> hydroxyacetamide (S1.284).						
S1.260	glycolic acid $e_{\text{aq}}^- + \text{CH}_2\text{OHCOOH} \rightarrow$ $\text{OH}^- + \text{CH}_2\text{OHCO} \cdot$ (1) $e_{\text{aq}}^- + \text{CH}_2\text{OHCOOH} \rightarrow$ $\text{H} + \text{CH}_2\text{OHCOO}^-$ (2)	3-4	4.27×10^8 (rel.)	$k_1/k_{\text{H}^+} = 2.72 \times 10^{-2}$ $k_2/k_1 < 0.1$	γ -r.	chem.	c.k.; $\mu = 0.05$; assume $k_{\text{H}^+} = 1.57$ $\times 10^{10}$ at that μ .	72-0057
S1.261	glycylglycine, zwitterion	6.4	3.7×10^8	—	p.r.	opt.	d.k.	71-3052
S1.262	glycylglycine, negative ion	13.1	4.9×10^7	—	p.r.	opt.	d.k.	71-3052
		<i>See also</i> 1.452.						
S1.263	glycylglycine amide	5.7	4.2×10^9	—	p.r.	opt.	d.k.	71-3052
		11.4	1.7×10^9				d.k.	71-3052
S1.264	glycylglycine, ethyl ester	5.9	4.0×10^9	—	p.r.	opt.	d.k.	71-3052
		11.4	1.7×10^9				d.k.	71-3052
S1.265	glycylglycyl- β -alanine	5.0	1.4×10^9	—	p.r.	opt.	d.k.	74-1058
		12.2	2.3×10^8				d.k.	74-1058
S1.266	glycylglycyl- glycine, zwitterion	6.1	1.8×10^9	—	p.r.	opt.	d.k.	71-3052
		<i>See also</i> 1.454.						
S1.267	glycylglycyl- glycine, negative ion	10.9	3.4×10^8	—	p.r.	opt.	d.k.	71-3052
		<i>See also</i> 1.455.						
S1.268	glycylglycyl- glycine amide	5.0	7.4×10^9	—	p.r.	opt.	d.k.	71-3052
		11.2	1.5×10^9				d.k.	71-3052
S1.269	glycylglycyl- glycylglycine amide	6.3	8.8×10^9	—	p.r.	opt.	d.k.	71-3052
		9.7	3.7×10^9				d.k.	71-3052
S1.270	glycylphenyl- alanine	5.9	6.1×10^8	—	p.r.	opt.	d.k.	73-0076
		9.4	1.3×10^8				d.k.	73-0076
S1.271	glycylphenyl- alanylglycine	5.5	1.6×10^9	—	p.r.	opt.	d.k.	73-0076
		11.6	5.4×10^8				d.k.	73-0076
S1.272	glycylsarcosine	6.4	6.9×10^8	—	p.r.	opt.	d.k.	74-1058
		11.3	1.0×10^8				d.k.	74-1058
S1.273	glyoxylic acid $e_{\text{aq}}^- + \text{CHOCO} \cdot \rightarrow$ $\text{OH}^- + \text{CHOCO} \cdot$ (1) $e_{\text{aq}}^- + \text{CHOCO} \cdot \rightarrow$ $\text{H} + \text{CHOCO}^-$ (2) <i>N</i> -(2-guanidiny)lsulfanilamide <i>See</i> sulfaguanidine (S1.404)	3-4	1.26×10^9 (rel.)	$k/k_{\text{H}^+} = 8.03$ $\times 10^{-2}$ $k_2/k_1 < 0.1$	γ -r.	chem.	c.k.; $\mu = 0.05$; assume $k_{\text{H}^+} = 1.57$ $\times 10^{10}$ at that μ .	72-0057
S1.274	guanine	7	1.35×10^{10}	—	p.r.	opt.	d.k.; little change in k on addition of surfactants.	73-3013
		11	2.0×10^9				d.k.; cytochrome C deriv.	
S1.275	heme - peptide	6.0	$(1.5 \pm 0.2) \times 10^{11}$	—	p.r.	opt.	d.k.; cytochrome C deriv.	72-1003
S1.276	heparin	—	2.2×10^7	—	p.r.	opt.	d.k.; rate calcd. per hexose unit.	68-0352, 70-3081

TABLE 3. Reactions of hydrated electrons with organic solutes — Continued

No.	Solute and Reaction	pH	$k(\text{dm}^3 \text{mol}^{-1} \text{s}^{-1})$	Ratio	Source	Method	Comment	Ref.
S1.277	heparin, N-de-sulfated	—	1.0×10^7	—	p.r.	opt.	d.k.; rate calcd. per hexose unit.	70-3081
S1.278	hexadecyltri-methylammonium bromide	— 7	$\leq 9 \times 10^5$ $< 10^7$	— —	p.r. p.r.	opt. opt.	d.k. d.k.	71-0586 73-3013
S1.279	hexafluorobenzene $e_{\text{aq}}^- + \text{C}_6\text{F}_6 \rightarrow \cdot\text{C}_6\text{F}_5 + \text{F}^-$	~6.5	2.0×10^{10}	—	p.r.	opt.	d.k.	73-0054
S1.280	hyaluronic acid	5.2	3×10^8	—	p.r.	opt.	d.k.; per disaccharide unit (mol. wt. 400).	67-0730
		11.2	8×10^8	—	p.r.	opt.	d.k.; rate calcd. per hexose unit.	68-0352, 70-3081
		—	1.4×10^8	—	p.r.	—	solns. contain ~ 0.07 - 0.5% protein.	72-3119
		—	$(2.1 \text{ to } 6.4) \times 10^7$	—	p.r.	—	d.k.; rate calcd. per hexose unit.	70-3081
S1.281	hyaluronic acid, sulfated	—	1.7×10^7	—	p.r.	opt.	d.k.; rate calcd. per hexose unit.	70-3081
S1.282	hydrocortisone	—	3.5×10^{10}	—	p.r.	—	—	70-1056
S1.283	hydrocortisone acetate	—	3.2×10^{10}	—	p.r.	—	—	70-1056
S1.284	hydroxyacetamide	7.5	2.7×10^8	—	p.r.	opt.	d.k.	73-0071
S1.285	hydroxycycloheptatriene $e_{\text{aq}}^- + \text{C}_7\text{H}_8\text{OH} \rightarrow \cdot\text{C}_7\text{H}_7\text{OH} + \text{OH}^-$	—	$(6 \pm 2) \times 10^9$	—	p.r.	opt.	d.k.	71-0710
S1.286	β -p-hydroxy-phenylglucoside	~7	$\sim 1 \times 10^7$	—	p.r.	opt.	d.k.	71-0480
S1.287	p-hydroxyphenyl-propionate ion (dianion)	7.0	$(4.6 \pm 0.5) \times 10^7$	—	p.r.	opt.	d.k.; $pK_a = 4.6, 10.1$.	73-0003
		12.5	$(2.1 \pm 0.2) \times 10^7$	—	p.r.	opt.	d.k.	73-0003
		—	See also 1.481.	—	—	—	—	—
S1.288	2-hydroxypropionamide	9.3	1.9×10^8	—	p.r.	opt.	d.k.	73-0071
S1.289	Igepal CO-730 See polyoxyethylene (15) nonylphenol (S1.382). indole	11	2.6×10^8	—	f.phot.	opt.	d.k.	72-0541
S1.290	indole-3-acetate ion	11	1.7×10^8	—	f.phot.	opt.	d.k.	72-0541
S1.291	indole-3-propionate ion	11	2.6×10^8	—	f.phot.	opt.	d.k.	72-0541
S1.292	iodoacetamide $e_{\text{aq}}^- + \text{ICH}_2\text{CONH}_2 \rightarrow \text{I}^- + \text{CH}_2\text{CONH}_2$	—	5×10^{10}	—	p.r.	—	estd.	69-3030
S1.293	3-iodopropionate ion	7	5.8×10^9	—	f.phot.	opt.	d.k.	70-1226
S1.294	iodotyrosine	3.0-6.0	8.2×10^9	$k/k_{\text{H}^+} = 0.355$	X-r.	opt.	c.k.; assume $k_{\text{H}^+} = 2.3 \times 10^{10}$.	72-0610
S1.295	keratan sulfate	—	3.3×10^7	—	p.r.	opt.	d.k.; rate calcd. per hexose unit.	70-3081
		—	3.0×10^7	—	p.r.	opt.	d.k.	71-0067
		—	laccase See copper oxidase (S1.186).	—	—	—	—	—
S1.296	lactamide See 2-hydroxypropionamide (S1.288). lactate ion	7.0	5.0×10^7 (rel.)	$k/k_{\text{BrPhOH}} = 8.33 \times 10^{-3}$	γ -r.	chem.	c.k.; obs. $G(\text{Br}^-)$; assume $k_{\text{BrPhOH}} = 6.0 \times 10^9$	72-0027
		—	See also 1.501.	—	—	—	—	—

TABLE 3. Reactions of hydrated electrons with organic solutes — Continued

No.	Solute and Reaction	pH	$k(\text{dm}^3 \text{mol}^{-1} \text{s}^{-1})$	Ratio	Source	Method	Comment	Ref.
S1.297	lactic acid $e_{\text{aq}}^- + \text{CH}_3\text{CHOHCOOH} \rightarrow \text{OH}^- + \text{CH}_3\text{CHOHCO} \cdot (1)$ $e_{\text{aq}}^- + \text{CH}_3\text{CHOHCOOH} \rightarrow \text{H} + \text{CH}_3\text{CHOHCOO}^- (2)$	3.0 3-4	7×10^8 (rel.) 6.31×10^8 (rel.)	$k/k_{\text{BrPhOH}} = 9.67 \times 10^{-2}$ $k_1/k_{\text{H}^+} = 4.02 \times 10^{-2}$ $k_2/k_1 < 0.1$	γ -r. γ -r.	chem. chem.	c.k.; obs. $G(\text{Br}^-)$; assume $k_{\text{BrPhOH}} = 6.0 \times 10^9$ and $pK_a = 3.82$ to calc. k . c.k.; $\mu = 0.05$; assume $k_{\text{H}^+} = 1.57 \times 10^{10}$ at that μ .	72-0027 72-0057
S1.298	lipoate ion	7.0	$(1.5 \pm 0.2) \times 10^{10}$ See also 1.507.	—	p.r.	opt.	d.k.	72-0388
S1.299	maleate ion (monoanion)	—	1.8×10^{10}	—	p.r.	opt.	d.k.; calcd. from $k_{\text{obs.}} = 1.45 \times 10^{10}$ at pH 5.77.	73-0097
	(dianion)	10.5	1.6×10^9 See also 1.511 - 1.512.	—	p.r.	opt.	d.k.	73-0097
S1.300	malonamide	7.0	1.1×10^9	—	p.r.	opt.	d.k.	73-0091
S1.301	malonate ion (monoanion) $e_{\text{aq}}^- + \text{HOOCCH}_2\text{COO}^- \rightarrow \text{OH}^- + \text{OCCH}_2\text{COO}^- (1)$ $e_{\text{aq}}^- + \text{HOOCCH}_2\text{COO}^- \rightarrow \text{H} + \text{OOCCH}_2\text{COO}^- (2)$	— 3-4	6×10^8 (rel.) 6.11×10^8 (rel.)	— $k/k_{\text{H}^+} = 3.89 \times 10^{-2}$ $k_2/k_1 \leq 0.1$	γ -r.	chem.	c.k.; obs. $G(\text{Br}^-)$; assume $k_{\text{BrPhOH}} = 6.0 \times 10^9$; value calcd. from ratios at pH 2.1, 3.5, 5.1, 6.2, and 7.2 of $k/k_{\text{BrPhOH}} = 0.175, 0.12, 0.065, 0.0183,$ and 0.002 , resp.; $pK_a = 2.86, 5.5$. c.k.; $\mu = 0.05$; assumed $k_{\text{H}^+} = 1.57 \times 10^{10}$ at that μ .	72-0027 72-0057
S1.302	malonate ion (dianion)	—	3×10^6 (rel.) See also 1.513.	—	γ -r.	chem.	c.k.; see S1.301 above.	72-0027
S1.303	malonic acid $e_{\text{aq}}^- + \text{HOOCCH}_2\text{COOH} \rightarrow \text{OH}^- + \text{OCCH}_2\text{COOH}$	— 3-4	1.3×10^9 (rel.) 1.45×10^9 (rel.)	— $k/k_{\text{H}^+} = 9.22 \times 10^{-2}$	γ -r. γ -r.	chem. chem.	c.k.; see S1.301 above. c.k.; $\mu = 0.05$; assumed $k_{\text{H}^+} = 1.57 \times 10^{10}$ at that μ , cor. for e_{aq}^- + anions.	72-0027 72-0057
S1.304	menaquinone See 2-methyl-1,4-naphthoquinone (S1.333). 2-mercaptoacetate ion See thioglycolate ion (1.621, S1.416). 2-mercaptoethanol	1.6- 3.0	5.8×10^{10} (rel.)	—	γ -r.	chem.	c.k. with H^+ ; assume $k_{\text{H}^+} = 2.3 \times 10^{10}$.	73-0286
S1.304a	2-mercaptopro- pionate ion	7.2 12.2	$5.0 \times 10^9 (\pm 10\%)$ $7.7 \times 10^8 (\pm 10\%)$	—	p.r.	opt.	d.k.; $pK_a \cong 4, 10.7$.	73-0090
S1.305	3-mercapto- propionate ion	7.4 13.0	$5.0 \times 10^9 (\pm 10\%)$ $\sim 2.8 \times 10^8 (\pm 10\%)$	—	p.r.	opt.	d.k.; $pK_a = 4.3, 10.3$.	73-0090
S1.306	2-mercaptopro- pionic acid	1.6- 3.0	$(3.4 \text{ to } 17.5) \times 10^9$ (rel.)	—	p.r.	opt.	c.k.; assume $k_{\text{H}^+} = 2.3 \times 10^{10}$; k increases with pH.	73-0286
S1.307	3-mercaptopro- pionic acid	1.6- 3.0	5.4×10^9 (rel.)	—	p.r.	opt.	c.k. with H^+ ; assume $k_{\text{H}^+} = 2.3 \times 10^{10}$.	73-0286
	3-mercaptovaline See penicillamine (1.517, S1.365).							

