Sodium

22.989770



2-8-1

Element Name

Bohr Electron Configuration

Atomic Number

These \*\* indicate that there are energy levels of 2-8-18 for elements 55 & above

Letter Symbol

 Atomic Mass

 Cerium

140.116



 Praseodymium

140.90765

 

Neodymium

144.24



 Thorium

232.038



Promethium

(145)

**

Protactinium

231.03588



 Uranium

238.0289



Neptunium

(237)



 Samarium

150.36



 Plutonium

(244)



 Europium

151.964



Americium

(243)



Gadolinium

157.25



 Curium

(247)

 

 Terbium

158.92534



 Dysprosium

162.500



 Holmium

164.93032



Berkelium

(247)



 Erbium

167.259



Californium

(251)



Einsteinium

(252)



 Fermium

(257)

 Thulium

168.93421

 

 Mendelevium

(258)

 

Ytterbium

173.054



 Nobelium

(259)



 Lutetium

174.9668



Lawrencium

(262)



Key:

*italicized symbols* = synthetic (human made)

an entry in ( ) indicates the longest lived isotope of an element for which the atomic mass is indeterminate

Beryllium

9.012182



2-2

 Boron

10.811

 

2-3

 Carbon

12.0107

 

2-4

 Nitrogen

14.00674

 

2-5

 Oxygen

15.9994

 

2-6

 Fluorine

18.9984

 

2-7

 Neon

20.1797

 

 **2-8**

Lithium

6.941

 

2-1

Sodium

22.989770

 2-8-1

Magnesium

24.3050

2-8-2

 Aluminum

26.98153



2-8-3

 Silicon

28.0855



2-8-4

Phosphorus

30.973761



**2-8-5**

 Sulfur

32.066



**2-8-6**

 Chlorine

35.4527



2-8-7

 Argon

39.948

 **2-8-8**

Potassium

39.0983



2-8-8-1

Calcium

40.078



2-8-8-2

 Scandium

44.955910



2-8-9-2

 Titanium

47.867

 2-8-10-2

 Vanadium

50.9415



2-8-11-2

 Chromium

51.9961



2-8-13-1

 Manganese

54.938049

 

 2-8-13-2

 Iron

55.845



2-8-14-2



 Cobalt

58.933200



2-8-15-2

 Nickel

58.6934



2-8-16-2

Copper

63.546



2-8-18-1

 Zinc

65.39



2-8-18-2

Gallium

69.723



2-8-18-3

Germanium

72.61



2-8-18-4

 Arsenic

74.92160



2-8-18-5

 Selenium

 78.96



2-8-18-6

Bromine

79.904



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 Krypton

83.80



**2-8-18-8**

Rubidium

85.4678

  2-8-18-8-1

Strontium

87.62



2-8-18-8-2

Yttrium

88.90585

  2-8-18-9-2

Zirconium

91.224

 2-8-18-10-2

Niobium

92.90638

 

2-8-18-12-1

 Molybdenum

 95.94

 

2-8-18-13-1

 Technetium

(98)



2-8-18-14-1

 Ruthenium

101.07

 

2-8-18-15-1

Rhodium

102.90550

 

 2-8-18-16-1

Palladium

106.42

 

2-8-18-18

Silver

107.8682

 

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**-32-18-8**

Francium

(223)

 

-32-18-8-1

Radium

(226)

  -32-18-8-2

 Actinium

(227)

  -32-18-9-2

 Rutherfordium

(267)

 

 Dubnium

(268)

Seaborgium

(271)



 Bhorium

(272)



 Hassium

(270)



 Meitnerium

(276)



 Darmstadtium

(281)

 

 Roentgenium

 (280)

 

Copernicium

(285)

 

 

Flerovium

(289)

 



Livermorium

(293)





