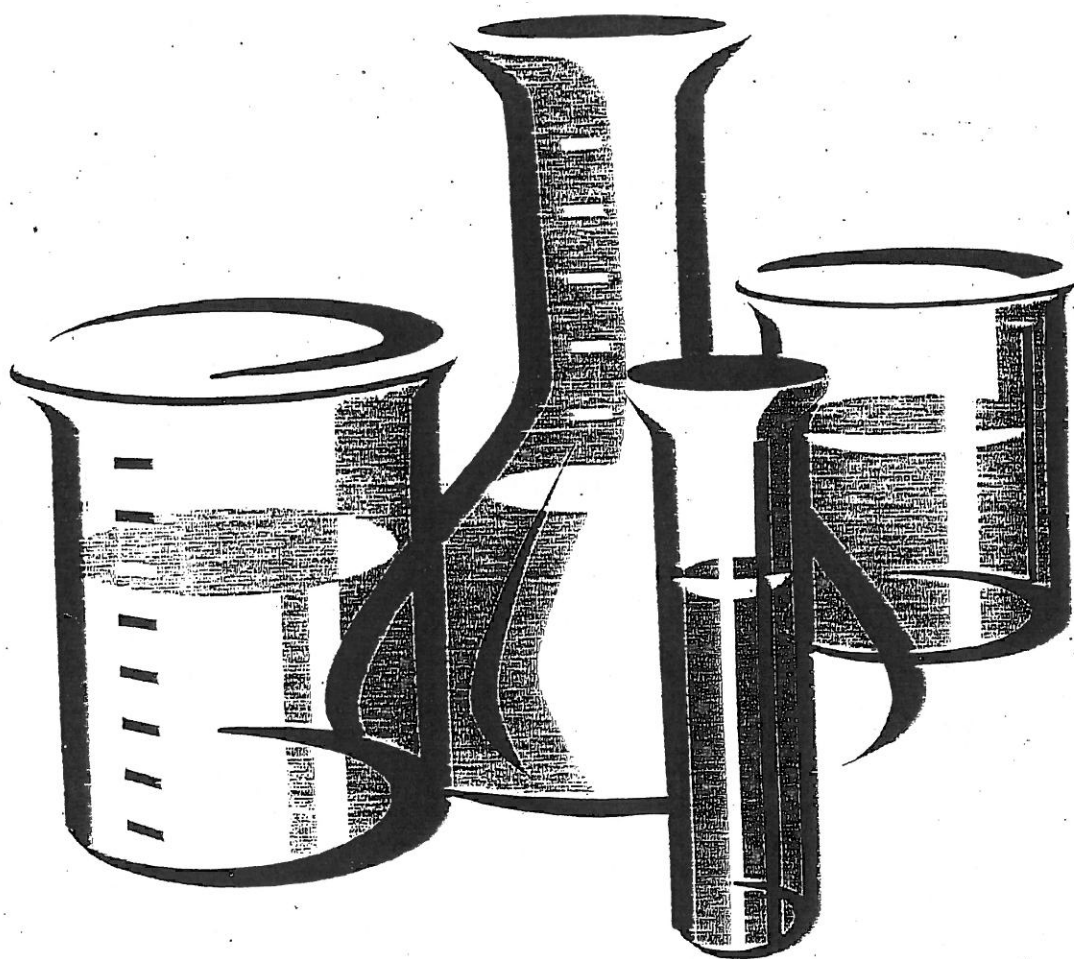


Data Booklet

CHEMISTRY 11



The Metric Prefixes

Prefix:	Symbol:	Magnitude:	Meaning (multiply by):
Yotta-	Y	1×10^{24}	1 000 000 000 000 000 000 000 000
Zetta-	Z	1×10^{21}	1 000 000 000 000 000 000 000
Exa-	E	1×10^{18}	1 000 000 000 000 000 000
Peta-	P	1×10^{15}	1 000 000 000 000 000
Tera-	T	1×10^{12}	1 000 000 000 000
Giga-	G	1×10^9	1 000 000 000
Mega-	M	1×10^6	1 000 000
kilo-	k	1×10^3	1 000
hecto-	h	1×10^2	100
deka-	da	1×10^1	10
-	-	-	-
deci-	d	1×10^{-1}	0.1
centi-	c	1×10^{-2}	0.01
milli-	m	1×10^{-3}	0.001
micro-	μ	1×10^{-6}	0.000 001
nano-	n	1×10^{-9}	0.000 000 001
picco-	p	1×10^{-12}	0.000 000 000 001
femto-	f	1×10^{-15}	0.000 000 000 000 001
atto-	a	1×10^{-18}	0.000 000 000 000 000 001
zepto-	z	1×10^{-21}	0.000 000 000 000 000 000 001
yocto-	y	1×10^{-24}	0.000 000 000 000 000 000 000 001

