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Chapter 2
Elements, Compounds, and the Periodic Table

Chemistry, 7th Edition
International Student Version

Brady/Jespersen/Hyslop

Periodic Table

Modern Periodic Table

- Arranged by increasing **atomic number (*Z*)**:
- **Rows** called **periods**
- **Columns** called **groups** or **families**
  - Identified by numbers
  - 1 – 18 standard international
  - 1A – 8A longer columns and 1B – 8B shorter columns

Modern Periodic Table

with group labels and chemical families identified

Alkali metals (except H)

Alkaline earth metals

Atomic number

1
H
1.00794

Atomic mass

Group designation

Halogens

Noble gases

Periods	1A (1)	2A (2)	3B (3)	4B (4)	5B (5)	6B (6)	7B (7)	8B (8)	8B (9)	8B (10)	1B (11)	2B (12)	3A (13)	4A (14)	5A (15)	6A (16)	7A (17)	8A (18)
1	1 H 1.008																	2 He 4.003
2	3 Li 6.941	4 Be 9.012											5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18
3	11 Na 22.99	12 Mg 24.31											13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.06	17 Cl 35.45	18 Ar 39.95
4	19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.87	23 V 50.94	24 Cr 52.00	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.69	29 Cu 63.55	30 Zn 65.38	31 Ga 69.72	32 Ge 72.64	33 As 74.92	34 Se 78.96	35 Br 79.90	36 Kr 83.80
5	37 Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.96	43 Tc [98]	44 Ru 101.07	45 Rh 102.91	46 Pd 106.42	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.76	52 Te 127.60	53 I 126.90	54 Xe 131.29
6	55 Cs 132.91	56 Ba 137.33	57 La 138.91	72 Hf 178.49	73 Ta 180.95	74 W 183.84	75 Re 186.21	76 Os 190.23	77 Ir 192.22	78 Pt 195.08	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.2	83 Bi 208.98	84 Po [209]	85 At [210]	86 Rn [222]
7	87 Fr [223]	88 Ra [226]	89 Ac [227]	104 Rf [267]	105 Db [268]	106 Sg [271]	107 Bh [272]	108 Hs [270]	109 Mt [276]	110 Ds [281]	111 Rg [280]	112 Cn [285]	113 Uut [284]	114 Fl [289]	115 Uup [288]	116 Lv [293]	117 Uus [294]	118 Uuo [294]

Lanthanides	58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm [145]	62 Sm 150.36	63 Eu 151.96	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.93	68 Er 167.26	69 Tm 168.93	70 Yb 173.05	71 Lu 174.97
Actinides	90 Th 232.04	91 Pa 231.04	92 U 238.03	93 Np [237]	94 Pu [244]	95 Am [243]	96 Cm [247]	97 Bk [247]	98 Cf [251]	99 Es [252]	100 Fm [257]	101 Md [258]	102 No [259]	103 Lr [262]

Note: Placement of elements 58 – 71 and 90 – 103 saves space

Representative/Main Group Elements

A groups—Longer columns

- **Alkali Metals**
  - **1A** = first group
  - All are metals except for H
  - Tend to form **+1** ions

Representative/Main Group Elements

A groups—Longer columns

- **Alkaline Earth Metals**
  - **2A** = second group
  - Tend to form **+2** ions

Representative/Main Group Elements

A groups—Longer columns

- **Halogens**
  - **7A** = next to last group on right
  - Form **diatomic** molecules in elemental state
    - 2 gases – F_2, Cl_2
    - 1 liquid – Br_2
    - 2 solids – I_2, At_2
  - Form **–1** ions with alkali metals—salts (e.g. NaF, NaCl, NaBr, and NaI)

Representative/Main Group Elements

A groups—Longer columns

- **Noble Gases**
  - **8A** = last group on right
  - Inert—very unreactive
  - Only heavier elements of group react and then very limited
  - Don’t form charged ions
  - Monatomic gases (e.g., He, Ne, Ar)

Transition Elements

B groups—shorter columns

- All are metals
- In center of table
- Begin in fourth row
- Tend to form ions with several different charges

e.g.,

- Fe^{2+} and Fe^{3+}
- Cu^{+} and Cu^{2+}
- Mn^{2+}, Mn^{3+}, Mn^{4+}, Mn^{5+}, Mn^{6+}, and Mn^{7+}

Metals, Nonmetals, or Metalloids

- Elements break down into three broad categories
- Organized by regions of periodic table