TABLE 3. Reactions of hydrated electrons with organic solutes — Continued

No.	Solute and Reaction	pH	$k(\text{dm}^3 \text{mol}^{-1} \text{s}^{-1})$	Ratio	Source	Method	Comment	Ref.
Sl.308	methacrylamide	9.2	$(2.4 \pm 0.3) \times 10^{10}$	—	p.r.	opt.	d.k.	73-0072
Sl.309	methacrylate ion	11	$3 \times 10^9 (\pm 15\%)$	—	f.phot.	opt.	d.k.; H_2 -satd.	71-7345
		9.2	$(4.5 \pm 0.2) \times 10^9$	—	p.r.	opt.	d.k.	73-0072
		See also 1.518.						
Sl.310	methacrylic acid	1.5-3.5	$(2.8 \pm 0.3) \times 10^{10}$	—	p.r.	opt.	d.k.; also c.k.	73-0072
Sl.311	β -methazone val- erate	—	3.7×10^{10}	—	p.r.	opt.	d.k.	70-1056
Sl.312	methemoglobin	6-9	$\sim 6 \times 10^9$ to $\sim 3 \times 10^{11}$ (cor.)	—	p.r.	opt.	d.k.; decreases with pH.	71-3049
		6	3.0×10^{11}	—	p.r.	opt.	d.k. (e_{aq}^-); d.k. (protein) or p.b.k., $k = (2.2 \pm$ $0.3) \times 10^{11}$.	72-1003
Sl.313	methicillin	6.0	2.8×10^9	—	p.r.	opt.	d.k.	73-3020
Sl.314	methionine	7.3	$4.5 \times 10^7 (\pm 10\%)$	—	p.r.	opt.	d.k.; $pK_a =$ 2.3, 9.2.	73-0090
		See also 1.522.						
Sl.315	methyl acrylate	11	$9.4 \times 10^9 (\pm 15\%)$	—	f.phot.	opt.	d.k.; H_2 -satd.	71-7345
Sl.316	2-methyladenine	7	8.4×10^9	—	p.r.	opt.	d.k.; $\mu = 0.1$;	71-0375
		11	1.0×10^9	—			$pK_a \sim 10$.	
Sl.317	7-methyladenine	6-12	1.3×10^{10}	—	p.r.	opt.	d.k.; $\mu = 0.1$.	71-0375
Sl.318	methyl 2-amino- acetate (glycine methyl ester)	11.2	3.3×10^8	—	p.r.	opt.	d.k.	71-3052
		5.3	6.8×10^9	—	p.r.	opt.	d.k.	71-3052
		See also 1.523.						
Sl.319	positive ion S -methylcysteine	5.4	$7.2 \times 10^8 (\pm 10\%)$	—	p.r.	opt.	d.k.; $pK_a \cong$ 2, 8.8.	73-0090
		12.2	$1.5 \times 10^8 (\pm 10\%)$	—				
Sl.320	1-methylcytosine	7-14	1.4×10^{10}	—	p.r.	opt.	d.k.; $\mu = 0.1$.	71-0375
Sl.321	methylene chloride	10	$(6.3 \pm 0.5) \times 10^9$	—	p.r.	opt.	d.k.	72-0159
	$e_{aq}^- + \text{CH}_2\text{Cl}_2 \rightarrow$ $\text{CH}_2\text{Cl} + \text{Cl}^-$							
Sl.322	methylene iodide	6-7	3.4×10^{10}	—	p.r.	opt.	d.k.	73-1041
Sl.323	N -methylformamide	9.2	7.1×10^7	—	p.r.	opt.	d.k.	71-0414
		See also 1.530.						
Sl.324	methyl fumarate (monoanion)	—	1.3×10^{10}	—	p.r.	opt.	d.k.	73-0097
	methyl glycolate See methyl hydroxyacetate							
Sl.325	methylhydrazine	12.0	$6.5 \times 10^6 (\pm 15\%)$	—	p.r.	opt.	d.k.	72-0003
Sl.326	methylhydrazin- ium ion	5.5	$1.4 \times 10^9 (\pm 15\%)$	—	p.r.	opt.	d.k.	72-0003
Sl.327	methyl hydroxy- acetate	9.0	1.4×10^9	—	p.r.	opt.	d.k.	73-0071
		See also 1.532.						
Sl.328	N -methylhydroxyl- amine	9.0	2.4×10^8	—	p.r.	opt.	d.k.	71-0493
Sl.329	O -methylhydroxyl- amine	9.1	4.4×10^8	—	p.r.	opt.	d.k.	71-0493
Sl.330	N -methylhydroxyl- ammonium ion	4.8	1.3×10^{10}	—	p.r.	opt.	d.k.	71-0493
Sl.331	O -methylhydroxyl- ammonium ion	4.5	$\geq 1.9 \times 10^{10}$	—	p.r.	opt.	d.k.; could be $\sim 30\%$ higher.	71-0493
Sl.332	methyl methacry- late	11	$6.3 \times 10^9 (\pm 15\%)$	—	f.phot.	opt.	d.k.; H_2 -satd.	71-7345
		9.2	$(1.3 \pm 0.1) \times 10^{10}$	—	p.r.	opt.	d.k.	73-0072
Sl.333	2-methyl-1,4- naphthoquinone (menaquinone, Vitamin K_3)	—	5.4×10^{10}	—	p.r.	opt.	—	72-3057, 73-0026
	$e_{aq}^- + \text{MQ} \rightarrow \text{MQ}^-$ (semiquinone)							
Sl.334	methylpenicillin	6.0	2.0×10^9	—	p.r.	opt.	d.k.	73-3020

TABLE 3. Reactions of hydrated electrons with organic solutes — Continued

No.	Solute and Reaction	pH	$k(\text{dm}^3 \text{mol}^{-1} \text{s}^{-1})$	Ratio	Source	Method	Comment	Ref.
Sl.335	<i>N</i> -methylsuccinimide	6.9	1.3×10^{10}	—	p.r.	opt.	d.k.	73-0091
Sl.336	methyl thioglycolate	5.2 10.3	$1.4 \times 10^{10} (\pm 10\%)$ $1.4 \times 10^9 (\pm 10\%)$	—	p.r.	opt.	d.k.; $pK_a = 7.8$.	73-0090
Sl.337	metmyoglobin	6-9	$\sim 7 \times 10^9$ to $\sim 4 \times 10^{10}$ (cor.)	—	p.r.	opt.	d.k.; decreases with pH.	71-3049
		6	$(5.3 \text{ to } 6.0)(\pm 0.6) \times 10^{10}$	—	p.r.	opt.	d.k. (e_{aq}^- or protein) or p.b.k.	72-1003
Sl.338	1,2-naphthoquinone-4-sulfonate ion	~ 9.2	$1.7 \times 10^{10} (\pm 10\%)$	—	p.r.	opt.	d.k.	72-0171
Sl.339	1,4-naphthoquinone-2-sulfonate ion	~ 9.2	$2.6 \times 10^{10} (\pm 10\%)$	—	p.r.	opt.	d.k.	72-0171
Sl.340	5-nitrobarbituric acid	5.9	1.82×10^{10}	—	p.r.	opt.	d.k.	73-1003
Sl.341	nitrobenzene $e_{aq}^- + \text{C}_6\text{H}_5\text{NO}_2 \rightarrow \text{C}_6\text{H}_5\text{NO}_2^-$	—	2.8×10^{10}	—	p.r.	opt.	d.k.; $k = (3.0 \text{ to } 4.1) \times 10^{10}$ and $E_a \cong 2 - 4.8$ kcal/mol (10 - 20 kJ/mol) vary with concn. of added ethanol, MgCl_2 , KI, methanol, propanol, and butanol.	71-0580
		—	4.2×10^{10}	—	p.r.	opt.	d.k.; $\mu = 0$; k decreased in H_2O -ethanol mixtures.	73-1008
Sl.342	nitrobenzene anion $e_{aq}^- + \text{C}_6\text{H}_5\text{NO}_2^- \rightarrow \text{C}_6\text{H}_5\text{NO}_2^{2-}$	See also 1.551. 10	2.5×10^{10}	—	p.r.	opt., condy.	p.b.k. during train of pulses (train length $\sim 100 \mu\text{s}$); computer analysis.	71-0171
Sl.343	5-nitrofuraldehyde	7	3.4×10^{10}	—	p.r.	opt.	—	73-1018
Sl.344	5-nitrofuraldehyde diacetate	7	3.0×10^{10}	—	p.r.	opt.	—	73-1018
Sl.345	5-nitro-2-furaldehyde semicarbazone (nitrofurazone)	—	2.8×10^{10}	—	p.r.	opt.	d.k. (e_{aq}^-) or p.b.k. (radical anion).	73-3016
Sl.346	<i>anti</i> -5-nitro-2-furaldoxime (NF) $e_{aq}^- + \text{NF} \rightarrow \text{NF}^-$	6.8	3.8×10^{10}	—	p.r.	opt.	d.k. at 550 nm (e_{aq}^-) or at 360 nm (NF) as well as p.b.k. at 395 nm; slight decrease in k with increase in pH (4 - 12).	73-1018
Sl.347	5-nitrofuroate ion $e_{aq}^- + {}^-\text{OOC}(\text{C}_4\text{H}_2\text{O})\text{NO}_2 \rightarrow {}^-\text{OOE}(\text{C}_4\text{H}_2\text{O})\text{NO}_2^-$	3.3- 7	2.2×10^{10}	—	p.r.	opt.	d.k.	73-0114
Sl.348	nitromethane	—	2.2×10^{10}	—	p.r.	opt.	d.k.; k unchanged in sodium dodecyl sulfate soln.	73-1004
		6-7	2.9×10^{10}	—	p.r.	opt.	d.k.	73-1041
Sl.349	nitromethane anion $e_{aq}^- + \text{CH}_3\text{NO}_2^- \rightarrow \text{CH}_3\text{NO}_2^{2-}$	See also 1.553. 10	—	—	p.r.	opt.	k has same order of magnitude as for $e_{aq}^- + \text{CH}_3\text{NO}_2 \rightarrow \text{CH}_3\text{NO}_2^-$.	71-0171

See also 1.554.

TABLE 3. Reactions of hydrated electrons with organic solutes — Continued

No.	Solute and Reaction	pH	$k(\text{dm}^3 \text{mol}^{-1} \text{s}^{-1})$	Ratio	Source	Method	Comment	Ref.
S1.350	5-nitro-6-methyluracil	5.9	1.94×10^{10}	—	p.r.	opt.	d.k.	73-1003
S1.351	5-nitroorotic acid	5.9	1.75×10^{10}	—	p.r.	opt.	d.k.	73-1003
S1.352	<i>p</i> -nitrophenol	5.5	4.4×10^{10}	—	p.r.	opt.	d.k.; <i>k</i> also detd. at 6.4 kbar.	72-0102
S1.353	<i>o</i> -nitrophenyl- β -D-glucopyranoside	—	<i>See also</i> 1.559. 2.54×10^{10}	—	p.r.	opt.	d.k.	71-0056
S1.354	<i>p</i> -nitrophenyl- β -D-glucopyranoside	— ~7	3.89×10^{10} $(1-5) \times 10^9$	— —	p.r. p.r.	opt. opt.	d.k. d.k.	71-0056 71-0480
S1.355	5-nitrouracil	5.9	2.1×10^{10}	—	p.r.	opt.	d.k.	73-1003
S1.356	norpseudopelletierine <i>N</i> -oxyl	—	$(2.4 \pm 0.2) \times 10^{10}$	—	p.r.	opt.	d.k.	71-0061
S1.357	oleate ion	7,11	$< 10^7$	—	p.r.	opt.	d.k.	73-3013
S1.358	oxaloacetate ion	9.5	$(4.8 \pm 0.6) \times 10^9$	—	p.r.	opt.	d.k.	73-0073
S1.359	oxamate ion	9.2	<i>See also</i> 1.568. 5.7×10^9	—	p.r.	opt.	d.k.	73-0091
S1.360	oxamide	9.2	<i>See also</i> 1.572. 2.7×10^{10} 3.3×10^{10}	— —	p.r. p.r.	opt. opt.	d.k. d.k.	71-0782 73-0091
S1.361	2-oxoglutarate ion	9.2	$(5.5 \pm 0.8) \times 10^9$	—	p.r.	opt.	d.k.	73-0073
S1.362	oxomalonate ion	9.3	$(1.3 \pm 0.1) \times 10^9$	—	p.r.	opt.	d.k.	73-0073
S1.363	papain	6.4	4.1×10^{10}	—	p.r.	opt.	d.k.	72-3042
S1.364	penamcillin	6.0	4.5×10^{10}	—	p.r.	opt.	d.k.	73-3020
S1.365	penicillamine (3-mercaptopalane) positive ion	5.3 12.0 1.6- 3.0	$1.0 \times 10^{10} (\pm 10\%)$ $5.6 \times 10^8 (\pm 10\%)$ $1.6 \times 10^{10} (\text{cor.})$ (rel.)	—	p.r. γ -r.	opt. chem.	d.k.; $pK_a \approx 2$, 7.9, 10.4. c.k. with H^+ ; assumed $k_{H^+} = 2.3 \times 10^{10}$.	73-0090 73-0286
	zwitterion	1.6- 3.0	5.2×10^9 (rel.)	—	γ -r.	chem.	c.k. with H^+ ; assumed $k_{H^+} = 2.3 \times 10^{10}$.	73-0286
S1.366	penicillamine disulfide	7.0 12.4 7.0 8.0 9.0 10.0	<i>See also</i> 1.517. $(1.2 \pm 0.1) \times 10^{10}$ $(3.5 \pm 0.4) \times 10^9$ 7.3×10^9 3.7×10^9 (cor.) 1.6×10^9 (cor.) 8×10^8 (cor.)	— — — — — —	p.r. p.r.	opt. opt.	d.k. d.k.; obs. values are 4.5, 2.3, and 1.4×10^9 for pH = 8, 9, and 10, resp.; net charge changes from 0 to -2 at pH 7 \rightarrow 10.	72-0388 73-1073
S1.367	pentafluorobenzene $e_{aq}^- + C_6HF_5 \rightarrow$ $\cdot C_6HF_4 + F^-$	~6.5	1.6×10^{10} <i>See also</i> 1.573a.	—	p.r.	opt.	d.k.	73-0054
S1.368	phenethicillin	6.0	2.7×10^9	—	p.r.	opt.	d.k.	73-3020
S1.369	phenol	—	1.6×10^7	—	p.r.	opt.	d.k.; concn. 0.2 mol/dm^3 .	71-0475
S1.370	phenoxide ion	—	<i>See also</i> 1.575. 3.7×10^5	—	p.r.	opt.	d.k.; concn. 0.19 mol/dm^3 , $k = 4.0 \times 10^5$ at 2.13 mol/dm^3 ; contains 0.2 mol/dm^3 NaOH.	71-0475
			<i>See also</i> 1.576.					