The Electron Energy Levels for a Polyelectronic Atom

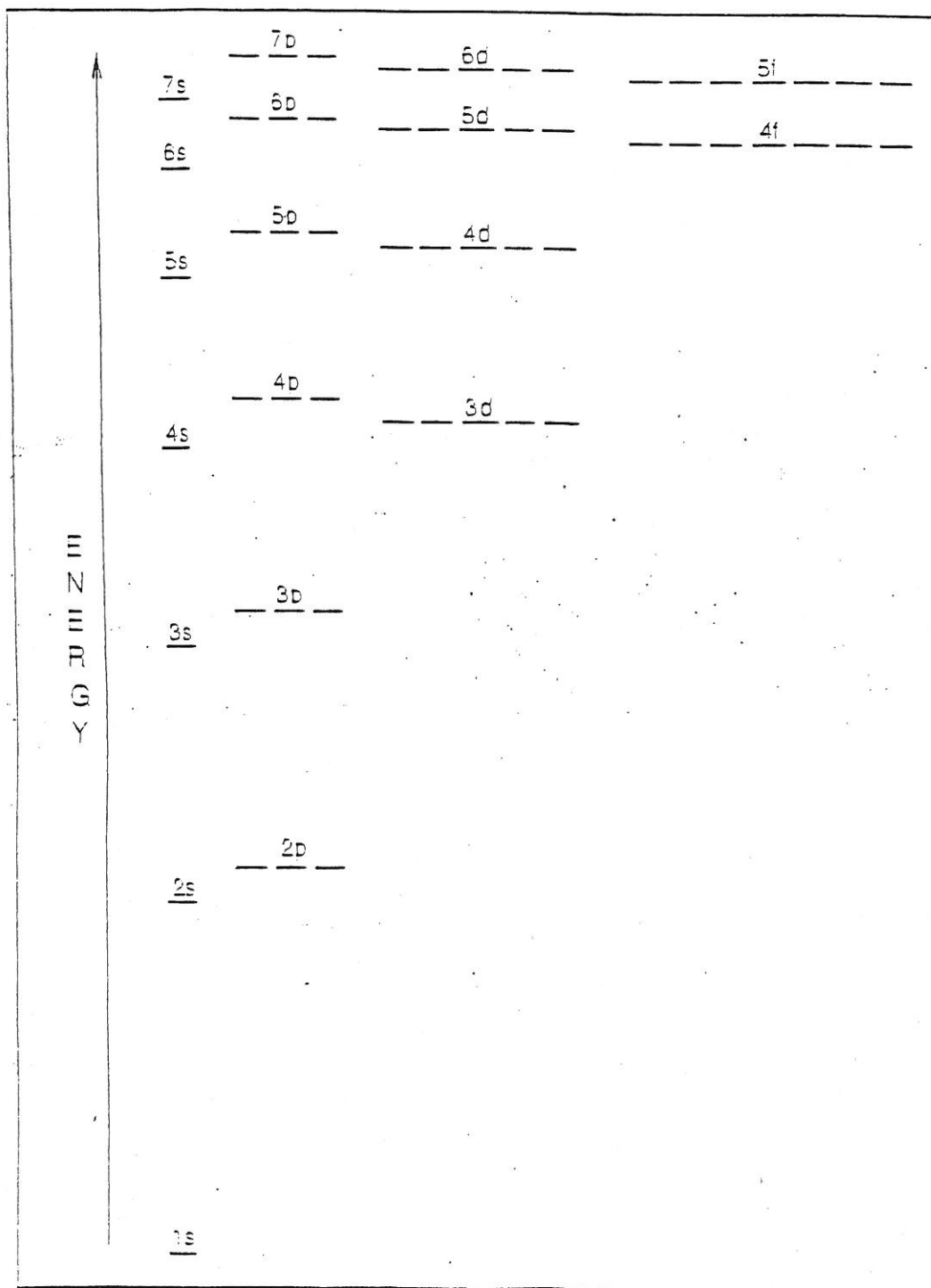


TABLE OF ELECTRONEGATIVITIES:

H	2.2	Be	1.5	B	2.0	C	2.5	N	3.0	O	3.5	F	3.9
Li	1.0	Mg	1.2	Al	1.5	Si	1.8	P	2.1	S	2.4	Cl	3.2
Na	0.9	Ca	1.0	Sc	1.3	Ti	1.5	Ge	1.8	As	2.0	Se	2.4
K	0.9	Sr	1.0	V	1.6	Cr	1.6	Sn	1.8	Sb	1.9	Te	2.1
Rb	0.8	Y	1.2	Nb	1.6	Mn	1.5	In	1.7	Pd	1.9	I	2.2
Cs	0.7	Zr	1.4	Mo	1.6	Fe	1.8	Tl	1.8	Bi	1.9	Po	2.0
Fr	0.7	Hf	1.3	Ta	1.5	Co	1.8	Hg	1.4	Pt	1.9	At	2.2
		Ta	1.5	W	1.7	Ni	1.8						
		Pb	1.9	Re	1.9	Cu	1.9						
		Ru	2.2	Os	2.2	Zn	1.7						
		Rh	2.2	Ir	2.2	Ga	1.6						
		Pd	2.2	Pt	2.2	Ge	1.8						
		Ag	1.9	Au	2.4	As	2.0						
		Cd	1.5	Hg	1.4	Sn	1.8						
		In	1.7	Tl	1.8	Sb	1.9						
		Pb	1.8	Bi	1.9	Pt	1.9						
		Po	2.0	At	2.2								

Source: L. Pauling, The Nature of the Chemical Bond and the Structure of Molecules and Crystals,
 Cornell University Press, Ithaca, New York, 1960. Used by permission of the publisher.

Table 5-2

ACTIVITY SERIES	
METALS	NONMETALS
decreasing activity	
lithium	fluorine
potassium	chlorine
calcium	bromine
sodium	iodine
magnesium	
aluminum	
zinc	
chromium	
iron	
nickel	
tin	
lead	
hydrogen	
copper	
silver	
mercury	
platinum	
gold	

SOLUBILITY OF COMMON COMPOUNDS IN WATER

The term soluble here means > 0.1 mol/L at 25°C.