Metals

- Left-hand side
- Sodium, lead, iron, gold

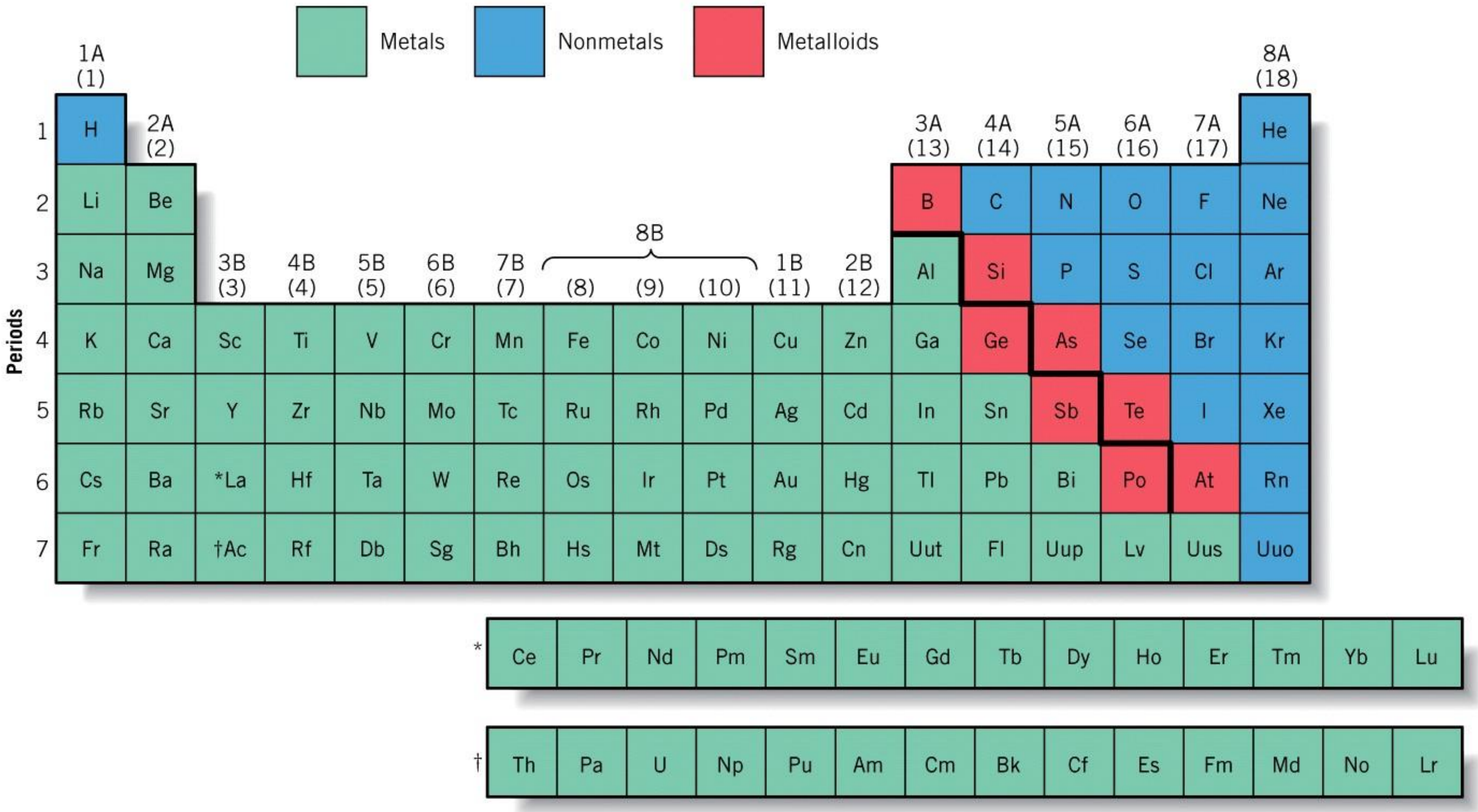
Nonmetals

- Upper right-hand corner
- Oxygen, nitrogen, chlorine

Metalloids

- Diagonal line between metals and nonmetals
- Boron to astatine

Metals, Nonmetals, or Metalloids



Your Turn!

Classify the following three elements as a metal, non-metal, or metalloid:

silicon (Si), vanadium (V), bromine (Br)

A. nonmetal, metal, nonmetal, respectively
B. metal, metalloid, nonmetal, respectively
C. nonmetal, metal, metalloid, respectively
D. metalloid, metal, metalloid, respectively
E. None of these are correct

Your Turn!

Strontium (Sr) is a ________, ruthenium (Ru) is a _________, and iodine (I) is a___________.

A. alkali metal, transition metal, halogen
B. transition metal, alkaline earth metal, halogen
C. alkaline earth metal, transition metal, halogen
D. transition metal, alkali metal, noble gas
E. alkali metal, actinide, halogen

Your Turn!

Which of the following statements is correct?

