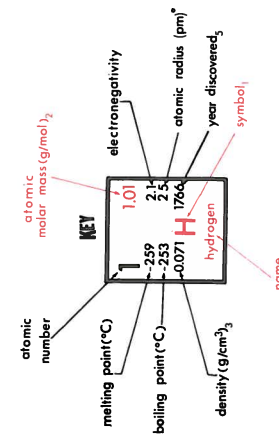


ALCHEM PERIODIC TABLE OF THE ELEMENTS



GROUP IA		GROUP IIA		GROUP IIIA		GROUP IVA		GROUP VA		GROUP VIA		GROUP VIIA		GROUP VIIIA			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Li	Be	B	C	N	O	F	Ne	Na	Mg	Al	Si	P	S	Cl	Ar	K	Ca
6.94	9.01	10.81	12.01	14.01	16.00	19.00	20.17	22.99	24.31	26.98	28.09	30.97	32.06	35.45	39.95	39.10	40.08
0.53	1.85	0.8	1.0	1.3	1.6	2.0	2.0	0.9	1.2	1.5	1.8	2.1	2.3	2.5	3.0	3.9	4.5
17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17
0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071
H	He	Li	Be	B	C	N	O	F	Ne	Na	Mg	Al	Si	P	S	Cl	Ar
1.01	4.00	6.94	9.01	10.81	12.01	14.01	16.00	19.00	20.17	22.99	24.31	26.98	28.09	30.97	32.06	35.45	39.95
0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071
H	He	Li	Be	B	C	N	O	F	Ne	Na	Mg	Al	Si	P	S	Cl	Ar
1.01	4.00	6.94	9.01	10.81	12.01	14.01	16.00	19.00	20.17	22.99	24.31	26.98	28.09	30.97	32.06	35.45	39.95
0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071
H	He	Li	Be	B	C	N	O	F	Ne	Na	Mg	Al	Si	P	S	Cl	Ar

NOTES:
 1. Black—solid
 Red—gas
 Slant—liquid
 Outline—synthetically prepared
 2. Based upon carbon-12. () indicates most stable or best known isotope. Rounded to 2 decimal places.
 3. Values for gaseous elements are for liquids at boiling point at 28 atmospheres.
 4. Boiling point at 28 atmospheres.
 5. Atomic weight.
 6. Bragg-Straker atomic radius in picometres (10⁻¹² m).
 7. Graphite
 8. White or yellow
 9. a—discovered by ancients



58	59	60	61	62	63	64	65	66	67	68	69	70	71
Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr
11.7	15.4	19.1	19.5	19.4	13.7	13.0	14	15	15	15	15	15	15
11.7	15.4	19.1	19.5	19.4	13.7	13.0	14	15	15	15	15	15	15
Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr
11.7	15.4	19.1	19.5	19.4	13.7	13.0	14	15	15	15	15	15	15
11.7	15.4	19.1	19.5	19.4	13.7	13.0	14	15	15	15	15	15	15
Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr
11.7	15.4	19.1	19.5	19.4	13.7	13.0	14	15	15	15	15	15	15
11.7	15.4	19.1	19.5	19.4	13.7	13.0	14	15	15	15	15	15	15
Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

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ALCHEM PERIODIC TABLE OF IONS

GROUP
IA



TABLE OF COMPLEX IONS

• acetate CH ₃ COO ⁻	perchlorate ClO ₄ ⁻	oxalate C ₂ O ₄ ²⁻	• permanganate MnO ₄ ⁻	• OCOCCOO ²⁻	hydrogen sulfate HSO ₄ ⁻
• ammonium NH ₄ ⁺	chlorite ClO ₂ ⁻	• permanganate MnO ₄ ⁻	• phosphate PO ₄ ³⁻	• bisulfite HSO ₃ ⁻	hydrogen sulfite HSO ₃ ⁻
• benzoate C ₆ H ₅ COO ⁻	hypochlorite ClO ⁻ or OCl ⁻	• hydrogen phosphate HPO ₄ ²⁻	• hydrogen phosphate HPO ₄ ²⁻	• thiocyanate SCN ⁻	thiocyanate SCN ⁻
• borate BO ₃ ³⁻	• chromate CrO ₄ ²⁻	• dichromate Cr ₂ O ₇ ²⁻	• dihydrogen phosphate H ₂ PO ₄ ⁻	• thiocyanate SCN ⁻	thiocyanate SCN ⁻
• bromate BrO ₃ ⁻	• cyanide CN ⁻	• cyanide CN ⁻	• hypophosphite H ₂ PO ₂ ⁻	• silicate SiO ₃ ²⁻	• silicate SiO ₃ ²⁻
• carbonate CO ₃ ²⁻	• gluconate C ₆ H ₁₁ NO ₇ ⁻	• gluconate C ₆ H ₁₁ NO ₇ ⁻	• silicate SiO ₃ ²⁻	• C ₁₇ H ₃₅ COO ⁻	• C ₁₇ H ₃₅ COO ⁻
• hydrogen carbonate HCO ₃ ⁻	• hydroxide OH ⁻	• hydroxide OH ⁻	• sulfite SO ₃ ²⁻	• sulfate SO ₄ ²⁻	• sulfate SO ₄ ²⁻
• iodate IO ₃ ⁻	• nitrate NO ₃ ⁻	• nitrate NO ₃ ⁻	• nitrite NO ₂ ⁻	• nitrite NO ₂ ⁻	• nitrite NO ₂ ⁻
• chlorate ClO ₃ ⁻	• Use often, Should be learned	• Use often, Should be learned	• Use often, Should be learned	• Use often, Should be learned	• Use often, Should be learned