TABLE 3. Reactions of hydrated electrons with organic solutes — Continued

No.	Solute and Reaction	pH	$k(\text{dm}^3\text{mol}^{-1}\text{s}^{-1})$	Ratio	Source	Method	Comment	Ref.
S1.371	phenoxymethyl- penicillin	6.0	2.7×10^9	—	p.r.	opt.	d.k.	73-3020
S1.372	phenylacetate ion	9.0	2.0×10^7 <i>See also</i> 1.577.	—	p.r.	opt.	d.k.	73-0076
S1.373	phenyl acetone	~9.2	$1.2 \times 10^{10} (\pm 10\%)$	—	p.r.	opt.	d.k.	72-0171
S1.374	phenylalanine	6.0- 6.6 6.9	1.0×10^8 1.6×10^8 <i>See also</i> 1.578.	—	f.phot. p.r.	opt. opt.	d.k. d.k.	71-7350 73-0076
S1.375	phenylalanine amide	5.4 9.2	1.4×10^9 1.4×10^8	— —	p.r. p.r.	opt. opt.	d.k. d.k.	73-0076 73-0076
S1.376	phenylalanyl- glycylglycine	6.6 11.3	1.1×10^9 3.7×10^8	— —	p.r. p.r.	opt. opt.	d.k. d.k.	73-0076 73-0076
S1.377	phenylglycine	9.2	3.0×10^8	—	p.r.	opt.	d.k.	73-0076
S1.378	phenyl- β -D- glucopyranoside	— — ~7	7×10^7 6.5×10^7 $< 5 \times 10^6$	— — —	p.r. p.r. p.r.	opt. opt. opt.	d.k. d.k. d.k.	71-0055 71-0056 71-0480
S1.379	phthalic acid	—	4.8×10^9	—	p.r.	opt.	d.k.	73-0094
S1.380	pivalamide	9.2	1.5×10^7	—	p.r.	opt.	d.k.	71-0414
S1.381	polyadenylic acid <i>See</i> adenine polynucleotides (S1.106).	—	4.3×10^7	—	p.r.	opt.	d.k.	68-0352
S1.382	poly(ethylene- sulfonate ion)	—	$\leq 1 \times 10^6$ <i>See also</i> 1.483a.	—	p.r.	opt.	d.k.	71-0586
S1.383	polyoxyethylene- (15)-nonylphenol (Igepal CO-730)	7	$< 10^7$	—	p.r.	opt.	d.k.	73-3013
S1.384	polyoxyethylene sorbitan mono- laurate (Tween 20)	—	3.6×10^7	—	p.r.	opt.	d.k.	68-0352
S1.385	poly(styrene- sulfonate) ion	—	5.4×10^7 <i>See also</i> 1.592.	—	p.r.	opt.	d.k.	71-0414
S1.386	polyuridylic acid <i>See</i> uracil polynucleotides (1.649, S1.438).	9.2	5.4×10^7	—	p.r.	opt.	d.k.	71-0414
S1.387	propionamide	3-4	2.2×10^7 (rel.)(1) 1.3×10^7 (rel.)(2)	$k_1/k_{H^+} = 1.4 \times 10^{-3}$ $k_2/k_1 = 0.60$	γ -r.	chem.	c.k.; $\mu = 0.05$; assume $k_{H^+} = 1.57 \times 10^{10}$ at that μ .	72-0057
S1.388	propionic acid $e_{aq}^- + \text{CH}_3\text{CH}_2\text{COOH} \rightarrow$ $\text{OH}^- + \text{CH}_3\text{CH}_2\text{CO}(1)$ $e_{aq}^- + \text{CH}_3\text{CH}_2\text{COOH} \rightarrow$ $\text{H} + \text{CH}_3\text{CH}_2\text{COO}^-(2)$	13 8.5	$(1.1 \pm 0.1) \times 10^6$ $(2.8 \pm 0.1) \times 10^6$ <i>See also</i> 1.593a.	— —	p.r. p.r.	opt. opt.	d.k. d.k.	73-0016 73-0016
S1.389	propylamine	7	1.6×10^{10}	—	p.r.	opt.	d.k.; $\mu = 0.1$; $pK_a = 8.75$.	71-0375 71-0375
S1.390	pyrene	11	8.2×10^9 <i>See also</i> 1.595.	—	p.r.	opt.	d.k. in polyoxy- ethylene (23) dodecanol soln.; $k = 3.3 \times 10^{10}$ in hexadecyl- trimethyl- ammonium bromide soln.; $k < 5.0 \times 10^7$ in sodium dodecyl sulfate soln.	73-1004
S1.391	pyridine $e_{aq}^- + \text{C}_5\text{H}_5\text{N} \rightarrow$ $\text{C}_5\text{H}_5\text{NH} + \text{OH}^-$ (72-5208)	7	1.0×10^9 <i>See also</i> 1.596.	—	p.r.	opt.	d.k.; $k = 3.7 \times 10^9$ is also re- ported with no explanation for the two values.	71-0582

TABLE 3. Reactions of hydrated electrons with organic solutes — Continued

No.	Solute and Reaction	pH	$k(\text{dm}^3 \text{mol}^{-1} \text{s}^{-1})$	Ratio	Source	Method	Comment	Ref.
S1.392	Rhodamine B	13	$\sim 3 \times 10^{10}$	—	p.r.	opt.	d.k.	67-6053
S1.393	ribonuclease	6.8	4×10^9	—	p.r.	opt.	d.k.; value from graph; at 65°C $k \approx 2.5 \times 10^{10}$.	67-0776
		5.9	$(1.7 \pm 0.2) \times 10^{10}$	—	p.r.	opt.	d.k.	72-3079
		7.1	$(1.0 \pm 0.15) \times 10^{10}$	—	p.r.	opt.	d.k.	72-3079
		7.6	1.0×10^{10} (rel.)	$k/k_{\text{ox}} = 0.53$	p.r.	opt.	c.k.; assumed $k(e_{\text{aq}}^- + \text{O}_2) = 1.9 \times 10^{10}$.	72-3079
		See also 1.604.						
S1.394	sarcosine anhydride	9.2	$(2.0 \pm 0.2) \times 10^9$	—	p.r.	opt.	d.k.	71-0554
S1.395	sarcosylglycine	5.8	8.8×10^8	—	p.r.	opt.	d.k.	74-1058
		12.2	7.7×10^7	—	p.r.	opt.	d.k.	74-1058
S1.396	selenocystine	6.0	7.6×10^9	—	p.r.	opt.	d.k.	73-1010
		11.5	3.9×10^9	—				
	sodium dodecyl sulfate	See dodecyl sodium sulfate (1.409b, S1.232).						
S1.397	sorbate ion	8.9	$(5.6 \pm 0.3) \times 10^9$	—	p.r.	opt.	d.k.	73-0072
S1.398	sorbic acid	1.5-4.0	$(1.9 \pm 0.1) \times 10^{10}$	—	p.r.	opt.	d.k.; also c.k.	73-0072
S1.399	stearate ion	11	$< 10^7$	—	p.r.	opt.	d.k.	73-3013
S1.400	succinamide	7.1	2.0×10^8	—	p.r.	opt.	d.k.	73-0091
S1.401	succinate ion (monoanion) (dianion)	—	$7 \times 10^7 (\pm 20\%)$ $7 \times 10^5 (\pm 50\%)$ (rel., calcd.)	—	γ -r.	chem.	c.k. with <i>p</i> -bromophenol assuming $k_{\text{BrPhOH}} = 6.0 \times 10^9$; obs. $G(\text{Br}^-)$ at pH 3.0, 4.0, 5.0, 6.0 and 7.5, 100 $k/k_{\text{BrPhOH}} = 5.67, 4.5, 1.6, 0.25$ and 0.025 , resp.; $\text{p}K_{\text{a}} = 4.16, 5.64$.	72-0027
		See also 1.613, 1.614.						
S1.402	succinic acid	—	$3.7 \times 10^8 (\pm 20\%)$ (rel., calcd.)	—	γ -r.	chem.	c.k.; see S1.401 above.	72-0027
	$e_{\text{aq}}^- + (\text{CH}_2\text{COOH})_2 \rightarrow \text{OH}^- + \text{HOOCCH}_2\text{CH}_2\text{CO} (1)$	3-4	8.56×10^7 (rel.)	$k_1/k_{\text{H}^+} = 5.45 \times 10^{-3}$	γ -r.	chem.	c.k.; $\mu = 0.05$; assume $k_{\text{H}^+} = 1.57 \times 10^{10}$ at that μ .	72-0057
	$e_{\text{aq}}^- + (\text{CH}_2\text{COOH})_2 \rightarrow \text{H}^+ + \text{HOOCCH}_2\text{CH}_2\text{CO}_2^- (2)$			$k_2/k_1 \leq 0.1$				
S1.403	succinimide	6.5	1.1×10^{10}	—	p.r.	opt.	d.k.	73-0091
		11.4	9.2×10^8	—	p.r.	opt.	d.k.	73-0091
		See also 1.615.						
S1.404	sulfaguanidine	—	8.6×10^9	—	p.r.	opt.	d.k.	73-0094
S1.405	sulfanilamide	11	$(3.5 \pm 0.5) \times 10^9$	—	f.phot.	opt.	d.k.	72-0423, 73-0015
		—	7.4×10^9	—	p.r.	opt.	d.k.	73-0094
		See also 1.615b.						
S1.406	sulfanilate ion	11	2.54×10^8	—	f.phot.	opt.	d.k.	73-0270
		See also 1.616.						
S1.407	sulfanilic acid	—	5.9×10^9	—	p.r.	opt.	d.k.	73-0094
		See also 1.616a.						
S1.408	sulfasuccidine	—	14.2×10^9	—	p.r.	opt.	d.k.	73-0094
S1.409	sulfathiazole	—	11.7×10^9	—	p.r.	opt.	d.k.	73-0094
S1.410	<i>p</i> -sulfodiphenylpicryl hydrazyl (SDPPH)	—	5.7×10^{10} (rel.)	$k/k_{\text{N}_2\text{O}} = 6.6$	γ -r.	chem.	c.k.; assume $k(e_{\text{aq}}^- + \text{N}_2\text{O}) = 8.6 \times 10^9$; p.r. gave 6.9×10^{10} .	72-0688
S1.411	1,2,3,4-tetrafluorobenzene	~ 6.5	2.6×10^{10}	—	p.r.	opt.	d.k.	73-0054
	$e_{\text{aq}}^- + \text{C}_6\text{H}_2\text{F}_4 \rightarrow \cdot\text{C}_6\text{H}_2\text{F}_3 + \text{F}^-$							

TABLE 3. Reactions of hydrated electrons with organic solutes — Continued

No.	Solute and Reaction	pH	$k(\text{dm}^3 \text{mol}^{-1} \text{s}^{-1})$	Ratio	Source	Method	Comment	Ref.
S1.412	2,2,6,6-tetra-methyl-4-piperidone <i>N</i> -oxyl (TAN)	7.8	$(2.2 \pm 0.2) \times 10^{10}$	—	p.r.	opt.	d.k.	71-0618
S1.413	thalamyd 4-(2-thiazolylsulfamoyl)succinanic acid <i>See</i> sulfasuccidine (S1.408). <i>N</i> -(2-thiazolyl)sulfanilamide <i>See</i> sulfathiazole (S1.409).	—	7.4×10^9	—	p.r.	opt.	d.k.	73-0094
S1.414	thiodiacetate ion	10.8	$8.3 \times 10^7 (\pm 10\%)$	—	p.r.	opt.	d.k.; $pK_a = 3.3, 4.5$.	73-0090
S1.415	3,3'-thiodipropionate ion thioglycol <i>See</i> 2-mercaptoethanol (1.514, S1.304).	10.8	$5.8 \times 10^7 (\pm 10\%)$	—	p.r.	opt.	d.k.; $pK_a \approx 4$.	73-0090
S1.416	thioglycolate ion	6.5 12.0 <i>See also</i> 1.621.	$5.5 \times 10^9 (\pm 10\%)$ $5.6 \times 10^8 (\pm 10\%)$	—	p.r.	opt.	d.k.; $pK_a = 3.7, 10.3$.	73-0090
S1.417	thiolactate ion <i>See</i> 2-mercaptopropionate ion (S1.304a).							
S1.418	thymine, negative ion	12 <i>See also</i> 1.627.	3.0×10^9	—	p.r.	opt.	d.k.	72-7036
S1.419	thymine dimer $e_{aq}^- + T_2 \rightarrow T^- + T$	8.01	$(1.5 \pm 0.2) \times 10^{10}$	—	p.r.	opt.	d.k.	72-0309
S1.420	<i>p</i> -toluenesulfonate ion $e_{aq}^- + \text{CH}_3\text{C}_6\text{H}_4\text{SO}_3^- \rightarrow \text{SO}_4^{2-}$ <i>See also</i> 1.632.	6	1.3×10^9 (rel.)	$k/k_{\text{N}_2\text{O}} = 0.15$	γ -r.	opt.	c.k. with N_2O assuming $k(e_{aq}^- + \text{N}_2\text{O}) = 8.67 \times 10^9$; obs. buildup of sulfate ion.	71-0932
S1.421	toluidine	11	$(2.0 \pm 0.5) \times 10^7$	—	f.phot.	opt.	d.k.	72-0423
S1.422	<i>o</i> -tolyl- β -D-glucopyranoside	—	4.1×10^7	—	p.r.	opt.	d.k.	71-0056
S1.423	<i>m</i> -tolyl- β -D-glucopyranoside	—	1.4×10^8	—	p.r.	opt.	d.k.	71-0056
S1.424	<i>p</i> -tolyl- β -D-glucopyranoside	—	6.1×10^7	—	p.r.	opt.	d.k.	71-0056
S1.425	<i>p</i> -tolyl- β -D-thioglucopyranoside	—	3.9×10^9	—	p.r.	—	—	70-1056
S1.426	triamcinolone	—	3.5×10^{10}	—	p.r.	—	—	70-1056
S1.427	triamcinolone acetone	—	3.5×10^{10}	—	p.r.	—	—	70-1056
S1.428	trimethylhydrazine	10.4	$\sim 10^8$	—	p.r.	opt.	d.k.	72-0003
S1.429	trimethylhydrazinium ion	5.4	$1.3 \times 10^{10} (\pm 15\%)$	—	p.r.	opt.	d.k.	72-0003
S1.430	trimethylphosphate $e_{aq}^- + (\text{CH}_3\text{O})_3\text{PO} \rightarrow \cdot\text{CH}_3 + (\text{CH}_3\text{O})_2\text{PO}_2^-$	—	2×10^5	—	p.r.	—	—	72-3008
S1.431	1,3,5-trioxane tropolcarbinol <i>See</i> hydroxycycloheptatriene (S1.285). tryptaflavin <i>See</i> acriflavine (1.298a, S1.98).	11	$\sim 10^6$	—	f.phot.	opt.	d.k.; H_2 - satd.	71-7345
S1.432	trypsin	~ 7	$(3.5 \pm 0.8) \times 10^{10}$	—	p.r.	opt.	d.k. at 600 nm as well as p.b.k. at 430 nm.	71-3069
S1.433	trypsinogen	~ 7	$(2.5 \pm 0.5) \times 10^{10}$	—	p.r.	opt.	d.k. at 600 nm as well as p.b.k. at 430 nm.	71-3069
S1.434	tryptophan	6.0- 6.6 <i>See also</i> 1.643.	4.3×10^8	—	f.phot.	opt.	d.k.	71-7350
S1.435	tyramine, positive ion negative ion	6.9 11.2	$(3.5 \pm 0.2) \times 10^8$ $(5.8 \pm 0.5) \times 10^7$	—	p.r.	opt.	d.k.; $pK_a = 9.5, 10.8$.	73-0003

TABLE 3. Reactions of hydrated electrons with organic solutes — Continued

No.	Solute and Reaction	pH	$k(\text{dm}^3 \text{mol}^{-1} \text{s}^{-1})$	Ratio	Source	Method	Comment	Ref.
S1.436	tyrosine, zwitterion negative ion	~ 6 6.6 12.5	1.8×10^8 $(2.8 \pm 0.5) \times 10^8$ $(9.6 \pm 1.0) \times 10^7$ <i>See also</i> 1.645-6.	— —	f.phot. p.r.	opt. opt.	d.k. d.k.; $pK_a = 2.2$, 9.1, 10.1.	71-7350 73-0003
S1.437	uracil	— 7 11	1.5×10^{10} 1.5×10^{10} 3.0×10^9 <i>See also</i> 1.647-8.	— —	p.r. p.r.	opt. opt.	d.k. (e_{aq}^-) or p.b.k. (radical anion). d.k.; little change in k on addition of surfactants.	73-3016 73-3013
S1.438	uracil poly- nucleotides (poly U)	7	7.5×10^8 <i>See also</i> 1.649.	—	p.r.	opt.	d.k.; mol. wt. 2×10^5 ; k per base unit.	71-0375
S1.439	vinyl acetate	11	$1.7 \times 10^9 (\pm 15\%)$	—	f.phot.	opt.	d.k.; H_2 -satd.	71-7345
S1.440	vinyl benzoate	11	$7.3 \times 10^9 (\pm 15\%)$	—	f.phot.	opt.	d.k.; H_2 -satd.	71-7345
S1.441	vinyl isobutyl ether	11	$\sim 10^7$	—	f.phot.	opt.	d.k.; H_2 -satd.	71-7345
S1.442	<i>N</i> -vinylpyrroli- done Vitamin B ₁₂ <i>See</i> cyanocobalamin (S1.190). Vitamin K ₃ <i>See</i> 2-methyl-1,4-naphthoquinone (S1.333).	11	$2 \times 10^9 (\pm 15\%)$	—	f.phot.	opt.	d.k.; H_2 -satd.	71-7345
S1.443	xlenol orange	11	$(5.2 \pm 0.4) \times 10^9$	—	f.phot.	opt.	d.k.	71-0437