A. Cu is a representative transition element

B. Na is an alkaline earth metal

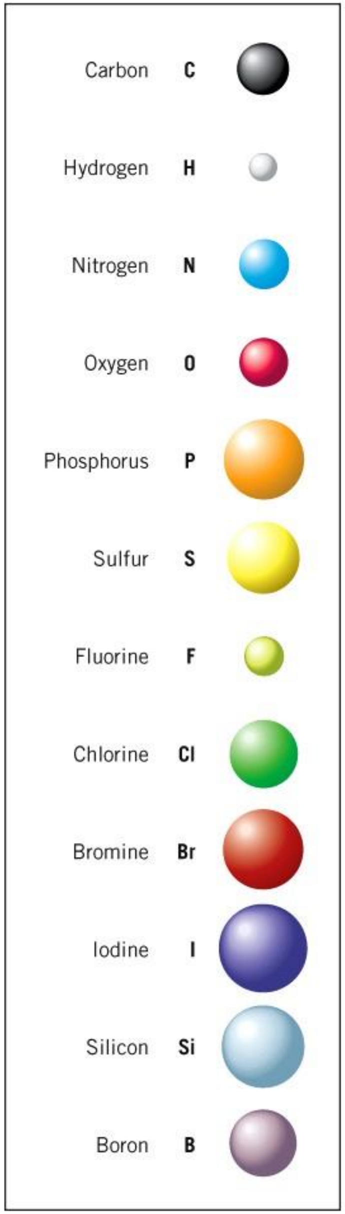
C. Al is a metalloid in group 3A

D. F is a representative halogen

E. None of these are correct

Molecules and Chemical Formulas

- Atoms combine into compounds
- Useful to visualize atoms, compounds, and molecules
- Atoms represented by spheres
- Different atoms have different colors
- Standard scheme is represented on the right



Molecules

- Atoms combine to form more complex substances
- Discrete particles
- Each composed of two or more atoms

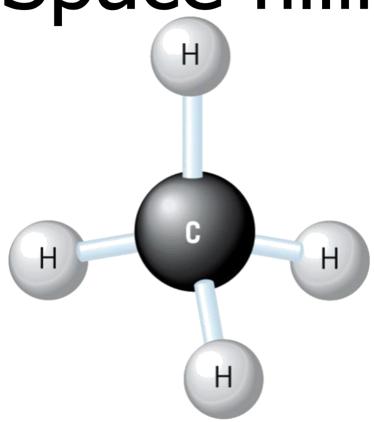
e.g.,

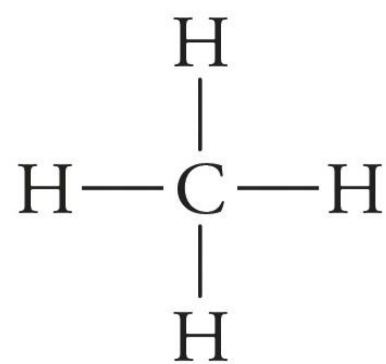
- Molecular oxygen, O_2
- Carbon dioxide, CO_2
- Ammonia, NH_3
- Sucrose, $C_{12}H_{22}O_{11}$

Depicting Molecules

- Want to show:
  - Order in which atoms are attached to each other
  - 3-dimensional shape of molecule
- Three ways of visualizing molecules:

1. Structural formula
2. Ball-and-stick model
3. Space filling model





CH_4
methane

Chemical Reactions

- When one or more substances react to form one or more new substances

e.g., Reaction of methane, CH_4, with oxygen, O_2, to form carbon dioxide, CO_2, and water, H_2O.

Reactants = CH_4 and O_2

Products = CO_2 and H_2O

- How to depict?
  - Words too long
  - Pictures too awkward

photocuisine/©Corbis

Balanced Chemical Equation

Ex. $2C_4H_{10} + 13O_2 \longrightarrow 8CO_2 + 10H_2O$

4 C and 10 H per molecule

2 O per molecule

1 C and 2 O per molecule

2 H and 1 O per molecule

Subscripts

- Define identity of substances
- Must not change when equation is balanced

Balanced Chemical Equation

Ex. $\mathbf{2}C_4H_{10} + \mathbf{13}O_2 \longrightarrow \mathbf{8}CO_2 + \mathbf{10}H_2O$

2 molecules of C_4H_{10}

13 molecules of O_2

8 molecules of CO_2

10 molecules of C_4H_{10}

Coefficients

- Number in front of formulas
- Indicate number of molecules of each type
- Adjusted so number of each type of atom is same on both sides of arrow
- Can change

Balanced Chemical Equations

- How do you determine if an equation is balanced?
  - Count atoms
  - Same number of each type on both sides of equation?
    - If yes, then balanced
    - If no, then unbalanced