Negative Ions (Anions)	Positive Ions (Cations)	Solubility of Compounds
All	Alkali ions: Li ⁺ , Na ⁺ , K ⁺ , Rb ⁺ , Cs ⁺ , Fr ⁺	Soluble
All	Hydrogen ion: H ⁺	Soluble
All	Ammonium ion: NH ₄ ⁺	Soluble
Nitrate, NO ₃ ⁻	All	Soluble
Chloride, Cl ⁻ or Bromide, Br ⁻ or Iodide, I ⁻	All others	Soluble
	Ag ⁺ , Pb ²⁺ , Cu ⁺	Low Solubility
Sulphate, SO ₄ ²⁻	All others	Soluble
	Ag ⁺ , Ca ²⁺ , Sr ²⁺ , Ba ²⁺ , Pb ²⁺	Low Solubility
Sulphide, S ²⁻	Alkali ions, H ⁺ , NH ₄ ⁺ , Be ²⁺ , Mg ²⁺ , Ca ²⁺ , Sr ²⁺ , Ba ²⁺	Soluble
	All others	Low Solubility
Hydroxide, OH ⁻	Alkali ions, H ⁺ , NH ₄ ⁺ , Sr ²⁺ ?	Soluble
	All others	Low Solubility
Phosphate, PO ₄ ³⁻ or Carbonate, CO ₃ ²⁻ or Sulphite, SO ₃ ²⁻	Alkali ions, H ⁺ , NH ₄ ⁺	Soluble
	All others	Low Solubility

NAMES, FORMULAE, AND CHARGES OF SOME COMMON IONS

* *Aqueous solutions are readily oxidized by air.*
 ** *Not stable in aqueous solutions.*

Positive Ions (Cations)

Al^{3+} Aluminum	Pb^{4+} Lead(IV), plumbic
NH_4^+ Ammonium	Li^+ Lithium
Ba^{2+} Barium	Mg^{2+} Magnesium
Ca^{2+} Calcium	Mn^{2+} Manganese(II), manganous
Cr^{2+} Chromium(II), chromous	Mn^{4+} Manganese(IV)
Cr^{3+} Chromium(III), chromic	Hg_2^{2+} Mercury(I)*, mercurous
Cu^+ Copper(I)*, cuprous	Hg^{2+} Mercury(II), mercuric
Cu^{2+} Copper(II), cupric	K^+ Potassium
H^+ Hydrogen	Ag^+ Silver
H_3O^+ Hydronium	Na^+ Sodium
Fe^{2+} Iron(II)*, ferrous	Sn^{2+} Tin(II)*, stannous
Fe^{3+} Iron(III), ferric	Sn^{4+} Tin(IV), stannic
Pb^{2+} Lead(II), plumbous	Zn^{2+} Zinc

Negative Ions (Anions)

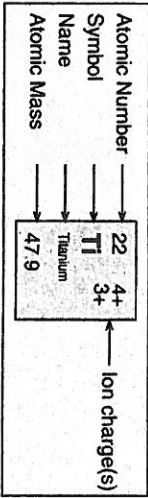
Br^- Bromide	OH^- Hydroxide
CO_3^{2-} Carbonate	ClO^- Hypochlorite
ClO_3^- Chlorate	I^- Iodide
Cl^- Chloride	HPO_4^{2-} Monohydrogen phosphate
ClO_2^- Chlorite	NO_3^- Nitrate
CrO_4^{2-} Chromate	NO_2^- Nitrite
CN^- Cyanide	$\text{C}_2\text{O}_4^{2-}$ Oxalate
$\text{Cr}_2\text{O}_7^{2-}$ Dichromate	O^{2-} Oxide**
H_2PO_4^- Dihydrogen phosphate	ClO_4^- Perchlorate
$\text{C}_2\text{H}_3\text{O}_2^- = \text{CH}_3\text{COO}^-$ Ethanoate, acetate	MnO_4^- Permanganate
F^- Fluoride	PO_4^{3-} Phosphate
HCO_3^- Hydrogen carbonate, bicarbonate	SO_4^{2-} Sulphate
HC_2O_4^- Hydrogen oxalate, binoxalate	S^{2-} Sulphide
HSO_4^- Hydrogen sulphate, bisulphate	SO_3^{2-} Sulphite
HS^- Hydrogen sulphide, bisulphide	SCN^- Thiocyanate
HSO_3^- Hydrogen sulphite, bisulphite	PO_3^{3-} Phosphite