Formula Index

- Ag^+ , 1.11
 AgH_6N_2^+ Diamminesilver(I) ion, 1.12
 Al^{3+} , 1.16
 AlH_4O_4^- Aluminate ion, 1.17
 AsF_6^- Hexafluoroarsenate(V) ion, 1.24
 AsHO_4^{2-} Arsenate ion, 1.23
 AsO_2^- Arsenite ion, 1.22
 BF_4^- Tetrafluoroborate ion, 1.26
 $\text{BrCoH}_{15}\text{N}_5^{2+}$ Bromopentaamminecobalt(III) ion, 1.67
 $\text{BrH}_{15}\text{N}_5\text{Ru}^{2+}$ Bromopentaammineruthenium(III) ion, S1.56
 BrO^- Hypobromite ion, 1.28
 BrO_2^- Bromite ion, 1.29
 BrO_3^- Bromate ion, 1.30
 BrO_4^- Perbromate ion, S1.6
 Br_2^- Bromine molecule ion, 1.27
 CBrF_3 Bromotrifluoromethane, 1.347a
 CClF_3 Chlorotrifluoromethane, 1.378
 CCl_2F_2 Dichlorodifluoromethane, 1.399a
 CCl_3F Trichlorofluoromethane, 1.635
 CCl_4 Carbon tetrachloride, 1.355
 CF_3I Trifluoroiodomethane, 1.638a
 CHCl_3 Chloroform, 1.367
 CHN Hydrogen cyanide, S1.7
 CHO_2^- Formate ion, 1.434
 CHO_3^- Bicarbonate ion, 1.33
 CH_2Cl_2 Methylene chloride, S1.321
 CH_2I_2 Methylene iodide, S1.322
 CH_2O Formaldehyde, 1.432
 CH_2O_2 Formic acid, 1.435, S1.246
 CH_3Cl Chloromethane, 1.367a, S1.174
 CH_3I Iodomethane, 1.495
 CH_3NO Formamide, 1.433, S1.245
 CH_3NO_2 Nitromethane, 1.553, 1.554, S1.348
 CH_3NO_2^- Nitromethane anion, S1.349
 CH_4 Methane, 1.519
 $\text{CH}_4\text{N}_2\text{O}$ Urea, 1.650
 $\text{CH}_4\text{N}_2\text{S}$ Thiourea, 1.624
 $\text{CH}_4\text{N}_2\text{Se}$ Selenourea, 1.609
 CH_4O Methanol, 1.521
 CH_4S Methanethiol, 1.520
 CH_5NO *N*-Methylhydroxylamine, S1.328;
 O-Methylhydroxylamine, S1.329
 CH_5N_3 Guanidine, 1.463, 1.464
 CH_6N^+ Methylammonium ion, 1.524
 CH_6NO^+ *N*-Methylhydroxylammonium ion, S1.330;
 O-Methylhydroxylammonium ion, S1.331
 CH_6N_2 Methylhydrazine, S1.325
 CH_7N_2^+ Methylhydrazinium ion, S1.326
 $\text{CH}_{14}\text{CoN}_5\text{O}^{2+}$ Cyanoaquotetraamminecobalt(III) ion, 1.71
 $\text{CH}_{15}\text{CoN}_6^{2+}$ Cyanopentaamminecobalt(III) ion, 1.68
 $\text{CH}_{15}\text{CoN}_6\text{S}^{2+}$ Thiocyanatopentaamminecobalt(III) ion, 1.69
 CN^- Cyanide ion, 1.35
 CNO^- Cyanate ion, 1.36
 CNS^- Thiocyanate ion, 1.37, S1.9
 CN_3O_6^- Trinitromethyl ion, 1.642
 CN_4O_8 Tetranitromethane, 1.618
 CO Carbon monoxide, 1.31
 CO_2 Carbon dioxide, 1.32
 CO_3^{2-} Carbonate ion, 1.34
 CS_2 Carbon disulfide, 1.354, S1.164
 C_2AgN_2^- Dicyanoargentate(I) ion, 1.13
 C_2AuN_2^- Dicyanoaurate(I) ion, 1.25
 $\text{C}_2\text{Cl}_3\text{O}_2^-$ Trichloroacetate ion, 1.634
 C_2Cl_4 Tetrachloroethylene, 1.633a
 $\text{C}_2\text{F}_3\text{O}_2^-$ Trifluoroacetate ion, 1.637
 $\text{C}_2\text{HCl}_2\text{O}_2^-$ Dichloroacetate ion, 1.396a
 C_2HCl_3 1,1,2-Trichloroethylene 1.634a
 C_2HO_4^- Oxalate ion, 1.570
 C_2H_2 Acetylene, 1.295
 $\text{C}_2\text{H}_2\text{BrO}_2^-$ Bromoacetate ion, 1.335
 $\text{C}_2\text{H}_2\text{ClO}_2^-$ Chloroacetate ion, 1.358
 $\text{C}_2\text{H}_2\text{Cl}_2$ 1,1-Dichloroethylene, 1.399b;
 1,2-Dichloroethylene, 1.399c
 $\text{C}_2\text{H}_2\text{FO}_2^-$ Fluoroacetate ion, 1.423
 $\text{C}_2\text{H}_2\text{IO}_2^-$ Iodoacetate ion, 1.488
 $\text{C}_2\text{H}_2\text{NO}_3^-$ Oxamate ion, 1.572, S1.359
 $\text{C}_2\text{H}_2\text{O}_3$ Glyoxylic acid, S1.273
 $\text{C}_2\text{H}_2\text{O}_4$ Oxalic acid, 1.571
 $\text{C}_2\text{H}_3\text{Cl}$ Vinyl chloride, 1.658a
 $\text{C}_2\text{H}_3\text{ClO}_2$ Chloroacetic acid, 1.359
 $\text{C}_2\text{H}_3\text{Cl}_3\text{O}_2$ Chloral hydrate, S1.171
 $\text{C}_2\text{H}_3\text{N}$ Acetonitrile, 1.292
 $\text{C}_2\text{H}_3\text{O}_2^-$ Acetate ion, 1.287, S1.77
 $\text{C}_2\text{H}_3\text{O}_2\text{S}^-$ Thioglycolate ion, 1.621, S1.416
 C_2H_4 Ethylene, 1.419
 $\text{C}_2\text{H}_4\text{CdNO}_2^+$ Glycinatocadmium(II) ion, 1.43
 $\text{C}_2\text{H}_4\text{INO}$ Iodoacetamide, S1.292
 $\text{C}_2\text{H}_4\text{NNiO}_2^+$ Glycinatonickel(II) ion, 1.196
 $\text{C}_2\text{H}_4\text{N}_2\text{O}_2$ Oxamide, S1.360
 $\text{C}_2\text{H}_4\text{O}$ Acetaldehyde, 1.284
 $\text{C}_2\text{H}_4\text{O}_2$ Acetic acid, 1.288, S1.78
 $\text{C}_2\text{H}_4\text{O}_3$ Glycolic acid, S1.260
 $\text{C}_2\text{H}_5\text{Br}$ 1-Bromoethane, 1.339
 $\text{C}_2\text{H}_5\text{BrO}$ 2-Bromoethanol, 1.340
 $\text{C}_2\text{H}_5\text{ClO}$ 2-Chloroethanol, 1.366, S1.173
 $\text{C}_2\text{H}_5\text{I}$ Iodoethane, 1.494
 $\text{C}_2\text{H}_5\text{NO}$ Acetaldoxime, 1.285; Acetamide, 1.286, S1.75;
 N-Methylformamide, 1.530, S1.323
 $\text{C}_2\text{H}_5\text{NO}_2$ Glycine, 1.443–1.445, S1.256–S1.258;
 Glycine, copper salt, 1.116a;
 Hydroxyacetamide, S1.284
 $\text{C}_2\text{H}_5\text{N}_3\text{O}_2$ Biuret, S1.154
 $\text{C}_2\text{H}_5\text{O}_3\text{S}^-$ Ethanesulfonate ion, S1.234
 $\text{C}_2\text{H}_6\text{N}_2\text{O}$ 2-Aminoacetamide(glycine amide), S1.115
 $\text{C}_2\text{H}_6\text{O}$ Ethanol, 1.411
 $\text{C}_2\text{H}_6\text{OS}$ Dimethylsulfoxide, 1.405, S1.227;
 2-Mercaptoethanol, 1.514, S1.304
 $\text{C}_2\text{H}_6\text{S}$ Dimethylsulfide, 1.404
 $\text{C}_2\text{H}_7\text{N}$ Ethylamine, S1.236
 $\text{C}_2\text{H}_7\text{NS}$ Cysteamine(2-aminoethanethiol), 1.389, S1.193
 $\text{C}_2\text{H}_8\text{CdN}_2^{2+}$ Ethylenediaminecadmium(II) ion, 1.48
 $\text{C}_2\text{H}_8\text{N}^+$ Ethylammonium ion, 1.417, S1.237
 $\text{C}_2\text{H}_8\text{N}_2$ 1,1-Dimethylhydrazine, S1.222;
 1,2-Dimethylhydrazine, S1.223
 $\text{C}_2\text{H}_8\text{N}_2\text{Ni}^{2+}$ Ethylenediaminenickel(II) ion, 1.202
 $\text{C}_2\text{H}_8\text{N}_2^+$ 1,1-Dimethylhydrazinium ion, S1.220;
 1,2-Dimethylhydrazinium ion, S1.221
 $\text{C}_2\text{H}_{10}\text{Tl}^+$ Diethylthallium ion, 1.401
 $\text{C}_2\text{H}_{18}\text{CoN}_5\text{O}_2^{2+}$ Acetatopentaamminecobalt(III) ion, 1.72
 C_2N_2 Cyanogen, S1.8
 $\text{C}_2\text{O}_4^{2-}$ Oxalate ion, 1.569
 $\text{C}_3\text{H}_2\text{NO}_2^-$ Cyanoacetate ion, 1.382

$C_3H_2O_4^{2-}$ Malonate ion, S1.302
 $C_3H_3F_3O$ α,α,α -Trifluoroacetone, 1.638
 $C_3H_3F_3O_2$ Methyl trifluoroacetate, 1.537
 C_3H_3N Acrylonitrile, S1.102
 C_3H_3NS Thiazole, 1.619
 $C_3H_3O_2^-$ Acrylate ion, S1.100
 $C_3H_3O_3^-$ Pyruvate ion, 1.601
 $C_3H_3O_4^-$ Hydrogen malonate ion, 1.513, S1.301
 $C_3H_4BrO_2^-$ 2-Bromopropionate ion, 1.346;
 3-Bromopropionate ion, 1.347
 $C_3H_4ClO_2^-$ 2-Chloropropionate ion, 1.375;
 3-Chloropropionate ion, 1.376
 $C_3H_4IO_2^-$ 2-Iodopropionate ion, 1.497;
 3-Iodopropionate ion, S1.233
 $C_3H_4N_2$ Imidazole, 1.484
 $C_3H_4N_2O_3$ Barbituric acid, S1.130
 $C_3H_4O_2$ Acrylic acid, S1.101
 $C_3H_4O_4$ Malonic acid, S1.303
 C_3H_5FO Fluoroacetone, 1.424
 $C_3H_5FO_2$ Methyl fluoroacetate, 1.529
 C_3H_5N Propionitrile, 1.593
 C_3H_5NO Acrylamide, 1.299, S1.99
 $C_3H_5NO_3$ *N*-Formylglycine, S1.247
 $C_3H_5O_2S^-$ 2-Mercaptopropionate ion, S1.304a;
 3-Mercaptopropionate ion, S1.305
 $C_3H_5O_3^-$ Lactate ion, 1.501, S1.296
 C_3H_6ClNO 2-Chloropropionamide, 1.373;
 3-Chloropropionamide, 1.374
 $C_3H_6N_2O_2$ Malonamide, S1.300
 C_3H_6O Acetone, 1.289, S1.80; Allyl alcohol, 1.309
 $C_3H_6O_2$ Propionic acid, S1.386
 $C_3H_6O_2S$ 2-Mercaptopropionic acid, S1.306;
 3-Mercaptopropionic acid, S1.307;
 Methyl thioglycolate, S1.336
 $C_3H_6O_3$ Lactic acid, S1.297; Methyl 2-hydroxyacetate,
 1.532, S1.327; 1,3,5-Trioxane, S1.431
 C_3H_7Br 1-Bromopropane, 1.345
 C_3H_7Cl 1-Chloropropane, 1.372
 C_3H_7I 1-Iodopropane, 1.496
 C_3H_7NO Acetone oxime, 1.291, S1.81;
 N,N-Dimethylformamide, 1.403, S1.218;
 Propionamide, 1.592, S1.385
 $C_3H_7NO_2$ Alanine, 1.303–1.304, S1.110;
 β -Alanine, 1.305, S1.111;
 2-Hydroxypropionamide, S1.288;
 Methyl 2-aminoacetate, 1.523, S1.318
 Sarcosine, 1.608
 $C_3H_7NO_2S$ Cysteine, 1.390–1.392, S1.194
 $C_3H_7NO_3$ Serine, 1.610
 C_3H_9N Isopropylamine, 1.500a; Propylamine, S1.387
 $C_3H_9N_3S$ Mercaptoethylguanidine, 1.515
 $C_3H_9O_4P$ Trimethylphosphate, S1.430
 $C_3H_{10}N^+$ Propylammonium ion, 1.593a, S1.388
 $C_3H_{10}N_2$ Trimethylhydrazine, S1.428
 $C_3H_{11}N_2^+$ Trimethylhydrazinium ion, S1.429
 $C_3O_5^{2-}$ Oxomalonate ion, S1.362
 $C_4CdN_4^{2-}$ Tetracyanocadmiate(II) ion, 1.42
 $C_4H_2O_4^{2-}$ Fumarate ion, 1.436; Maleate ion, 1.512, S1.299
 $C_4H_3BrN_2O_2$ 5-Bromouracil, 1.348, S1.159
 $C_4H_3ClN_2O_2$ 5-Chlorouracil, S1.178
 $C_4H_3FN_2O_2$ 5-Flourouracil, S1.244
 $C_4H_3IN_2O_2$ Iodouracil, 1.499
 $C_4H_3N_3O_4$ 5-Nitouracil, S1.355
 $C_4H_3N_3O_5$ 5-Nitobarbituric acid, S1.340
 $C_4H_3O_4^-$ Hydrogen maleate ion, 1.511, S1.299
 $C_4H_3O_5^-$ Oxalacetate ion, 1.568, S1.358
 $C_4H_4CrO_{10}^-$ Dioxalatodiaquochromate(III) ion, 1.111
 $C_4H_4N_2O_2$ Uracil, 1.647, 1.648, S1.437
 $C_4H_4N_2O_2S$ Thiobarbituric acid, 1.620
 C_4H_4O Furan, 1.437
 $C_4H_4O_4^{2-}$ Succinate ion, 1.614, S1.401
 $C_4H_4O_4S^{2-}$ Thiodiacetate ion, S1.414
 $C_4H_4O_4S_2^{2-}$ 2,2'-Dithiobisacetate ion, S1.229
 $C_4H_4O_5^{2-}$ Malate ion, 1.510
 C_4H_4S Thiophene, 1.622
 C_4H_5N 3-Butenenitrile, 1.351; Pyrrole, 1.597
 $C_4H_5NO_2$ Methyl cyanoacetate, 1.526;
 Succinimide, 1.615, S1.403
 $C_4H_5NO_4^{2-}$ Aspartate ion, 1.322
 $C_4H_5N_3$ 2-Aminopyrimidine, 1.313
 $C_4H_5N_3O$ Cytosine, 1.396, S1.204
 $C_4H_5O_2^-$ *trans*-Crotonate ion, S1.188;
 Methacrylate ion, 1.518, S1.309
 $C_4H_5O_3^-$ Acetoacetate ion, S1.79
 $C_4H_5O_4^-$ Succinate ion, 1.613, S1.401
 C_4H_6 Butadiene, 1.349
 $C_4H_6NO_4^-$ Aspartate ion, 1.321
 $C_4H_6N_2O_2$ Glycine anhydride, S1.259;
 Hydrouracil, 1.474
 $C_4H_6O_2$ 2,3-Butanedione, 1.350; *trans*-Crotonic acid,
 S1.189; Methacrylic acid, S1.310; Methyl
 acrylate, S1.315; Vinyl acetate, S1.439
 $C_4H_6O_4$ Succinic acid, S1.402
 C_4H_7NO 2-Pyrrolidone, 1.600; Methacrylamide, S1.308
 $C_4H_7NO_2$ Diacetamide, S1.208
 $C_4H_7NO_3$ *N*-Acetyl glycine, 1.296, S1.87
 $C_4H_7NO_4$ Aspartic acid, S1.128
 $C_4H_8CdN_2O_4$ Bis(glycinato)cadmium(II), 1.44
 $C_4H_8NO_2^-$ 4-Aminobutyrate ion, 1.312
 $C_4H_8N_2NiO_4$ Bis(glycinato)nickel(II), 1.197
 $C_4H_8N_2O_2$ *N*-Acetyl glycine amide, S1.88;
 Succinamide, S1.400
 $C_4H_8N_2O_3$ Asparagine, 1.319, 1.320;
 Glycylglycine, 1.450–1.452, S1.261, S1.262
 $C_4H_8O_2$ Ethyl acetate, 1.415; 3-Hydroxy-2-butanone, 1.480;
 Methyl propionate, 1.536
 C_4H_9Br 1-Bromobutane, 1.338
 C_4H_9Cl 1-Chlorobutane, 1.364; 2-Chlorobutane, 1.365;
 1-Chloro-2-methylpropane, 1.368
 C_4H_9I 1-Iodobutane, 1.493
 C_4H_9N Pyrrolidine, 1.598, 1.599
 C_4H_9NO *N*-Ethylacetamide, 1.414;
 N,N-Dimethylacetamide, S1.215
 C_4H_9NOS *N*-Acetylcysteamine, S1.85
 $C_4H_9NO_2$ Ethyl 2-aminoacetate, 1.416; Threonine, 1.625
 $C_4H_9NO_2S$ Cysteine, methyl ester, S1.195;
 Homocystine, 1.470; *S*-Methylcysteine, S1.319
 $C_4H_9NO_3$ 2-Methyl-2-nitro-1-propanol, 1.556
 $C_4H_9NO_4$ 2-Methyl-2-nitro-1,3-propanediol, 1.555
 $C_4H_9N_3O$ Acetone semicarbazone, 1.290
 $C_4H_9N_3O_2$ Creatine, 1.381; Glycylglycine amide, S1.263
 $C_4H_{10}N^+$ Pyrrolidinium ion, 1.599
 $C_4H_{10}O$ *tert*-Butyl alcohol, 1.352; Ethyl ether, 1.421
 $C_4H_{10}S$ *tert*-Butyl mercaptan, 1.353
 $C_4H_{11}N$ Butylamine, S1.161
 $C_4H_{11}NO$ *N,N*-Diethylhydroxylamine, S1.212
 $C_4H_{12}N^+$ Butylammonium ion, S1.162;
 tert-Butylammonium ion, 1.352a