Ex. $\mathbf{2C_4H_{10} + 13O_2 \longrightarrow 8CO_2 + 10H_2O}$

Reactants	Products
$2 \times 4 = 8\ \text{C}$	$8 \times 1 = 8\ \text{C}$
$2 \times 10 = 20\ \text{H}$	$10 \times 2 = 20\ \text{H}$
$13 \times 2 = 26\ \text{O}$	$(8 \times 2) + (10 \times 1) = 26\ \text{O}$

Learning Check

$$Fe(OH)_3 + 2\ HNO_3 \longrightarrow Fe(NO_3)_3 + 2\ H_2O$$

	Reactants	Products
Fe	**1**	**1**
O	$3 + (2\times3) = \mathbf{9}$	$(3\times3) + 2 = \mathbf{11}$
H	$3 + 2 = \mathbf{5}$	$(2\times2) = \mathbf{4}$
N	**2**	**3**

- Not balanced
- Only Fe has same number of atoms on either side of arrow.

Your Turn!

How many atoms of each element appear on each side of the arrow in the following equation?

$$4NH_3 + 3O_2 \rightarrow 2N_2 + 6H_2O$$

	Reactants	Products
N	$(4 \times 1) = 4$	$(2 \times 2) = 4$
O	$(3 \times 2) = 6$	$(6 \times 1) = 6$
H	$(4 \times 3) = 12$	$(6 \times 2) = 12$

Your Turn!

Count the number of atoms of each element on both sides of the arrow to determine whether the following equation is balanced.

$$2(NH_4)_3PO_4 + 3Ba(C_2H_3O_2)_2 \rightarrow Ba_3(PO_4)_2 + 6NH_4C_2H_3O_2$$

	Reactants	Products
N	$(2 \times 3) = 6$	$(6 \times 1) = 6$
H	$(2\times3\times4)+(3\times3\times2) = 42$	$(6\times4) + (6\times3) = 42$
O	$(2\times4) + (3\times2\times2) = 20$	$(2\times4) + (6\times2) = 20$
P	$(2 \times 1) = 2$	$(2 \times 1) = 2$
Ba	$(3 \times 1) = 3$	$(3 \times 1) = 3$

Ions and Ionic Compounds

Ions

- Transfer of one or more electrons from one atom to another
- Form electrically charged particles

Ionic compound

- Compound composed of ions
- Formed from metal and nonmetal
- Infinite array of alternating Na^+ and Cl^- ions