PERIODIC TABLE OF THE ELEMENTS

1	H Hydrogen 1.0
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1	H Hydrogen 1.0
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2	He Helium 4.0
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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
3	4	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Li Lithium 6.9	Be Beryllium 9.0	Sc Scandium 45.0	Ti Titanium 47.9	V Vanadium 50.9	Cr Chromium 52.0	Mn Manganese 54.9	Fe Iron 55.8	Co Cobalt 58.9	Ni Nickel 58.7	Cu Copper 63.5	Zn Zinc 65.4	Ga Gallium 69.7	Ge Germanium 72.6	As Arsenic 74.9	Se Selenium 79.0	Br Bromine 79.9	Kr Krypton 83.8
11	12	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
Na Sodium 23.0	Mg Magnesium 24.3	Y Yttrium 88.9	Zr Zirconium 91.2	Nb Niobium 92.9	Mo Molybdenum 95.9	Tc Technetium (98)	Ru Ruthenium 101.1	Rh Rhodium 102.9	Pd Palladium 106.4	Ag Silver 107.9	Cd Cadmium 112.4	In Indium 114.8	Sn Tin 118.7	Sb Antimony 121.8	Te Tellurium 127.6	I Iodine 126.9	Xe Xenon 131.3
19	20	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53
K Potassium 39.1	Ca Calcium 40.1	Sr Strontium 87.6	Y Yttrium 88.9	Zr Zirconium 91.2	Nb Niobium 92.9	Mo Molybdenum 95.9	Ru Ruthenium 101.1	Rh Rhodium 102.9	Pd Palladium 106.4	Ag Silver 107.9	Cd Cadmium 112.4	In Indium 114.8	Sn Tin 118.7	Sb Antimony 121.8	Te Tellurium 127.6	I Iodine 126.9	Xe Xenon 131.3
55	56	57	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86
Cs Cesium 132.9	Ba Barium 137.3	La Lanthanum 138.9	Hf Hafnium 178.5	Ta Tantalum 180.9	W Tungsten 183.8	Re Rhenium 186.2	Os Osmium 190.2	Ir Iridium 192.2	Pt Platinum 195.1	Au Gold 197.0	Hg Mercury 200.6	Tl Thallium 204.4	Pb Lead 207.2	Bi Bismuth 209.0	Po Polonium (209)	At Astatine (210)	Rn Radon (222)
87	88	89	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118
Fr Francium (223)	Ra Radium (226)	Ac Actinium (227)	Rf Rutherfordium (261)	Db Dubnium (262)	Sg Seaborgium (263)	Bh Bohrium (262)	Hs Hassium (265)	Mt Meitnerium (266)	Ds Darmstadtium (281)	Rg Roentgenium (272)	Uub Ununbium (285)	Uut Ununtrium (284)	Uuq Ununquadium (289)	Uup Ununpentium (289)	Uuh Ununhexium (292)	Uus Ununseptium (?)	Uuo Ununoctium (294)
90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107
Th Thorium 232.0	Pa Protactinium 231.0	U Uranium 238.0	Np Neptunium 237	Pu Plutonium (244)	Am Americium (243)	Cm Curium (247)	Bk Berkelium (247)	Cf Californium (251)	Es Einsteinium (252)	Fm Fermium (257)	Md Mendelevium (258)	No Nobelium (259)	Lr Lawrencium (262)				
58	59	60	61	62	63	64	65	66	67	68	69	70	71				
Ce Cerium 140.1	Pr Praseodymium 140.9	Nd Neodymium 144.2	Pm Promethium (145)	Sm Samarium 150.4	Eu Europium 152.0	Gd Gadolinium 157.3	Tb Terbium 158.9	Dy Dysprosium 162.5	Ho Holmium 164.9	Er Erbium 167.3	Tm Thulium 168.9	Yb Ytterbium 173.0	Lu Lutetium 175.0				

Based on mass of C-12 at 12.00.

Any value in parentheses is the mass of the most stable or best known isotope for elements which do not occur naturally.