- $C_4H_{12}NO^+$ *N,N*-Diethylhydroxylammonium ion, S1.211
 $C_4H_{12}N_2S_2$ Cystamine, 1.388, S1.192
 $C_4H_{16}CdN_4^{2+}$ Bis(ethylenediamine)cadmium(II) ion 1.49
 $C_4H_{16}Cl_2CoN_4^+$ Dichlorobis(ethylenediamine)cobalt(III) ion, 1.87
 $C_4H_{16}Cl_2CrN_4^+$ Dichlorobis(ethylenediamine)chromium(III) ion, 1.107
 $C_4H_{16}CoF_2N_4^+$ Difluorobis(ethylenediamine)cobalt(III) ion, 1.86
 $C_4H_{16}N_4Ni^{2+}$ Bis(ethylenediamine)nickel(II) ion, 1.203
 $C_4H_{18}ClCoN_5^{2+}$ Chloroamminebis(ethylenediamine)cobalt(III) ion, 1.89
 $C_4H_{18}CoFN_4O^{2+}$ Fluoroaquo-bis(ethylenediamine)cobalt(III) ion, 1.91
 $C_4H_{18}CoN_5O_4^+$ Fumaratopentamminecobalt(III) ion, 1.73
 $C_4H_{18}CoN_6O_2^{2+}$ Nitroamminebis(ethylenediamine)cobalt(III) ion, 1.90
 $C_4HgN_4^{2-}$ Tetracyanomercurate(II) ion, 1.150
 $C_4N_4Ni^{2-}$ Tetracyanonickelate(II) ion, 1.195
 $C_4N_4Pd^{2-}$ Tetracyanopalladate(II) ion, 1.221
 $C_4N_4Pt^{2-}$ Tetracyanoplatinate(II) ion, 1.226, S1.53
 $C_4N_4Zn^{2-}$ Tetracyanozincate(II) ion, 1.279
 $C_5ClCoN_5^{3-}$ Chloropentacyanocobaltate(III) ion, 1.77
 $C_5CoIN_5^{3-}$ Iodopentacyanocobaltate(III) ion, S1.20
 $C_5CoN_5^{3-}$ Pentacyanocobaltate(II) ion, 1.59, S1.14
 $C_5CoN_6O^{3-}$ Pentacyanonitrosylcobaltate(III) ion, S1.21
 $C_5CoN_6O_2^{3-}$ Nitropentacyanocobaltate(III) ion, 1.80
 $C_5CoN_8^{3-}$ Azidopentacyanocobaltate(III) ion, 1.79
 $C_5CrN_6O^{3-}$ Pentacyanonitrosylchromate(III) ion, S1.23
 $C_5FeN_6O^{2-}$ Pentacyanonitrosylferrate(III) ion, 1.138
 $C_5HCoN_5^{3-}$ Hydridopentacyanocobaltate(III) ion, S1.16
 $C_5HCoN_5O^{3-}$ Hydroxypentacyanocobaltate(III) ion, 1.78, S1.19
 $C_5H_2BrN_2O_4^-$ 5-Bromoorotate ion, S1.155
 $C_5H_2CoN_5O^{2-}$ Aquopentacyanocobaltate(III) ion, S1.18
 $C_5H_2NO_5^-$ 5-Nitrofuroate ion, S1.347
 $C_5H_3BrN_2O_4$ 5-Bromoorotic acid, S1.156
 $C_5H_3FeN_6^{3-}$ Pentacyanoammineferrate(II) ion, 1.35
 $C_5H_3NO_4$ 5-Nitro-2-furaldehyde, S1.343
 $C_5H_3N_2O_4^-$ Isoorotate ion, 1.500c; Orotate ion, 1.567
 $C_5H_3N_3O_6$ 5-Nitroorotic acid, S1.351
 $C_5H_4N_2O_4$ *anti*-5-Nitro-2-furaldoxime, S1.346
 $C_5H_4N_4$ Purine, 1.595, S1.389
 $C_5H_4N_4O$ Hypoxanthine, 1.483
 $C_5H_4N_4O_3$ Uric acid, 1.651
 $C_5H_4O_5^{2-}$ 2-Oxoglutarate ion, 1.573, S1.361
 C_5H_5N Pyridine, 1.596, S1.391
 $C_5H_5N_2O_4^-$ Hydrooorotate ion, 1.472a
 $C_5H_5N_3O_4$ 5-Nitro-6-methyluracil, S1.350
 $C_5H_5N_5$ Adenine, 1.300, S1.105
 $C_5H_5N_5O$ Guanine, S1.274
 $C_5H_5O_4^-$ Methyl fumarate ion, S1.324
 $C_5H_6N_2O_2$ 6-Methyluracil, 1.539; Thymine, 1.627, S1.418
 $C_5H_7NO_2$ Ethylcyanoacetate, 1.418;
N-Methylsuccinimide, S1.335
 $C_5H_7N_3O$ 1-Methylcytosine, S1.320;
5-Methylcytosine, 1.527
 $C_5H_8NO_4^-$ Glutamate ion, 1.440
 $C_5H_8N_2O_2$ Hydrothymine, 1.473a
 $C_5H_8O_2$ Ethyl acrylate, S1.235; Methyl methacrylate, S1.332
 $C_5H_9NO_2$ Proline, 1.590, 1.591
 $C_5H_9NO_3$ *N*-Acetylalanine, 1.293, 1.294;
N-Acetylglycine, methyl ester, S1.89;
N-Acetylsarcosine, S1.96; Hydroxyproline, 1.482
 $C_5H_9NO_3S$ *N*-Acetylcysteine, S1.86
 $C_5H_{10}N_2O_3$ Alanine, 1.307; Glycylalanine, 1.447;
Glycylsarcosine, S1.272; Sarcosylglycine, S1.395
 $C_5H_{10}O_2$ Pivalic acid, 1.588
 $C_5H_{10}O_4$ Deoxyribose, S1.205
 $C_5H_{10}O_5$ Arabinose, 1.315; Ribose, 1.605; Xylose, 1.661
 $C_5H_{11}NO$ Pivalamide, S1.380
 $C_5H_{11}NO_2$ Valine, 1.657, 1.658
 $C_5H_{11}NO_2S$ 3-Mercaptovaline (Penicillamine), 1.517, S1.365; Methionine, 1.522, S1.314
 $C_5H_{13}N$ Amylamine, 1.313b, S1.121; Isoamylamine, 1.499a
 $C_5H_{14}N^+$ Amylammonium ion, S1.122
 $C_5H_{16}CoN_4O_3^+$ Carbonatobis(ethylenediamine)cobalt(III) ion, 1.88
 $C_6CoN_6^{3-}$ Hexacyanocobaltate(III) ion, 1.76, S1.15
 $C_6CoN_6S^{3-}$ Pentacyanothiocyantocobaltate(III) ion, S1.17
 $C_6CoO_{12}^{3-}$ Trioxalatocobaltate(III) ion, 1.82
 $C_6CrN_6^{3-}$ Hexacyanochromate(III) ion, 1.105
 $C_6CrN_6^{4-}$ Hexacyanochromate(II) ion, 1.100
 $C_6CrO_{12}^{3-}$ Trioxalatochromate(III) ion, S1.24
 C_6F_6 Hexafluorobenzene, 1.465c, S1.279
 $C_6FeN_6^{3-}$ Hexacyanoferrate(III) ion, 1.137, S1.30
 $C_6FeN_6^{4-}$ Hexacyanoferrate(II) ion, 1.134
 C_6HF_5 Pentafluorobenzene, 1.573a, S1.367
 $C_6HFeN_6^{3-}$ Hydrogen hexacyanoferrate(II) ion, S1.29
 $C_6H_2F_4$ 1,2,3,4-Tetrafluorobenzene, 1.633b, S1.411
 $C_6H_2N_3O_7^-$ Picrate ion, 1.587
 $C_6H_3O_6^{3-}$ *cis*-Aconitate ion, 1.297
 $C_6H_4BrO^-$ *o*-Bromophenoxide ion, 1.341;
m-Bromophenoxide ion, 1.342;
p-Bromophenoxide ion, 1.344, S1.158
 $C_6H_4ClO^-$ *o*-Chlorophenoxide ion, 1.369;
m-Chlorophenoxide ion, 1.370;
p-Chlorophenoxide ion, 1.371
 $C_6H_4Cl_2$ *o*-Dichlorobenzene, 1.397;
m-Dichlorobenzene, 1.398;
p-Dichlorobenzene, 1.399
 $C_6H_4FO^-$ *o*-Fluorophenoxide ion, 1.429;
m-Fluorophenoxide ion, 1.430;
p-Fluorophenoxide ion, 1.431
 $C_6H_4F_2$ *o*-Difluorobenzene, S1.213;
p-Difluorobenzene, S1.214
 $C_6H_4NO_2^-$ Isonicotinate ion, 1.500b;
Nicotinate ion, 1.549;
Picolinate ion, 1.586a
 $C_6H_4NO_3^-$ *o*-Nitrophenoxide ion, 1.557;
m-Nitrophenoxide ion, 1.558;
p-Nitrophenoxide ion, 1.560
 $C_6H_4O_2$ *p*-Benzoquinone, 1.330, S1.138
 C_6H_5Br Bromobenzene, 1.336
 C_6H_5BrO *p*-Bromophenol, 1.343, S1.157
 C_6H_5Cl Chlorobenzene, 1.360
 C_6H_5F Fluorobenzene, 1.425, S1.243
 C_6H_5I Iodobenzene, 1.489
 C_6H_5NO Nitrosobenzene, 1.563
 $C_6H_5NO_2$ Nitrobenzene, 1.551, S1.341
 $C_6H_5NO_2^-$ Nitrobenzene anion, S1.342
 $C_6H_5NO_3$ *p*-Nitrophenol, 1.559, S1.352
 $C_6H_5O^-$ Phenoxide ion, 1.576, S1.370
 $C_6H_5O_2^-$ *p*-Hydroxyphenoxide ion, 1.473
 $C_6H_5O_3S^-$ Benzenesulfonate ion, 1.326
 $C_6H_5S^-$ Thiophenoxide ion, 1.623