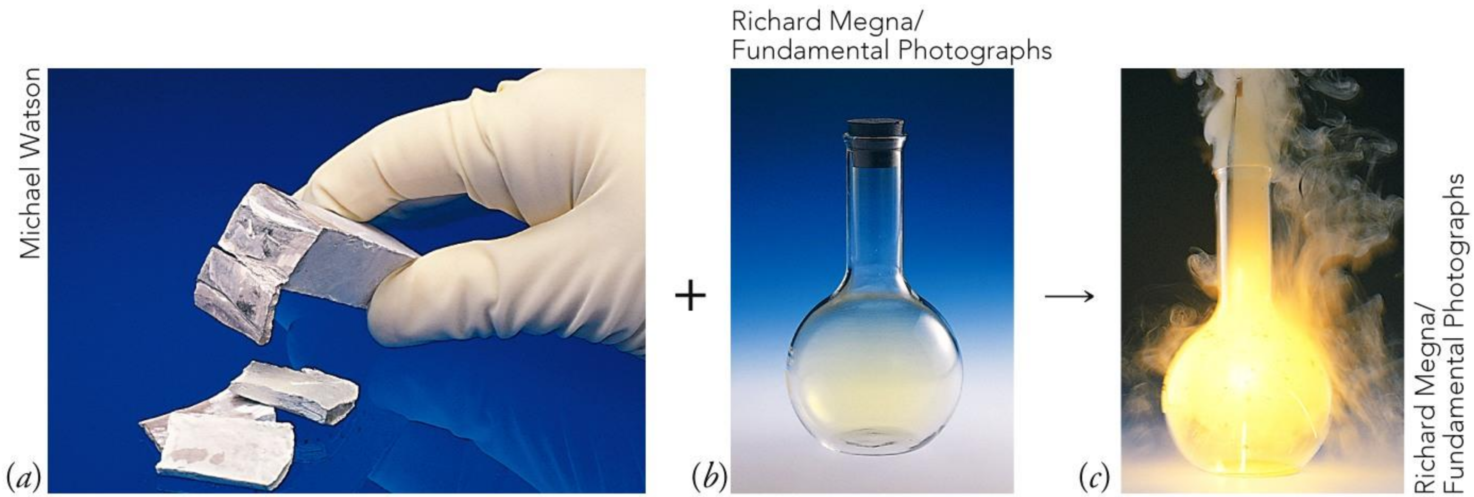
Formula unit

- Smallest neutral unit of ionic compound
- Smallest whole-number ratio of ions

Formation of Ionic Compounds

Metal + Non-metal $\longrightarrow$ ionic compound

$$2Na(s) + Cl_2(g) \longrightarrow 2NaCl(s)$$



$$Na + Cl \longrightarrow Na^{+} + Cl^{-} \longrightarrow NaCl(s)$$

e^{-}

Ionic Compounds

Cations

- Positively charged ions
- Formed from metals
- Atoms **lose** electrons

e.g., Na has 11 e^- and 11 p

Na^+ has 10 e^- and 11 p

Anions

- Negatively charged ions
- Formed from non-metals
- Atoms **gain** electrons

e.g., Cl has 17 e^- and 17 p

Cl^- has 18 e^- and 17 p

Ions of Representative Elements

- Can use periodic table to predict ion charges

TABLE 2.2 Ions Formed from the Representative Elements

Group Number						
1A	2A	3A	4A	5A	6A	7A
H^+						
Li^+	Be^{2+}		C^{4-}	N^{3-}	O^{2-}	F^-
Na^+	Mg^{2+}	Al^{3+}	Si^{4-}	P^{3-}	S^{2-}	Cl^-
K^+	Ca^{2+}				Se^{2-}	Br^-
Rb^+	Sr^{2+}				Te^{2-}	I^-
Cs^+	Ba^{2+}					

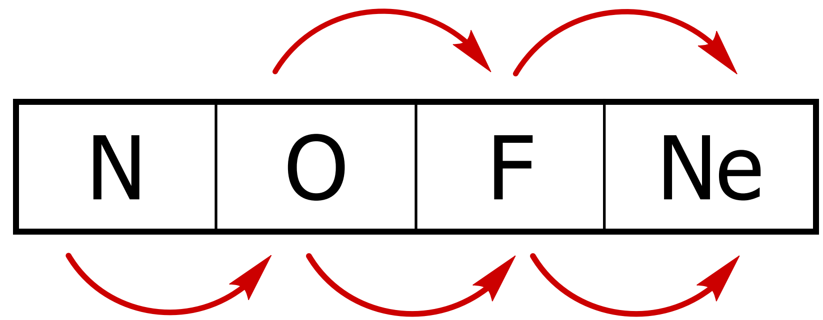
- When we use North American numbering of groups: Cation positive charge = group number

Ions of Representative Elements

- Noble gases are especially stable

Nonmetals

- **Negative (–)** charge on anion = number of spaces you have to move to right to get to noble gas
- Expected charge on O
  - Move two spaces to right
  - O^{2-}



- What is expected charge on N?
  - Move three spaces to right
  - N^{3-}

Rules For Writing Ionic Formulas

1. **Cation** given **first** in formula
2. **Subscripts** in formula must produce electrically neutral formula unit
3. **Subscripts** must be smallest whole numbers possible
   - Divide by 2 if all subscripts are even
   - May have to repeat several times
4. **Charges** on ions not included in finished formula unit of substance
   - If no subscript, then 1 implied

Determining Ionic Formulas

Example: Formula of ionic compound formed when magnesium reacts with oxygen

- Mg is group 2A
  - Forms +2 ion or Mg^{2+}
- O is group 6A
  - Forms –2 ion or O^{2-}
- To get electrically neutral particle need
  - 1:1 ratio of Mg^{2+} and O^{2-}
- **Formula**: **MgO**

Determining Ionic Formulas

"Criss-cross" rule

- Make **magnitude** of charge on one ion into subscript for other
- When doing this, make sure that subscripts are reduced to **lowest whole number**.

Example: What is the formula of ionic compound formed between aluminum and oxygen ions?

$Al^{3+}\ O^{2-}$ $\qquad\qquad$ Al_2O_3

Your Turn!

Which of the following is the correct formula for the formula unit composed of potassium and oxygen ions?

A. KO

B. KO_2

C. K_2O

D. P_2O_3

E. K_2O_2

Your Turn!

Which of the following is the correct formula for the formula unit composed of Fe^{3+} and sulfide ions?

A. FeS

B. Fe_3S_2

C. FeS_3

D. Fe_2S_3

E. Fe_4S_6

Your Turn!

Which of the following is the correct formula for the formula unit composed of ions of magnesium and nitrogen?