(also see rules for naming ions)

hydrogen ——— life becomes hydro ——— ic acid
hydrogen ——— ate becomes hydro ——— ic acid
hydrogen ——— ite becomes ——— ous acid

1 H ⁺ hydrogen	2 He helium	3 Li ⁺ lithium	4 Be ²⁺ beryllium	5 B boron	6 C carbon	7 N ³⁻ nitride	8 O ²⁻ oxide	9 F ⁻ fluoride	10 Ne neon	11 Na ⁺ sodium	12 Mg ²⁺ magnesium	13 Al ³⁺ aluminum	14 Si silicon	15 P ³⁻ phosphide	16 S ²⁻ sulfide	17 Cl ⁻ chloride	18 Ar argon	19 K ⁺ potassium	20 Ca ²⁺ calcium	21 Sc ³⁺ scandium	22 Ti ⁴⁺ titanium (iv)	23 V ⁵⁺ vanadium (v)	24 Cr ³⁺ chromium (iii)	25 Mn ²⁺ manganese (ii)	26 Fe ³⁺ ferric iron (iii)	27 Co ²⁺ cobalt (ii)	28 Ni ²⁺ nickel (ii)	29 Cu ²⁺ cupric copper (ii)	30 Zn ²⁺ zinc	31 Ga ³⁺ gallium	32 Ge ⁴⁺ germanium	33 As ³⁻ arsenide	34 Se ²⁻ selenide	35 Br ⁻ bromide	36 Kr krypton	37 Rb ⁺ rubidium	38 Sr ²⁺ strontium	39 Y yttrium	40 Zr zirconium	41 Nb niobium	42 Mo molybdenum	43 Tc technetium	44 Ru ruthenium	45 Rh rhodium	46 Pd ²⁺ palladium (ii)	47 Ag ⁺ silver	48 Cd ²⁺ cadmium	49 In ³⁺ indium	50 Sn ⁴⁺ stannic tin (iv)	51 Sb ³⁺ antimony (iii)	52 Te ²⁻ telluride	53 I ⁻ iodide	54 Xe xenon	55 Cs ⁺ cesium	56 Ba ²⁺ barium	57 La lanthanum	58 Ce ³⁺ cerium	59 Pr ³⁺ praseodymium	60 Nd ³⁺ neodymium	61 Pm ³⁺ promethium	62 Sm ³⁺ samarium	63 Eu ³⁺ europium (iii)	64 Gd ³⁺ gadolinium	65 Tb ³⁺ terbium	66 Dy ³⁺ dysprosium	67 Ho ³⁺ holmium	68 Er ³⁺ erbium	69 Tm ³⁺ thulium	70 Yb ³⁺ ytterbium	71 Lu ³⁺ lutetium	72 Hf hafnium	73 Ta tantalum	74 W wolfram (tungsten)	75 Re rhenium	76 Os osmium	77 Ir iridium	78 Pt ²⁺ platinum (ii)	79 Au ³⁺ gold (iii)	80 Hg ²⁺ mercuric mercury (ii)	81 Tl ³⁺ thallium (iii)	82 Pb ²⁺ plumbous lead (ii)	83 Bi ³⁺ bismuth (iii)	84 Po ⁴⁺ polonium (iv)	85 At ⁻ astatide	86 Rn radon	87 Fr ⁺ francium	88 Ra ²⁺ radium	89 Ac ³⁺ actinium	104 Rf rutherfordium	105 Ha hahnium	106 Ni nibohium
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atomic number

ion charge (most common or most stable ion listed on top)

KEY

26 Fe³⁺ iron (iii)

26 Fe²⁺ ferrous iron (ii)

26 Fe⁺ ferric iron (iii)

symbol

classical name

Stock (IUPAC) name

5 B boron

Shaded area indicates this element does not form ionic compounds.

* Hg⁺ or Hg₂²⁺

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ION	Group IA		NH ₄ ⁺	NO ₃ ⁻	CH ₃ COO ⁻	Cl ⁻ , Br ⁻ , I ⁻	SO ₄ ²⁻	S ²⁻	OH ⁻	PO ₄ ³⁻ , SO ₃ ²⁻
	soluble	LOW SOLUBILITY								
soluble	all	all	all	all	all	most	most	most	most	most
LOW SOLUBILITY	none	none	none	none	none	Hg ⁺ , Ca ²⁺ , Sr ²⁺	Ag ⁺ , Pb ²⁺ , Bi ³⁺ , Sn ²⁺	most	most	most

STRONG ACIDS

HCl(aq)	HCl(aq)
HNO ₃ (aq)	HNO ₃ (aq)
H ₂ SO ₄ (aq)	H ₂ SO ₄ (aq)