- C_6H_6 Benzene, 1.324, S1.132
 $C_6H_6AlNO_6$ Nitrilotriacetatoaluminum (III), 1.19
 $C_6H_6AsO_3^-$ Phenylarsonate(V) ion, 1.581
 $C_6H_6NNiO_6^-$ Nitrilotriacetatonickelate (II) ion, 1.199
 $C_6H_6NO_3S^-$ Sulfanilate ion, 1.616, S1.406
 $C_6H_6NO_6^{3-}$ Nitrilotriacetate ion, 1.550
 $C_6H_6NO_6Zn^-$ Nitrilotriacetatozincate (II) ion, 1.281
 $C_6H_6N_2O$ Isonicotinamide, 1.500a; Nicotinamide, 1.546a
 $C_6H_6N_4O_4$ 5-Nitro-2-furaldehyde semicarbazone, S1.345
 C_6H_6O Phenol, 1.575, S1.369
 C_6H_7N Aniline, 1.314, S1.123
 C_6H_7NO Phenylhydroxylamine, 1.582
 $C_6H_7NO_2$ *N*-Ethylmaleimide, 1.421a, S1.239
 $C_6H_7NO_2S$ Benzenesulfonamide, 1.325, S1.133
 $C_6H_7NO_3S$ Sulfanilic acid, 1.616a, S1.407
 $C_6H_7N_5$ 2-Methyladenine, S1.316; 7-Methyladenine, S1.317
 $C_6H_7O_2^-$ Sorbate ion, S1.397
 $C_6H_7O_6^-$ Ascorbate ion, S1.127
 $C_6H_7O_7^-$ Citrate ion, 1.380; Isocitrate ion, 1.500
 C_6H_8 1,3-Cyclohexadiene, 1.384;
 1,4-Cyclohexadiene, 1.385
 $C_6H_8NO_3^-$ *N*-Ethylmaleamate ion, S1.238
 $C_6H_8N_2O_2$ 1,3-Dimethyluracil, 1.406;
 1,6-Dimethyluracil, 1.407;
 3,6-Dimethyluracil, 1.408;
 4-Ethoxyuracil, 1.413
 $C_6H_8N_2O_2S$ Sulfanilamide, 1.615b, S1.405
 $C_6H_8O_2$ Sorbic acid, S1.398
 $C_6H_8O_4$ Dimethyl fumarate, S1.219;
 Dimethyl maleate, S1.224
 $C_6H_8O_4S^{2-}$ 3,3'-Thiodipropionate ion, S1.415
 $C_6H_8O_4S_2^{2-}$ 2,2'-Dithiobispropionate ion, S1.230
 C_6H_9NO *N*-Vinylpyrrolidone, S1.442
 $C_6H_9N_2O_4$ *N*-Acetylglycylglycine, S1.90
 $C_6H_9N_3O_2$ Histidine, 1.466-1.468
 $C_6H_9O_7^-$ *D*-Glucuronate ion, 1.439a, S1.252
 C_6H_{10} Cyclohexene, 1.387
 $C_6H_{10}N_2O_2$ Alanine anhydride, S1.112;
 Sarcosine anhydride, S1.394
 $C_6H_{10}N_3O_6$ Glycylasparagine, 1.448, 1.449
 $C_6H_{10}O$ Cyclohexanone, 1.386
 $C_6H_{11}N_3O_3$ *N*-Acetylglycylglycine amide, S1.91
 $C_6H_{11}N_3O_4$ Glycylglycylglycine, 1.453-1.455,
 S1.266, S1.267
 $C_6H_{12}AlN_3O_6$ Tris(glycinato)aluminum(III), 1.18
 $C_6H_{12}CdN_3O_6^-$ Tris(glycinato)cadmate(II) ion, 1.45
 $C_6H_{12}CuN_3O_6^-$ Tris(glycinato)cuprate(II) ion, 1.117
 $C_6H_{12}HgN_3O_6^-$ Tris(glycinato)mercurate(II) ion, 1.151
 $C_6H_{12}MnN_3O_6^-$ Tris(glycinato)manganate(II) ion, 1.171
 $C_6H_{12}N_2O_3$ Alanylalanine, 1.306; Glycylglycine, ethyl
 ester, S1.264
 $C_6H_{12}N_2O_4S_2$ Cystine, 1.393, 1.394, S1.196, S1.197
 $C_6H_{12}N_2O_4Se_2$ Selenocystine, S1.396
 $C_6H_{12}N_3NiO_6^-$ Tris(glycinato)nickelate(II) ion, 1.198
 $C_6H_{12}N_3O_6Pb^-$ Tris(glycinato)plumbate(II) ion, 1.216
 $C_6H_{12}N_3O_6Zn^-$ Tris(glycinato)zincate(II) ion, 1.283
 $C_6H_{12}N_4O_3$ Glycylglycylglycine amide, S1.268
 $C_6H_{12}O$ Vinyl isobutyl ether, S1.441
 $C_6H_{12}O_2$ Methyl trimethylacetate, 1.538
 $C_6H_{12}O_6$ Glucose, 1.439
 $C_6H_{13}N$ Cyclohexylamine, 1.387a
 $C_6H_{13}NO$ *N*-*tert*-Butylacetamide, S1.160;
 N,N-Diethylacetamide, S1.210
 $C_6H_{13}NO_2$ Leucine, 1.502; Norleucine, 1.566
 $C_6H_{13}NO_5$ 2-Amino-2-deoxy-*D*-galactose, S1.118;
 Glucosamine, 1.438
 $C_6H_{13}NO_8S$ 2-Deoxy-2-sulfoamino-*D*-glucose, S1.206
 $C_6H_{14}N_2O_2$ Lysine, 1.508
 $C_6H_{14}N_4O_2$ Arginine, 1.316-1.318
 $C_6H_{14}O_6$ Sorbitol, 1.611
 $C_6H_{16}CoN_6S_2^+$ Dithiocyanatobis(ethylenediamine)cobalt(III)
 ion, 1.92
 $C_6H_{16}CrN_6S_2^+$ Dithiocyanatobis(ethylenediamine)-
 chromium(III) ion, 1.108
 $C_6H_{16}N_6S_2$ Bis(2-guanidinoethyl)disulfide, 1.516
 $C_6H_{24}CdN_6^{2+}$ Tris(ethylenediamine)cadmium(II) ion, 1.50
 $C_6H_{24}CoN_6^{3+}$ Tris(ethylenediamine)cobalt(III) ion, 1.85
 $C_6H_{24}CrN_6^{3+}$ Tris(ethylenediamine)chromium(III) ion, 1.106
 $C_6H_{24}CuN_6^{2+}$ Tris(ethylenediamine)copper(II) ion, 1.121
 $C_6H_{24}HgN_6^{2+}$ Tris(ethylenediamine)mercury(II) ion, 1.149
 $C_6H_{24}NiN_6^{2+}$ Tris(ethylenediamine)nickel(II) ion, 1.204
 $C_6H_{24}PbN_6^{2+}$ Tris(ethylenediamine)lead(II) ion, 1.219
 $C_6H_{24}ZnN_6^{2+}$ Tris(ethylenediamine)zinc(II) ion, 1.278
 $C_6MnN_6^{4-}$ Hexacyanomanganate(II) ion, 1.174
 C_6N_4 Tetracyanoethylene, 1.617
 $C_6N_6Os^{4-}$ Hexacyanoosmate(II) ion, 1.207
 $C_6N_6Ru^{4-}$ Hexacyanoruthenate(II) ion, 1.231
 $C_7H_4BrO_2^-$ *p*-Bromobenzoate ion, 1.337
 $C_7H_4ClO_2^-$ *o*-Chlorobenzoate ion, 1.361;
 m-Chlorobenzoate ion, 1.362;
 p-Chlorobenzoate ion, 1.363
 $C_7H_4FO_2^-$ *o*-Fluorobenzoate ion, 1.426;
 m-Fluorobenzoate ion, 1.427;
 p-Fluorobenzoate ion, 1.428
 $C_7H_4IO_2^-$ *o*-Iodobenzoate ion, 1.490;
 m-Iodobenzoate ion, 1.491;
 p-Iodobenzoate ion, 1.492
 $C_7H_5Cl_3$ α,α,α -Trichlorotoluene, 1.636
 $C_7H_5F_3$ α,α,α -Trifluorotoluene, 1.639
 C_7H_5N Benzonitrile, 1.328
 C_7H_5NO *o*-Hydroxybenzonitrile, 1.477;
 m-Hydroxybenzonitrile, 1.478;
 p-Hydroxybenzonitrile, 1.479
 $C_7H_5N_4O_5$ Furamazole, S1.250
 $C_7H_5O_2^-$ Benzoate ion, 1.327
 $C_7H_5O_3^-$ *m*-Hydroxybenzoate ion, 1.475;
 p-Hydroxybenzoate ion, 1.476;
 Salicylate ion, 1.607
 $C_7H_6NO_2^-$ *p*-Aminobenzoate ion, 1.310, S1.116
 $C_7H_6N_2$ *o*-Aminobenzonitrile, 1.311
 $C_7H_6O_2$ Benzoic acid, 1.327a, S1.135
 C_7H_7Br Benzyl bromide, S1.145
 C_7H_7Cl Benzyl chloride, 1.332, S1.146;
 p-Chlorotoluene, 1.377
 C_7H_7I *p*-Iodotoluene, 1.498
 C_7H_7N Vinylpyridine, 1.659
 C_7H_7NO Benzamide, 1.323, S1.131
 $C_7H_7NO_2$ *p*-Nitrotoluene, 1.565
 $C_7H_7O_3S^-$ *p*-Toluensulfonate ion, 1.632, S1.420
 C_7H_8 Cycloheptatriene, S1.191; Toluene, 1.631
 $C_7H_8N^+$ Vinylpyridinium ion, 1.660
 C_7H_8O Benzyl alcohol, 1.331, S1.144; *p*-Cresol, S1.186;
 Hydroxycycloheptatriene, S1.285
 C_7H_8S Benzyl mercaptan, S1.149
 C_7H_9N Benzylamine, 1.331a; *p*-Toluidine, S1.421
 $C_7H_9N_2O$ 1-Methylnicotinamide, 1.535
 $C_7H_{10}N_2O_2$ 4-Ethoxy-1-methyluracil, 1.412;
 1,3,5-Trimethyluracil, 1.641

$C_7H_{10}N_4O_2S$ Sulfaguanidine, S1.404
 $C_7H_{12}N_2O_3$ Glycylproline, 1.459
 $C_7H_{13}N_3O_4$ β -Alanylglycylglycine, S1.113;
 Glycylglycyl- β -alanine, S1.265
 $C_7H_{14}N_2O_3$ Glycylvaline, 1.462
 $C_7H_{14}N_2O_4S_2$ Djenkolic acid, 1.409
 $C_7H_{15}NO$ *N,N*-Dimethylpivalamide, S1.226
 $C_8H_4NO_2^-$ *p*-Cyanobenzoate ion, 1.383
 $C_8H_4N_2$ 1,4-Dicyanobenzene, S1.209
 $C_8H_4O_4^{2-}$ *o*-Phthalate ion, 1.583, 1.584;
 m-Phthalate ion, 1.585;
 p-Phthalate ion, 1.586
 $C_8H_6ClO_2^-$ 2-Chloro-2-phenylacetate ion, S1.175
 $C_8H_6NO_4^-$ *p*-Nitrophenylacetate ion, 1.561
 $C_8H_6N_4O_5$ Furadantin, S1.249
 $C_8H_6O_4$ Phthalic acid, S1.379
 C_8H_7N Indole, 1.487, S1.289; *p*-Tolunitrile, 1.633
 C_8H_7NS Benzyl thiocyanate, S1.153
 $C_8H_7O_2^-$ Phenylacetate ion, 1.577, S1.372
 $C_8H_7O_2^-$ *o*-Toluate ion, 1.628; *m*-Toluate ion, 1.629;
 p-Toluate ion, 1.630
 C_8H_8 Styrene, 1.612
 $C_8H_8INO_3$ Iodotyrosine, S1.294
 $C_8H_8N_2O_3$ Nicotinuric acid, 1.549a
 C_8H_8O Acetophenone, S1.82
 $C_8H_8O_2$ Benzyl formate, S1.147
 C_8H_9Cl 1-Chloro-2-phenylethane, S1.176
 $C_8H_9NO_2$ Phenylglycine, S1.377
 $C_8H_{10}N_2O$ *p*-Nitrosodimethylaniline, 1.564
 $C_8H_{10}N_2O_3S$ Sulfacetamide, 1.615a
 $C_8H_{11}N$ Phenethylamine, 1.574a
 $C_8H_{11}NO$ Tyramine, S1.435
 $C_8H_{12}NO_2$ Norpseudopelletierine *N*-oxyl, S1.356
 $C_8H_{12}N_2O_2$ 2,4-Diethoxypyrimidine, 1.400
 $C_8H_{12}N_2O_3S$ 6-Aminopenicillanic acid, S1.119
 $C_8H_{13}N_3O_5$ *N*-Acetylglycylglycylglycine, S1.92
 $C_8H_{13}O_2S_2^-$ Lipoate ion, 1.507, S1.298
 $C_8H_{15}NO_6$ 2-Acetamido-2-deoxy-D-galactose, S1.76
 $C_8H_{15}N_5O_4$ Glycylglycylglycylglycine amide, S1.269
 $C_8H_{16}N_2O_3$ Glycylleucine, 1.456, 1.457;
 Leucylglycine, 1.504
 $C_8H_{16}N_2O_4S_2$ Cystine, dimethyl ester, S1.198
 $C_8H_{19}CoN_5O_4^+$ Terephthalatopentaamminecobalt(III)
 ion, 1.74
 $C_8H_{26}CoN_6^{3+}$ Bis(diethylenetriamine)cobalt(III) ion, 1.93
 $C_8H_{34}Co_2N_9O_2^{4+}$ Tetrakis(ethylenediamine)- μ -
 amidoperoxodicobalt(III) ion, 1.94
 $C_8MoN_8^{4-}$ Octacyanomolybdate(IV) ion, 1.176
 $C_9H_3O_6^{3-}$ Trimesate ion, 1.640
 $C_9H_6NO_2^-$ Indole-2-carboxylate ion, 1.487a;
 Indole-3-carboxylate ion, 1.487b;
 Indole-5-carboxylate ion, 1.487c
 $C_9H_7N_2O_{10}P^{3-}$ Uridine monophosphate(UMP³⁻), 1.655
 $C_9H_7O_2^-$ Cinnamate ion, 1.379
 $C_9H_8N_2O_{10}P^{2-}$ Uridine monophosphate(UMP²⁻), 1.654; Uridine
 monophosphate(2',3'-cyclic UMP²⁻), 1.656
 $C_9H_8O_2$ Vinyl benzoate, S1.440
 C_9H_9N 2-Methylindole, 1.533; 3-Methylindole, 1.534
 C_9H_9NO Cinnamamide, S1.183
 $C_9H_9NO_7$ 5-Nitro-2-furaldehyde, diacetate, S1.344
 $C_9H_9N_3O_2S_2$ Sulfathiazole, S1.409
 $C_9H_9O_2^-$ Hydrocinnamate ion, 1.471
 $C_9H_9O_3^-$ *p*-Hydroxyphenylpropionate ion, 1.481, S1.287
 $C_9H_{10}N_2$ 5,6-Dimethylbenzimidazole, S1.216
 $C_9H_{10}O$ Phenylacetone, S1.373
 $C_9H_{10}O_2$ Benzyl acetate, S1.143; Hydrocinnamic acid, 1.472
 $C_9H_{11}NO_2$ Phenylalanine, 1.578, 1.579, S1.374
 $C_9H_{11}NO_3$ Tyrosine, 1.645, 1.646, S1.436
 $C_9H_{11}NO_4$ 3-(3,4-Dihydroxyphenyl)alanine, 1.402
 $C_9H_{11}N_3O_7P^-$ Cytidine 2',3'-cyclicphosphate ion, S1.201
 $C_9H_{12}N_2O$ Phenylalanine amide, S1.375
 $C_9H_{12}N_2O_7$ Uridine, 1.620, 1.621
 $C_9H_{12}N_3O_8P^-$ Cytidine 5'-phosphate ion, S1.200
 $C_9H_{13}N_3O_5$ Cytidine, 1.395, S1.199
 $C_9H_{16}NO_2$ 2,2,6,6-Tetramethyl-4-piperidone *N*-oxyl, S1.412
 $C_9H_{18}N_2O_3$ Alanylleucine, 1.308; Leucylalanine, 1.503
 $C_{10}Co_2N_{10}O_2^{5-}$ Decacyano- μ -peroxodicobaltate(III)
 ion, 1.95
 $C_{10}H_5O_5S^-$ 1,2-Naphthoquinone-4-sulfonate ion, S1.338;
 1,4-Naphthoquinone-2-sulfonate ion, S1.339
 $C_{10}H_6NO_2^-$ Quinoline-2-carboxylate ion, 1.602a
 $C_{10}H_7O^-$ 1-Naphthyl oxide ion, 1.543;
 2-Naphthyl oxide ion, 1.544
 $C_{10}H_8$ Naphthalene, 1.540
 $C_{10}H_8NO_2^-$ Indole-3-acetate ion, S1.290
 $C_{10}H_8N_2$ 2,2'-Bipyridine, 1.334; 4,4'-Bipyridine, 1.334a
 $C_{10}H_9N_3$ Dipyrindylamine, 1.408c
 $C_{10}H_{11}NO_3$ *N*-Acetylphenylglycine, S1.95
 $C_{10}H_{11}N_2O_8^-$ Orotidine, 1.567b
 $C_{10}H_{12}AgN_2O_8^{3-}$ Ethylenediaminetetraacetatoargentate(I)
 ion, 1.15
 $C_{10}H_{12}AlN_2O_8^-$ Ethylenediaminetetraacetatoaluminate(III)
 ion, 1.21
 $C_{10}H_{12}CdN_2O_8^{2-}$ Ethylenediaminetetraacetatocadmate(II)
 ion, 1.47
 $C_{10}H_{12}CeN_2O_8^-$ Ethylenediaminetetraacetatocerate(III)
 ion, 1.52
 $C_{10}H_{12}CoN_2O_8^-$ Ethylenediaminetetraacetatocobaltate(III)
 ion, 1.84
 $C_{10}H_{12}CoN_2O_8^{2-}$ Ethylenediaminetetraacetatocobaltate(II)
 ion, 1.60
 $C_{10}H_{12}CrN_2O_8^-$ Ethylenediaminetetraacetatochromate(III)
 ion, 1.109
 $C_{10}H_{12}CuN_2O_8^{2-}$ Ethylenediaminetetraacetatocuprate(II)
 ion, 1.119
 $C_{10}H_{12}DyN_2O_8^-$ Ethylenediaminetetraacetatodysprosate(III)
 ion, 1.124
 $C_{10}H_{12}ErN_2O_8^-$ Ethylenediaminetetraacetatoerbate(III)
 ion, 1.126
 $C_{10}H_{12}EuN_2O_8^-$ Ethylenediaminetetraacetatoeuropate(III)
 ion, 1.128
 $C_{10}H_{12}FeN_2O_8^{2-}$ Ethylenediaminetetraacetatoferrate(II)
 ion, 1.133
 $C_{10}H_{12}FeN_2O_8^-$ Ethylenediaminetetraacetatoferrate(III)
 ion, 1.139
 $C_{10}H_{12}GaN_2O_8^-$ Ethylenediaminetetraacetatogallate(III)
 ion, 1.140
 $C_{10}H_{12}GdN_2O_8^-$ Ethylenediaminetetraacetatogadolinate(III)
 ion, 1.142
 $C_{10}H_{12}HgN_2O_8^{2-}$ Ethylenediaminetetraacetatomercurate(II)
 ion, 1.153
 $C_{10}H_{12}HoN_2O_8^-$ Ethylenediaminetetraacetatoholmate(III)
 ion, 1.155
 $C_{10}H_{12}InN_2O_8^-$ Ethylenediaminetetraacetatoindate(III)
 ion, 1.161
 $C_{10}H_{12}LaN_2O_8^-$ Ethylenediaminetetraacetatolanthanate(III)
 ion, 1.167