A. MgN

B. Mg_3N_2

C. Mn_3N_2

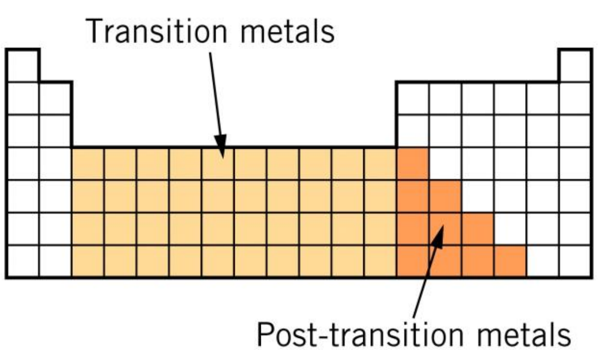
D. N_3Mg_2

E. Mn_2N_3

Cations of Transition Metals

Transition metals

- Center (shorter) region of periodic table
- Much less reactive than group 1A and 2A
- Still transfer electrons to nonmetals to form ionic compounds
- number of electrons transferred less clear
- Form more than one positive ion
- Can form more than one compound with same non-metal



e.g., Fe + Cl

$FeCl_2$ and $FeCl_3$

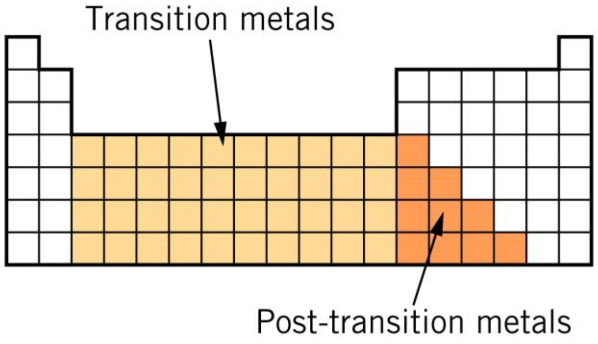
Cations of Post-transition Metals

Post-transition metals

- Nine metals Ga, In, Sn, Tl, Pb, Bi, Uut, Uuq, Uub
- After transition metals and before metalloids
- Two very important ones – tin (Sn) and lead (Pb)
  - Both have two possible oxidation states
  - Both form two compounds with same nonmetal

e.g., Ionic compounds of tin and oxygen are

  - SnO and SnO_2
- Bismuth
  - Only has +3 charge
  - Bi^{3+}



Ions of Some Transition Metals and Post-transition Metals

TABLE 2.3 Ions of Some Transition Metals and Post-transition Metals

Transition Metals		Transition Metals	
Titanium	Ti^{2+}, Ti^{3+}, Ti^{4+}	Silver	Ag^{+}
Chromium	Cr^{2+}, Cr^{3+}	Cadmium	Cd^{2+}
Manganese	Mn^{2+}, Mn^{3+}	Gold	Au^{+}, Au^{3+}
Iron	Fe^{2+}, Fe^{3+}	Mercury	Hg_2^{2+}, Hg^{2+}
Cobalt	Co^{2+}, Co^{3+}	**Post-transition Metals**	
Nickel	Ni^{2+}	Tin	Sn^{2+}, Sn^{4+}
Copper	Cu^{+}, Cu^{2+}	Lead	Pb^{2+}, Pb^{4+}
Zinc	Zn^{2+}	Bismuth	Bi^{3+}

Compounds with Polyatomic Ions

Binary compounds

- Compounds formed from two different elements

Polyatomic ions

- Ions composed of two or more atoms linked by molecular bonds
- If ions are negative, they have too many electrons
- If ions are positive, they have too few electrons

- Formulas for ionic compounds containing polyatomic ions
  - Follow same rules as ionic compounds
  - Polyatomic ions are expressed in parentheses

Polyatomic Ions

TABLE 2.4 Formulas and Names of Some Polyatomic Ions

Ion	Name (Alternate name in parentheses)	Ion	Name (Alternate name in parentheses)
NH_4^+	Ammonium ion	CO_3^{2-}	Carbonate ion
Hg_2^{2+}	Mercury(I) ion	HCO_3^-	Hydrogen carbonate ion (bicarbonate ion)[b]
H_3O^+	Hydronium ion[a]	SO_3^{2-}	Sulfite ion
OH^-	Hydroxide ion	HSO_3^-	Hydrogen sulfite ion (bisulfite ion)[b]
CN^-	Cyanide ion	SO_4^{2-}	Sulfate ion
NO_2^-	Nitrite ion	HSO_4^-	Hydrogen sulfate ion (bisulfate ion)[b]
NO_3^-	Nitrate ion	SCN^-	Thiocyanate ion
ClO^- or OCl^-	Hypochlorite ion	$S_2O_3^{2-}$	Thiosulfate ion
ClO_2^-	Chlorite ion	CrO_4^{2-}	Chromate ion
ClO_3^-	Chlorate ion	$Cr_2O_7^{2-}$	Dichromate ion
ClO_4^-	Perchlorate ion	PO_4^{3-}	Phosphate ion
MnO_4^-	Permanganate ion	HPO_4^{2-}	Monohydrogen phosphate ion
$C_2H_3O_2^-$	Acetate ion	$H_2PO_4^-$	Dihydrogen phosphate ion
$C_2O_4^{2-}$	Oxalate ion		

[a]You will only encounter this ion in aqueous solutions.