 Hydrogen

1.00794



1

 Helium

4.002602



**2**

 3 4 5 6 7 8 9 10 11 12

 1

 2

 13 14 15 16 17

 18

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1.00794



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4.002602



**2**

helium

 He

2 NG

thorium

 Th

90 M

protactinium

Pa

91 M

uranium

U

92 M

neptunium

Np

93 M

plutonium

Pu

94 M

americium

Am

95 M

curium

Cm

96 M

 berkelium

 Bk

97 M

 californium

 Cf

98 M

einsteinium

Es

99 M

fermium

Fm

100 M

mendelevium

 Md

101 M

nobelium

No

102 M

lawrencium

 Lr

103 M

 hydrogen

H

1 NM

berylium

Be

4 M

magnesium

Mg

12 M

 calcium

 Ca

20 M

strontium

 Sr

38 M

 barium

 Ba

56 M

 radium

 Ra

88 M

scandium

 Sc

21 M

 titanium

 Ti

22 M

 vanadium

 V

23 M

chromium

 Cr

24 M

manganese

 Mn

25 M

 iron

 Fe

26 M

 cobalt

 Co

27 M

 nickel

 Ni

28 M

 copper

 Cu

29 M

 zinc

 Zn

30 M

 cerium

 Ce

58 M

praeseodymium

 Pr

59 M

neodymium

 Nd

60 M

promethium

 Pm

61 M

samarium

 Sm

62 M

europium

 Eu

63 M

gadolinium

 Gd

64 M

terbium

 Tb

65 M

dysprosium

 Dy

66 M

holmium

 Ho

67 M

erbium

 Er

68 M

thulium

 Tm

69 M

ytterbium

 Yb

70 M

lutetium

 Lu

71 M

 yttrium

 Y

39 M

zirconium

 Zr

40 M

 niobium

 Nb

41 M

molybdenum

 Mo

42 M

technetium

 Tc

43 M

ruthenium

 Ru

44 M

rhodium

 Rh

45 M

palladium

 Pd

46 M

 silver

 Ag

47 M

 cadmium

 Cd

48 M

lanthanum

 La

57 M

 hafnium

 Hf

72 M

 tantalum

 Ta

73 M

 tungsten

 W

74 M

 rhenium

 Re

75 M

 osmium

 Os

76 M

 iridium

 Ir

77 M

 platinum

 Pt

78 M

 gold

 Au

79 M

 mercury

 Hg

80 M

 actinum

 Ac

89 M

rutherfordium

 Rf

104 M

dubnium

 Db

105 M

 seaborgium

 Sg

106 M

 bohrium

 Bh

107 M

 hassium

 Hs

108 M

meitnerium

 Mt

109 M

 damstadtium

 Ds

110 M

roentgentium

 Rg

111 M

 copernicium

Cn

112 M

 lithium

Li

3 M

sodium

Na

11 M

potassium

 K

19 M

 rubidium

 Rb

37 M

 cesium

 Cs

55 M

francium

 Fr

87 M

 *boron*

 *B*

*5 SM*

aluminum

 Al

13 M

 gallium

 Ga

31 M

 indium

 In

49 M

 thallium

 Tl

81 M

 Uut

 carbon

 C

6 NM

 *silicon*

 *Si*

*14 SM*

*germanium*

 *Ge*

*32 SM*

 tin

 Sn

50 M

 lead

 Pb

82 M

flerovium

Fl

114 M

nitrogen

 N

7 NM

**phosphorus**

 P

15 NM

*arsenic*

 *As*

*33 SM*

*antimony*

 *Sb*

*51 SM*

 bismuth

 Bi

83 M

 Uup

 fluorine

 F

9 NM

 chlorine

 Cl

17 NM

bromine

 Br

35 NM

 iodine

 I

53 NM

 astatine

 At

85 NM

 Uus

117 M

 oxygen

 O

8 NM

 sulfur

 S

16 NM

selenium

 Se

34 NM

*tellurium*

 *Te*

*52 SM*

polonium

 Po

84 M

livermorium

 Lv

116 M

 neon

 Ne

10 NG

 argon

 Ar

18 NG

krypton

 Kr

36 NG

 xenon

 Xe

54 NG

 radon

 Rn

86 NG

 1 2

3 4 5 6 7 8 9 10 11 12

 13 14 15 16 17 18

name

symbol

atomic M

number SM

 NM

 NG

Metal

SemiMetal

NonMetal

Noble Gas

 Table of Common Polyatomic Ions

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Formula | Name | Formula |
| Acetate | C2H3O2-1 | Hypochlorite | ClO-1 |
| Ammonium(*not* ammonia) | NH4+1 | Iodate | IO3-1 |
| Arsenate | AsO4-3 | Nitrate | NO3-1 |
| Carbonate | CO3-2 | Nitrite | NO2-1 |
| Chlorate  | ClO3-1 | Perchlorate | ClO4-1 |
| Chlorite | ClO2-1 | Peroxide | O22- |
| Chromate  | CrO4-2 | Phosphate | PO4-3 |
| Cyanide | CN-1 | Sulfate | SO4-2 |
| Dichromate | Cr2O7-2 | Sulfite | SO3-2 |
| Hydrogen Carbonate | HCO3-1 | Thiocyanate  | SCN-1 |
| Hydroxide | OH-1 | Thiosulfate | S2O3 -2 |

Note1: Example: In the compound Ca(NO3)2 there are 2 nitrate groups 2 (NO3-1) groups for every 1 Ca2+

Note2: Using the suffix *-ate* as the standard:

*-ite* = 1 fewer oxygen

*per* = 1 more oxygen

*hypo* = 2 fewer oxgyen

 Table of Common Acids

|  |  |  |
| --- | --- | --- |
| Name | Formula | Descriptors |
| hydrochloric acid | HCl(aq) | strong & inorganic  |
| hydrosulfuric acid | H2S(aq) | weak & inorganic |
| hydrobromic acid | HBr(aq) | strong & inorganic |
|  |  |  |
| carbonic acid | H2CO3(aq) | weak & inorganic |
| ethanoic acid | CH3COOH(aq) | weak & organic |
| hypochlorous acid | HClO(aq) | weak & inorganic |
| nitric acid | HNO3(aq) | strong & inorganic  |
| oxalic acid | H2C2O4(aq) | weak & organic |
| phosphoric acid | H3PO4(aq) | weak & inorganic |
| sulfuric acid | H2SO4(aq) | strong & inorganic  |

|  |  |
| --- | --- |
|  |   **The Hydrocarbons**  |
|  |  | Examples |
| Family | GeneralFormula | Formula | Name | Structure H H H H | | | |H—C—C—C—C—H | | | | H H H H | Other Views |
| alkane | CnH2n+2 | C4H10 | butane |  | http://www.edinformatics.com/interactive_molecules/3D/butane_structure.jpghttp://upload.wikimedia.org/wikipedia/commons/7/79/Butane_Molecule_3D.jpg |
| alkene | CnH2n | C4H8 | 1-butene |  H H  | | H—C—C—C C—H | | | |  H H H H  H H  | | H—C—C—C C—H | |  H H  |  butene_1.gif |
| alkyne | CnH2n-2 | C4H6 | 1-butyne |  | http://wtt-lite.nist.gov/images/107006.gifCH3CH2CCH |
| arene(aromatichydrocarbon)note: the term *aromatic* refers to a closed ring with C or N with alternating double bonds | CnH2n-6 | C6H6 | benzene |  | http://t0.gstatic.com/images?q=tbn:ANd9GcTA0vA4dsvP1DxQV0StQMnR52KV2DFqwYA2n2zbba1lYpE5aBcB |
|  |  where "n" equals the number of carbons in the longest (parent) chain |

|  |
| --- |
| **Organic Prefixes**  |
| **# of carbons** | **Prefix** |
| 1 | meth |
| 2 | eth |
| 3 | proppron: **prōp** |
| 4 | but (pron like **beaut***-y*)  |
| 5 | pent |
| 6 | hex |
| 7 | hept |
| 8 | oct |
| 9 | non |
| 10 | dec |
| 12 | dodec(laur-*yl*) |
| 16 | Hexadec(cet-*yl* or myrist-*ic*) |
| 18 | octadec (stear-*yl*) |
| 20 | eicos (arachid-*ic*) |

**Organic Compounds & Functional Groups**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Class | Description | Examples of molecular or condensed formula | a Example / Structure | b Example / Structure |
| Alcohol(Mono-hydroxy) |  R-OH1 (O-H) group bonded to a carbon. Soluble in water (polar molecule)  | a C3H7OHb C4H9OH  | a1-propanol H H H  | | | H—C—C—C—O-H | | |  H H H  | b 2-butanol H H H H  | | | | H—C—C—C—C—H | | | | H OH H H  |
| Alcohol(Glycol or Dihydroxy) | 2 O-H groups (or OH groups ) bonded to carbon. Soluble in water (polar molecule) | a C2H4(OH)2b C3H6(OH)2 | a1,2-ethanediol (ethylene glycol) H H  | | H—C—C—H | |  OH OH  | b1,2-propanediol (propylene glycol) H H H  | | | H—C—C—C—H | | |  H O-H O-H  |
| Ester |  O || R—O—C—R'The product of an alcohol & organic acid reaction. |  a CH3OOCCH3 b C2H5OOCC2H5 | a methyl ethanoate H O H | || |H—C—O—C—C—H | | H H | b ethyl propanoate H H O H H | | || | |H—C— C—O—C—C—C—H | | | |  H H H H  |
| Ketone |  O || R— C—R**'**A **carbonyl group** on an "interior" or non-terminal carbon | a C3H6Ob C6H12O | a 2-propanone (acetone) H O H | || | H—C—C—C—H | | H H | b 3-hexanone H H H O H H | | | || | | H—C—C—C—C—C—C—H | | | | | H H H H H |
| CarboxylicAcid(the most common form of organic acid) |  O || R—C—O-HA **carboxyl****group** (COOH) bonded to a carbon. Soluble in water | a CH3COOHb C2H5COOH | a ethanoic acid (acetic acid) H O  | || H—C—C—O—H |  H  | b propanoic acid  H H O  | | || H—C—C—C—O—H | |  H H  |
| Amine(simple) |  R⎯N⎯H | HAn organic derivative of NH3 (at least one H is replaced with an organic group. A weak base (B-L) | a C3H7NH2b C6H5NH2 | a 1-propanamine (1-propylamine) H H H | | | H⎯C⎯C⎯C⎯N⎯H | | | | H H H H |  b aniline   •• N⎯H | H |
| Halide(Halocarbon) |  R-X Halogen(s) substituted onto a hydrocarbon, by removing hydrogen(s) | a C3H7Brb C3H6F2 | a1-bromopropane  **Br** H H | | | H—C—C—C—H | | | H H H | b1,2-difluoropropane H H **F** | | | H—C—C—C—H | | | H **F**  H |