- $C_{10}H_{12}LuN_2O_8^-$ Ethylenediaminetetraacetatolutetate(III) ion, 1.169
 $C_{10}H_{12}MnN_2O_8^{2-}$ Ethylenediaminetetraacetatomanganate(II) ion, 1.173
 $C_{10}H_{12}N_2NdO_8^-$ Ethylenediaminetetraacetatoneodymate(III) ion, 1.192
 $C_{10}H_{12}N_2NiO_8^{2-}$ Ethylenediaminetetraacetatonickelate(II) ion, 1.201
 $C_{10}H_{12}N_2O_4$ Thymine dimer, S1.419
 $C_{10}H_{12}N_2O_5S$ 7-Aminocephalosporanic acid, S1.117
 $C_{10}H_{12}N_2O_8^{4-}$ Ethylenediaminetetraacetate ion, 1.420
 $C_{10}H_{12}N_2O_8Pb^{2-}$ Ethylenediaminetetraacetatoplumbate(II) ion, 1.218
 $C_{10}H_{12}N_2O_8Pr^-$ Ethylenediaminetetraacetatopraseodymate(II) ion, 1.224
 $C_{10}H_{12}N_2O_8Sc^-$ Ethylenediaminetetraacetatoscandate(III) ion, 1.244
 $C_{10}H_{12}N_2O_8Sm^-$ Ethylenediaminetetraacetatosamarate(III) ion, 1.251
 $C_{10}H_{12}N_2O_8Sn^{2-}$ Ethylenediaminetetraacetatostannate(II) ion, 1.255
 $C_{10}H_{12}N_2O_8Tb^-$ Ethylenediaminetetraacetatoterbate(III) ion, 1.259
 $C_{10}H_{12}N_2O_8Ti^-$ Ethylenediaminetetraacetatotitanate(III) ion, 1.262
 $C_{10}H_{12}N_2O_8Tm^-$ Ethylenediaminetetraacetatothulante(III) ion, 1.267
 $C_{10}H_{12}N_2O_8Y^-$ Ethylenediaminetetraacetatoyttrate(III) ion, 1.271
 $C_{10}H_{12}N_2O_8Yb^-$ Ethylenediaminetetraacetatoytterbate(III) ion, 1.273
 $C_{10}H_{12}N_2O_8Zn^{2-}$ Ethylenediaminetetraacetatozincate(II) ion, 1.280
 $C_{10}H_{12}N_5O_7P^-$ Adenosine 5'-phosphate ion, 1.302, S1.109
 $C_{10}H_{13}N_5O_4$ Adenosine, 1.301, S1.108
 $C_{10}H_{14}N_2O_4S$ Methylpenicillin, S1.334
 $C_{10}H_{15}N_2O_8P$ Thymidylic acid, 1.626
 $C_{10}H_{16}N^+$ Benzyltrimethylammonium ion, 1.333
 $C_{10}H_{17}N_3O_6S$ Glutathione, reduced, 1.441, S1.254
 $C_{10}H_{19}N_3O_4$ Leucylglycylglycine, 1.505, 1.506
 $C_{10}H_{20}N_2O_4S_2$ Penicillamine disulfide, S1.366
 $C_{11}H_7N$ Naphthonitrile, 1.520, 1.521
 $C_{11}H_7O_2^-$ 1-Naphthoate ion, 1.541; 2-Naphthoate ion, 1.542
 $C_{11}H_8O_2$ 2-Methyl-1,4-naphthoquinone, S1.333
 $C_{11}H_{10}NO_2^-$ Indole-3-propionate ion, S1.291
 $C_{11}H_{12}ClNO_3$ *N*-(2-Chloroacetyl)phenylalanine, S1.172
 $C_{11}H_{12}N_2O_2$ Tryptophan, 1.643, 1.644, S1.434
 $C_{11}H_{13}NO_3$ *N*-Acetylphenylalanine, S1.93
 $C_{11}H_{14}N_2O_2$ *N*-Acetylphenylalanine amide, S1.94
 $C_{11}H_{14}N_2O_3$ Glycylphenylalanine, 1.458, S1.270
 $C_{11}H_{14}N_2O_4$ Glycyltyrosine, 1.461
 $C_{11}H_{19}N_3O_5$ *N*-Acetylalanylalanylalanine, S1.83;
N-Acetylsarcosylsarcosylsarcosine, S1.97
 $C_{12}H_8N_2$ 1,10-Phenanthroline, 1.574
 $C_{12}H_9NO$ 2-Benzoylpyridine, S1.140;
3-Benzoylpyridine, S1.141;
4-Benzoylpyridine, S1.142
 $C_{12}H_{12}AgN_2O_{12}^{5-}$ Bis (nitrilotriacetato)argentate(I) ion, 1.14
 $C_{12}H_{12}AlN_2O_{12}^{3-}$ Bis(nitrilotriacetato)aluminate(III) ion, 1.20
 $C_{12}H_{12}CdN_2O_{12}^{4-}$ Bis(nitrilotriacetato)cadmate(II) ion, 1.46
 $C_{12}H_{12}Cl_2N_2$ 4,4-Dimethyl-1,1-bipyridylum chloride, S1.217
 $C_{12}H_{12}CoN_2O_{12}^{4-}$ Bis(nitrilotriacetato)cobalt(II) ion, 1.83
 $C_{12}H_{12}CuN_2O_{12}^{4-}$ Bis(nitrilotriacetato)cuprate(II) ion, 1.118
 $C_{12}H_{12}HgN_2O_{12}^{4-}$ Bis(nitrilotriacetato)mercurate(II) ion, 1.152
 $C_{12}H_{12}MnN_2O_{12}^{4-}$ Bis(nitrilotriacetato)manganate(II) ion, 1.172
 $C_{12}H_{12}N_2NiO_{12}^{4-}$ Bis(nitrilotriacetato)nickelate(II) ion, 1.200
 $C_{12}H_{12}N_2O_2S$ Sulfanilamide, 1.615b
 $C_{12}H_{12}N_2O_{12}Pb^{4-}$ Bis(nitrilotriacetato)plumbate(II) ion, 1.217
 $C_{12}H_{12}N_2O_{12}Zn^{4-}$ Bis(nitrilotriacetato)zincate(II) ion, 1.282
 $C_{12}H_{15}ClO_6$ *p*-Chlorophenyl- β -D-glucopyranoside, S1.177
 $C_{12}H_{15}NO_6$ *o*-Nitrophenyl- β -D-glucopyranoside, S1.353;
p-Nitrophenyl- β -D-glucopyranoside, S1.354
 $C_{12}H_{16}N_6O_3$ Histidylhistidine, 1.469
 $C_{12}H_{16}O_6$ Phenyl- β -D-glucopyranoside, S1.378
 $C_{12}H_{16}O_7$ β -*p*-Hydroxyphenylglucoside, S1.286
 $C_{12}H_{24}N_2O_3$ Leucylleucine, 1.506
 $C_{12}H_{25}NaO_4S$ Dodecyl sodium sulfate, 1.409b, S1.232
 $C_{12}H_{33}ClN_3Pd^+$ Chloro-1,1,7,7-tetraethyldiethylene-triaminepalladium(II) ion, 1.222
 $C_{12}H_{33}ClN_3Pt^+$ Chloro-1,1,7,7-tetraethyldiethylene-triamineplatinum(II) ion, 1.227
 $C_{13}H_8O$ Fluorenone, S1.241
 $C_{13}H_9O_2^-$ Biphenyl-4-carboxylate ion, 1.333a
 $C_{13}H_{10}O$ Benzophenone, 1.329, S1.137
 $C_{13}H_{12}NO^+$ 3-Benzoyl-*N*-methylpyridinium ion, S1.139
 $C_{13}H_{13}N_3O_5S_2$ Sulfasuccidine, S1.408
 $C_{13}H_{15}N_3O_3$ Glycyltryptophan, 1.460
 $C_{13}H_{17}N_3O_4$ Glycylphenylalanyl glycine, S1.271;
Phenylalanylglycylglycine, S1.376
 $C_{13}H_{18}O_5S$ *p*-Tolyl- β -D-thioglucofuranoside, S1.425
 $C_{13}H_{18}O_6$ β -Benzylglucoside, S1.148;
o-Tolyl- β -D-glucopyranoside, S1.422;
m-Tolyl- β -D-glucopyranoside, S1.423;
p-Tolyl- β -D-glucopyranoside, S1.424
 $C_{14}H_7O_5S^-$ 9,10-Anthraquinone-1-sulfonate ion, S1.124;
9,10-Anthraquinone-2-sulfonate ion, S1.125
 $C_{14}H_8O_4^{2-}$ *o,o'*-Diphenate ion, 1.408a; *p,p'*-Diphenate ion, 1.408b
 $C_{14}H_{10}O$ Anthrone, S1.126
 $C_{14}H_{10}O_2$ Benzil, S1.134
 $C_{14}H_{12}O_2$ Benzoin, S1.136
 $C_{14}H_{14}ClN_3$ Acriflavin, 1.298a, S1.98
 $C_{14}H_{20}O_6$ 2,4-dimethylphenyl- β -D-glucopyranoside, S1.225
 $C_{15}H_{14}N_2O_6S_2$ Cephalothin, S1.169
 $C_{15}H_{14}O$ 1,3-Diphenylacetone, S1.228
 $C_{15}H_{20}N_4O_6$ Riboflavin, 1.603
 $C_{15}H_{23}N_3O_{10}$ Glutamylglutamylglutamic acid, S1.253
 $C_{15}H_{24}CoO_6^{3+}$ Tris(acetylacetonato)cobalt(III) ion, 1.98
 $C_{16}H_6N_2O_{14}S_4^{4-}$ Indigotetrasulfonate ion, 1.486
 $C_{16}H_{10}$ Pyrene, S1.390
 $C_{16}H_{14}N_2O_6S$ Thalamyd, S1.413
 $C_{16}H_{18}ClN_3S$ Methylene blue, 1.528
 $C_{16}H_{18}N_2O_4S$ Benzylpenicillin, S1.150
 $C_{16}H_{18}N_2O_5S$ Phenoxyethylpenicillin, S1.371
 $C_{16}H_{19}N_3O_4S$ Ampicillin, S1.120