[b]You will often see and hear the alternate names for these ions.

Learning Check

Ex. What is the formula of the ionic compound formed between ammonium and phosphate ions?

- Ammonium = NH_4^+
- Phosphate = PO_4^{3-}

$(NH_4)^+ \; (PO_4)^{3-}$ **$(NH_4)_3PO_4$**

Ex. Between strontium ion and nitrate ion?

- Strontium = Sr^{2+}
- Nitrate = NO_3^{2-}

$Sr^{2+} \; (NO_3)^-$ **$Sr(NO_3)_2$**

Nomenclature (Naming)

- IUPAC system to standardize name of chemical compounds
- One system so that anyone can reconstruct formula from name
- We will look at naming ionic compounds of
  - Representative metals
  - Transition metals
  - Monatomic ions
  - Polyatomic ions
  - Hydrates

Naming Ionic Compounds

Cations:

- Metal that forms **only one** positive ion
  - Cation name = English name for metal
    - Na^{+} sodium
    - Ca^{2+} calcium
- Metal that forms **more than one** positive ion
- Use Stock System
  - Cation name = English name followed by numerical value of charge written as Roman numeral in parentheses (no spaces)
  - Transition metal
    - Cr^{2+} chromium(II) Cr^{3+} chromium(III)

Naming Ionic Compounds

Anions:

- Monatomic anions named by adding "*–ide*" suffix to stem name for element

TABLE 2.5 Monatomic Negative Ions

H^-	Hydride	C^{4-}	Carbide	N^{3-}	Nitride	O^{2-}	Oxide	F^-	Fluoride
		Si^{4-}	Silicide	P^{3-}	Phosphide	S^{2-}	Sulfide	Cl^-	Chloride
				As^{3-}	Arsenide	Se^{2-}	Selenide	Br^-	Bromide
				Te^{2-}	Telluride	I^-	Iodide		

- Polyatomic ions use names in Table 2.4

Learning Check: Name The Following

- K_2O — **potassium oxide**
- NH_4ClO_3 — **ammonium chlorate**
- $Mg(C_2H_3O_2)_2$ — **magnesium acetate**
- Cr_2O_3 — **chromium(III) oxide**
- $ZnBr_2$ — **zinc bromide**

Learning Check: Determine The Formula

- Calcium hydroxide
  - **$Ca(OH)_2$**
- Manganese(II) bromide
  - **$MnBr_2$**
- Ammonium phosphate
  - **$(NH_4)_3PO_4$**
- Mercury(I) nitride
  - **$(Hg_2)_3N_2$**

Your Turn!

Which is the correct name for Cu_2S?

A. copper sulfide
B. copper(II) sulfide
C. copper(II) sulfate
D. copper(I) sulfide
E. copper(I) sulfite

Your Turn!

Which is the correct formula for ammonium sulfite?

A. NH_4SO_3

B. $(NH_4)_2SO_3$

C. $(NH_4)_2SO_4$

D. NH_4S

E. $(NH_4)_2S$

Hydrates

- Crystals that contain water molecules

e.g., Plaster: $CaSO_4 \cdot 2H_2O$ calcium sulfate dihydrate

  - Water is not tightly held

- **Dehydration**
  - Removal of water by heating
  - Remaining solid is ***anhydrous*** (without water)

Blue =

$CuSO_4 \cdot 5H_2O$

Richard Megna/Fundamental Photographs

(*a*)

Michael Watson

(*b*)

White = $CuSO_4$

Naming Hydrates

- Ionic compounds
  - Crystals contain water molecules
  - Fixed proportions relative to ionic substance
- Naming
  - Name ionic compound
  - Give number of water molecules in formula using Greek prefixes

mono-	= 1	hexa-	= 6
di-	= 2	hepta-	= 7
tri-	= 3	octa-	= 8
tetra-	= 4	nona-	= 9
penta-	= 5	deca-	= 10

Learning Check: Naming Hydrates

- $CaSO_4 \cdot 2H_2O$
  - **calcium sulfate dihydrate**
- $CoCl_2 \cdot 6H_2O$
  - **cobalt(II) chloride hexahydrate**
- $FeI_3 \cdot 3H_2O$
  - **iron(III) iodide trihydrate**

Your Turn!

What is the correct formula for copper(II) sulfate pentahydrate?

A. $CuSO_4 \cdot 6H_2O$

B. $CuSO_3 \cdot 5H_2O$

C. $CoSO_4 \cdot 4H_2O$

D. $CoSO_3 \cdot 5H_2O$

E. $CuSO_4 \cdot 5H_2O$

Your Turn!

