

HW #2-1 Summer Assignment Chapter 2

PROBLEMS pg. 69 #11, 13, 17, 20, 22, 27, 28, 38, 41, 43, 47, 61, 64, 69

2.11 What do we call atoms of the same elements with different mass numbers? **Isotopes.**

2.13 What is the mass number of an iron atom that has 28 neutrons?

For iron, the atomic number Z is 26. Therefore the mass number A is: $A = 26 + 28 = 54$

2.17 Give the symbol for the following isotopes:

(a) $Z=11$ $A=23$ ${}^{23}_{11}\text{Na}$ (b) $Z=28$ $A=64$ ${}^{64}_{28}\text{Ni}$

2.20 State two differences between a metal and a nonmetal.

Metals conduct heat and electricity, are shiny & malleable; nonmetals are poor conductors, generally dull and brittle.

2.22 Define, with two examples, the following terms:

(a) Alkali metals: (1st column) Sodium, rubidium

(b) alkaline earth metals: (2nd column) barium, beryllium

(c) halogens: (7th column) fluorine, iodine

(d) noble gases: (8th column) xenon, krypton

2.27 What is the difference between an atom and a molecule?

An atom is the smallest representative unit of an element.

A molecule is the smallest representative unit of a (non-ionic) compound, composed of two or more atoms chemically bonded.

2.28 What are allotropes? Allotropes are different physical forms of the same element.

Examples? graphite and diamond are two allotropes of carbon.

How are allotropes different from isotopes?

Allotropes refer to differences in physical form of a macroscopic sample of an element. Isotopes refer to differences between individual atoms of an element.

2.38 The **molecular formula** shows the exact number of atoms of each element in the smallest unit of a substance (a molecule), while an **empirical formula** indicates the simplest whole-number ratio of each element in a substance.

What are similarities and differences between empirical formula and molecular formula? They are similar in that the ratio of one element to another is the same in either formula for a given substance, while they are different in that the empirical formula will not *necessarily* indicate the actual number of atoms of the elements in a substance.

2.41 **What is an ionic compound?** An *ionic compound* is composed of cations and anions held together by electrostatic attraction.

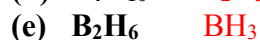
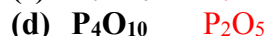
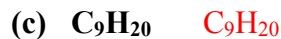
How is electrical neutrality maintained in an ionic compound?

Charge neutrality is maintained by having ions present in the reverse ratio of the magnitude of their charges.

2.43 What are the empirical formulas of the following compounds?

(a) C_2N_2 **CN**

(b) C_6H_6 **CH**



- 2.47 Which of the following compounds are likely to be ionic? Which are likely to be molecular?
Compounds of metals with nonmetals are usually ionic. Nonmetal-nonmetal compounds are usually molecular.

Ionic: LiF , BaCl_2 , KCl

Molecular: SiCl_4 , B_2H_6 , C_2H_4

- 2.61 One isotope of a metallic element has mass number 65 and 35 neutrons in the nucleus. The cation derived from the isotope has 28 electrons. Write the symbol for this cation.
The number of protons = $65 - 35 = 30$. The element that contains 30 protons is zinc, Zn. There are two fewer electrons than protons, so the charge of the cation is +2. The symbol for this cation is Zn^{2+} .
- 2.64 What is wrong with or ambiguous about the phrase “four molecules of NaCl”?
NaCl is an ionic compound; it doesn't form molecules.

- 69 Fill in the blanks in the following table:

Symbol	${}_{5}^{11}\text{B}$	${}_{26}^{54}\text{Fe}^{2+}$	${}_{15}^{31}\text{P}^{3-}$	${}_{79}^{196}\text{Au}$	${}_{86}^{222}\text{Rn}$
Protons	5	26	15	79	86
Neutrons	6	28	16	117	136
Electrons	5	24	18	79	86
Net Charge	0	+2	-3	0	0