$C_{16}H_{20}N_2O_5S$ Benzylpenicilloic acid, S1.152
 $C_{16}H_{21}N_3O_8S$ Cephalosporin C, S1.168
 $C_{17}H_{18}N_2O_6S$ Carbenicillin, S1.163
 $C_{17}H_{20}ClN_3$ Acridine orange, 1.298
 $C_{17}H_{20}N_2O_4S$ Benzylpenicillin, methyl ester, S1.151
 $C_{17}H_{20}N_2O_6S$ Methicillin, S1.313
 $C_{18}H_{11}N_5O_9S$ *p*-Sulfodiphenylpicrylhydrazyl, S1.410
 $C_{18}H_{16}N_3O_4S_2$ Cephaloridine, S1.167
 $C_{18}H_{20}N_2O_3$ Phenylalanylphenylalanine, 1.580
 $C_{18}H_{22}N_2O_4S$ Phenethicillin, S1.368
 $C_{18}H_{31}O_2^-$ Oleate ion, S1.357
 $C_{18}H_{35}O_2^-$ Stearate ion, S1.399
 $C_{19}H_{18}ClN_3O_5S$ Cloxacillin, S1.184
 $C_{19}H_{22}N_2O_6S$ Penamecillin, S1.364
 $C_{19}H_{42}BrN$ Hexadecyltrimethylammonium bromide, 1.465a, S1.278
 $C_{20}H_6Br_4O_5^{2-}$ Eosin(dianion), 1.410
 $C_{20}H_8I_4O_5$ Erythrosin (tetraiodofluorescein), S1.233
 $C_{20}H_{11}O_5^-$ Fluorescein(anion), 1.422
 $C_{20}H_{12}O_5$ Fluorescein, S1.242
 $C_{20}H_{19}ClN_4$ Safranin T, 1.577
 $C_{20}H_{32}N_6O_{12}S_2$ Glutathione, oxidized, 1.442, S1.255
 $C_{20}H_{34}N_6O_8$ *N*-Acetylalanylalanylalanylalanylalanine, S1.84
 $C_{21}H_{18}O_5S$ Cresol red, S1.187
 $C_{21}H_{27}FO_6$ Triamcinolone, S1.426
 $C_{21}H_{28}N_7O_{10}P_2$ Nicotinamide-adenine dinucleotide, 1.547, 1.548
 $C_{21}H_{30}O_5$ Hydrocortisone, S1.282
 $C_{21}H_{38}ClN$ Hexadecylpyridinium chloride, 1.465b
 $C_{23}H_{32}O_6$ Hydrocortisone acetate, S1.283
 $C_{24}H_{30}F_2O_6$ Fluocinolone acetonide, S1.240
 $C_{24}H_{31}FO_6$ Triamcinolone acetonide, S1.427
 $C_{26}H_{35}FO_6\beta$ -Methazone valerate, S1.311
 $C_{28}H_{31}ClN_2O_3$ Rhodamine B, S1.392
 $C_{30}H_{24}CoN_6^{3+}$ Tris(2,2'-bipyridine)cobalt(III) ion, 1.96
 $C_{30}H_{24}N_6Rh^{3+}$ Tris(2,2'-bipyridine)rhodium(III) ion, 1.230
 $C_{30}H_{24}N_6Ru^{2+}$ Tris(2,2'-bipyridine)ruthenium(II) ion, S1.54
 $C_{30}H_{24}N_6Ru^{3+}$ Tris(2,2'-bipyridine)ruthenium(III) ion, S1.60
 $C_{30}H_{32}N_2O_{10}S$ Xylenol orange, S1.443
 $C_{36}H_{24}CoN_6^{3+}$ Tris(1,10-phenanthroline)cobalt(III) ion 1.97
 $C_{45}H_{33}CoN_9^{3+}$ Tris(2,2',6',2''-terpyridine)cobalt(III) ion, S1.22
 $C_{63}H_{90}CoN_{14}O_{14}P$ Cyanocobalamin(Vitamin B₁₂), S1.190
 Cd^{2+} , 1.38, S1.10
 $CdH_6IO_3^+$ Iodotriaquocadmium(II) ion, 1.41
 $CdH_{12}N_4^{2+}$ Tetraamminecadmium(II) ion, 1.39
 Ce^{3+} , 1.51
 Cl^- , 1.53
 $ClCoH_{15}N_5^{2+}$ Chloropentaamminecobalt(III) ion, 1.66
 $ClCrH_{15}N_5^{2+}$ Chloropentaamminechromium(III) ion, 1.103
 $ClH_{15}N_5Ru^{2+}$ Chlorapentaammineruthenium(III) ion, 1.233, S1.57
 ClO^- Hypochlorite ion, 1.54, S1.11
 ClO_2^- Chlorite ion, S1.12
 ClO_3^- Chlorate ion, 1.55, S1.13
 ClO_4^- Perchlorate ion, 1.56
 Cl_2Hg Mercury(II) chloride, S1.33
 Cl_4Pd^{2-} Tetrachloropalladate(II) ion, 1.220
 Cl_4Pt^{2-} Tetrachloroplatinate(II) ion, 1.225, S1.52
 Cl_6Ir^{2-} Hexachloroiridate(IV) ion, 1.164

Cl_6Ir^{3-} Hexachloroiridate(III) ion, 1.162
 Cl_6Pt^{2-} Hexachloroplatinate(IV) ion, 1.228
 Co^{2+} , 1.57
 $CoFH_{15}N_5^{2+}$ Fluoropentaamminecobalt(III) ion, 1.65
 $CoH_{15}N_8^{2+}$ Azidopentaamminecobalt(III) ion, 1.70
 $CoH_{16}N_4O_3^{3+}$ Diaquotetraamminecobalt(III) ion, 1.63
 $CoH_{16}N_5O_2^{2+}$ Hydroxopentaamminecobalt(III) ion, 1.64
 $CoH_{17}N_5O_3^{3+}$ Aquopentaamminecobalt(III) ion, 1.62
 $CoH_{18}N_6^{3+}$ Hexaamminecobalt(III) ion, 1.61
 $CoN_6O_{12}^{3-}$ Hexanitrocobaltate(III) ion, 1.81
 CoO_2^{2-} Cobaltate(II) ion, 1.58
 $Co_2H_{30}N_{10}O_2^{5+}$ Decaammine- μ -dioxodicobalt(III) ion, 1.75
 Cr^{2+} , 1.99
 Cr^{3+} , 1.102
 CrF_6^{3-} Hexafluorochromate(III) ion, 1.104
 CrF_6^{4-} Hexafluorochromate(II) ion, 1.101
 CrO_4^{2-} Chromate(VI) ion, 1.112
 $Cr_2O_7^{2-}$ Dichromate(VI) ion, 1.113
 $Cr_4O_{12}^{3-}$ Trichromatochromate(III) ion, 1.114
 Cu^{2+} , 1.115, S1.25
 $CuH_4O_4^{2-}$ Tetrahydroxocuprate(II) ion, 1.116
 $CuH_{12}N_4^{2+}$ Tetraamminecopper(II) ion, 1.120
 D , 1.6, S1.4
 D^+ , 1.144
 DO , 1.8
 D_2O Deuterium oxide, 1.2
 D_2O_2 Deuterium peroxide, 1.147
 D_2S Deuterium sulfide, 1.235
 Dy^{3+} , 1.123
 Er^{3+} , 1.125
 Eu^{3+} , 1.127, S1.26
 F^- , 1.129
 FH Hydrofluoric acid, 1.130
 $FH_6NiO_3^+$ Fluorotriaquonickel(II) ion, 1.194
 F_2H_2 , 1.131
 F_3Sn^- Trifluorostannate(II) ion, 1.253
 F_6Fe^{3-} Hexafluoroferrate(III) ion, 1.136
 F_6S Sulfur hexafluoride, 1.237, S1.62
 F_6Si^{2-} Hexafluorosilicate(IV) ion, 1.249
 F_6Sn^{2-} Hexafluorostannate(IV) ion, 1.257
 F_6Ti^{2-} Hexafluorotitanate(IV) ion, 1.264
 Fe^{2+} , 1.132
 Fe^{3+} , S1.27
 FeO_4S^+ Sulfatoiron(III) ion, S1.28
 Gd^{3+} , 1.141
 H , 1.5, S1.3
 H^+ , 1.143, S1.31
 $HNO_7S_2^{2-}$ Hydroxylaminedisulfonate ion, 1.185
 HO Hydroxyl radical, 1.7
 $HOZn^+$ Hydroxozinc(II) ion, 1.275
 HO_2^- Hydroperoxide ion, 1.148
 HO_3S^- Bisulfite ion, S1.64
 HO_4P^{2-} Hydrogen phosphate ion, S1.49
 HO_5S^- Peroxysulfate ion, 1.241
 $HO_7P_2^{3-}$ Pyrophosphate ion, S1.50
 HS^- Hydrosulfide ion, 1.236, S1.61
 HSe^- Hydroselenide ion, 1.246
 H_2 , 1.145
 $H_2NO_3S^-$ Sulfamate ion, 1.183
 H_2O Water, 1.1
 H_2O_2 Hydrogen peroxide, 1.146, S1.32
 $H_2O_2P^-$ Hypophosphite(III) ion, 1.209
 $H_2O_3P^-$ Phosphite ion, 1.210
 $H_2O_4P^-$ Phosphate ion, 1.211, S1.48

H_2S Hydrogen sulfide, 1.234
 H_2Se Hydrogen selenide, 1.245
 H_3NO Hydroxylamine, 1.181, S1.40
 H_4N^+ Ammonium ion, 1.178
 H_4NO^+ Hydroxylammonium ion, 1.182, S1.41
 H_4N_2 Hydrazine, 1.179, S1.38
 $\text{H}_4\text{O}_4\text{Zn}^{2-}$ Tetrahydroxozincate(II) ion, 1.276
 H_5N_2^+ Hydrazinium ion, 1.180, S1.39
 $\text{H}_{12}\text{N}_4\text{Zn}^{2+}$ Tetraamminezinc(II) ion, 1.277
 $\text{H}_{15}\text{IN}_5\text{Ru}^{2+}$ Iodopentaammineruthenium(III) ion, S1.58
 $\text{H}_{15}\text{N}_7\text{Ru}^{2+}$ Pentaamminenitrogenruthenium(II) ion, 1.231a, S1.55
 $\text{H}_{16}\text{N}_5\text{ORu}^{2+}$ Hydroxopentaammineruthenium(III) ion, S1.59
 $\text{H}_{18}\text{IrN}_6^{3+}$ Hexaammineiridium(III) ion, 1.163
 $\text{H}_{18}\text{N}_6\text{Os}^{3+}$ Hexammineosmium(III) ion, 1.208
 $\text{H}_{18}\text{N}_6\text{Rh}^{3+}$ Hexamminerhodium(III) ion, 1.229
 $\text{H}_{18}\text{N}_6\text{Ru}^{3+}$ Hexaammineruthenium(III) ion, 1.232
 Ho^{2+} , 1.154
 I^- , S1.34
 IO_3^- Iodate ion, 1.158
 IO_4^- Periodate ion, 1.159
 I_2 , 1.156, S1.35
 I_3^- , 1.157
 In^{3+} , 1.160
 K^+ , 1.165, S1.36
 La^{3+} , 1.166
 Lu^{3+} , 1.168
 Mn^{2+} , 1.170
 MnO_4^- Permanganate ion, 1.175
 NO Nitric oxide, 1.187
 NO_2^- Nitrite ion, 1.188, S1.43
 NO_3^- Nitrate ion, 1.189, S1.44
 $\text{NO}_7\text{S}_2^{2-}$ Nitrosyldisulfonate ion, 1.184
 N_2O Nitrous oxide, 1.186, S1.42
 N_3^- Azide ion, 1.177
 Na^+ , 1.190
 Nd^{3+} , 1.191
 Ni^{2+} , 1.193, S1.45
 O^- , 1.9, S1.5
 O_2 , 1.205, 1.206, S1.47
 O_2^- , 1.10
 O_2Pb^{2-} Plumbate(II) ion, 1.215
 O_2Sn^{2-} Stannate(II) ion, 1.252
 O_2U^{2+} Uranyl(VI) ion, 1.268
 O_3S^{2-} Sulfite ion, 1.238, S1.63
 $\text{O}_3\text{S}_2^{2-}$ Thiosulfate ion, 1.240, S1.65
 O_3Sb^- Antimonate(V) ion, 1.243
 O_3Se^{2-} Selenite(IV) ion, 1.247
 O_3Sn^{2-} Stannate(IV) ion, 1.256
 O_3Te^{2-} Tellurate(IV) ion, 1.260
 O_3Ti^{2-} Titanate(IV) ion, 1.263
 O_3V^- Vanadate(V) ion, 1.269
 O_4S^{2-} Sulfate ion, 1.239
 $\text{O}_4\text{S}_2^{2-}$ Dithionite ion, S1.66
 O_4Se^{2-} Selenate(VI) ion, 1.248
 O_4Te^{2-} Tellurate(VI) ion, 1.261
 $\text{O}_6\text{S}_2^{2-}$ Dithionate ion, S1.67
 $\text{O}_6\text{S}_3^{2-}$ Trithionate ion, S1.69
 $\text{O}_6\text{S}_4^{2-}$ Tetrathionate ion, S1.70
 $\text{O}_7\text{P}_2^{2-}$ Pyrophosphate ion, 1.212
 $\text{O}_8\text{P}_2^{4-}$ Peroxyphosphate ion, 1.213, S1.50a
 $\text{O}_8\text{S}_2^{2-}$ Peroxydisulfate ion, 1.242, S1.68
 Pb^{2+} , 1.214
 Pr^{3+} , 1.223, S1.51
 Sm^{3+} , 1.250, S1.71
 Tb^{3+} , 1.258
 Tl^+ , 1.265, S1.72
 Tm^{3+} , 1.266
 Y^{3+} , 1.270
 Yb^{3+} , 1.272, S1.73
 Zn^{2+} , 1.274, S1.74

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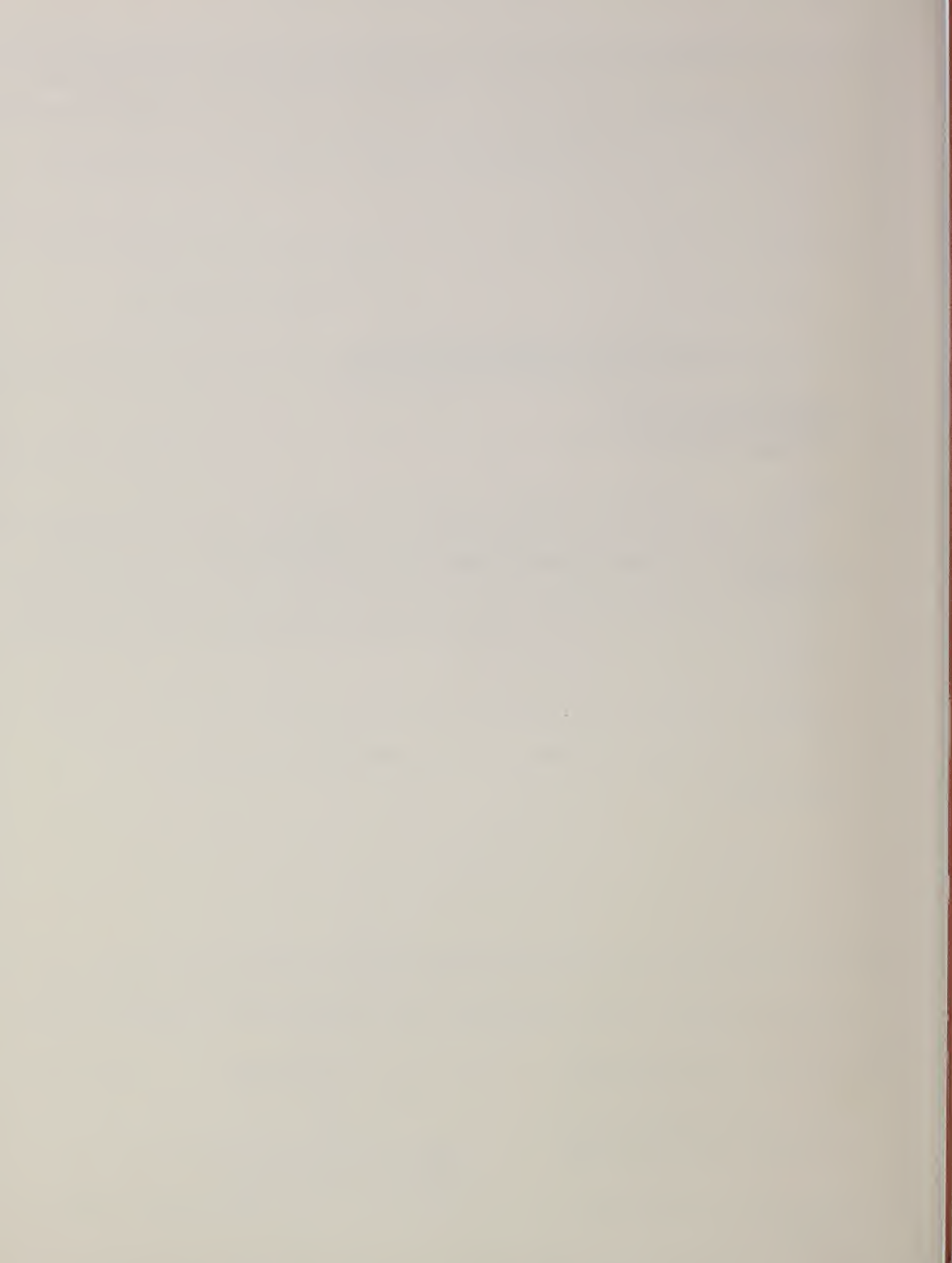
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