What is the correct name for $Fe(NO_3)_3 \cdot 9H_2O$

A. iron nitrate nonahydrate

B. iron(III) nitrate nonahydrate

C. Ferium (III) nitrate decahydrate

D. iron(III) nitrite nonahydrate

E. iron(III) nitrate heptahydrate

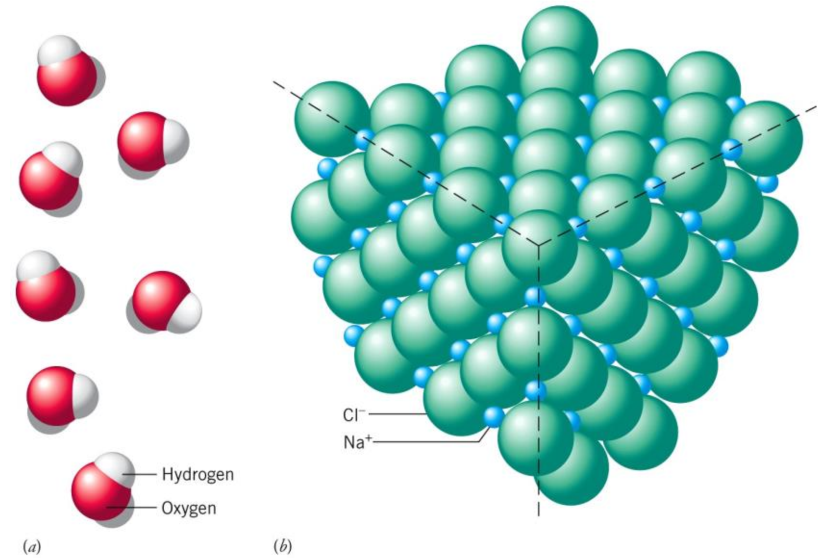
Molecules vs. Ionic Compounds

Molecules

- Discrete unit
  - Water = two hydrogen atoms bonded to one oxygen atom

Ionic Compounds

- Ions packed as close as possible to each other
  - Sodium chloride:
    Six anions surround each cation; six cations surround each anion
  - No one ion "belongs" to another



Molecular Compounds

- Formed when nonmetals combine
  - $C + O_2 \longrightarrow CO_2$ $2H_2 + O_2 \longrightarrow 2H_2O$
- Millions of compounds can form from a few non-metals
- Organic chemistry and biochemistry
  - Deal with chemistry of carbon + hydrogen, nitrogen, and oxygen
- A few compounds have only two atoms
  - Diatomics: HCl, CO, HF, NO
- Most molecules are far more complex
  - Sucrose ($C_{12}H_{22}O_{11}$) urea (CON_2H_4)

Nomenclature of Molecular Compounds

- Goal is a name that translates clearly into molecular formula

Naming Binary Molecular Compounds

- Which two elements present?
- How many of each?

Format:

- **First element in formula**
  - Use English name
- **Second element**
  - Use stem and append suffix *–ide*
- Use Greek number prefixes to specify how many atoms of each element

Naming Binary Molecular Compounds

1. hydrogen chloride

   1 H 1 Cl HCl

2. phosphorous pentachloride

   1 P 5Cl PCl_5

3. triselenium dinitride

   3 Se 2N Se_3N_2

- Mono always omitted on first element
- Often omitted on second element unless more than one combination of same two elements

  e.g., Carbon monoxide CO

  Carbon dioxide CO_2

- When prefix ends in vowel similar to start of element name, drop prefix vowel

Learning Check: Name Each

Format:

- Number prefix + first element name
- Number prefix + stem + –ide for second element

- AsF_3 = **arsenic trifluoride**
- HBr = **hydrogen bromide**
- N_2O_4 = **dinitrogen tetroxide**
- N_2O_5 = **dinitrogen pentoxide**
- CO = **carbon monoxide**
- CO_2 = **carbon dioxide**

Your Turn!

Which is the correct formula for nitrogen triiodide?

A. N_3I

B. NI_3

C. NIO_3

D. $N(IO_3)_3$

E. none of the above

Your Turn!

Which is the correct name for P_4O_{10}?

A. phosphorus oxide

B. phosphorous decoxide

C. tetraphosphorus decoxide

D. tetraphosphorus oxide

E. decoxygen tetraphosphide

Your Turn!

Which is the correct formula for disulfur decafluoride?

A. Su_2F_{10}

B. SF_5

C. S_2F_{10}

D. S_3F_{10}

E. S_2F_4

Exceptions to Naming Binary Molecules

Binary compounds of nonmetals + hydrogen

- No prefixes to be used
- Get number of hydrogens for each nonmetal from periodic table
- Hydrogen sulfide = H_2S
- Hydrogen telluride = H_2Te

Molecules with Common Names

- Some molecules have names that predate IUPAC systematic names
- Water H_2O
- Sucrose $C_{12}H_{22}O_{11}$
- Ammonia NH_3
- Phosphine PH_3

Summary of Naming