

CHAPTER 2

ATOMS, MOLECULES, AND IONS

Review

2.5: Modern View of Atomic Structure

electron: occupies bulk of volume of atom, electrically negative, arrangement determines chemical properties

proton: (Z) located in nucleus, electrically positive, number of protons is the atomic number which is unique to each type of element.

Neutron: located in nucleus and is electrically neutral. Accounts for isotopic masses of the elements.

Isotopes: atoms with the same number of protons, but different number of neutrons. Results in a different mass number (A).

Notation:

A , Mass Number (protons + neutrons) \rightarrow 23
 Z , Atomic Number (protons) \rightarrow 11 Na^+

Bookkeeping:

Protons = 11, electrons = 10 = (11 - 1), neutrons = 12 = (23 - 11)

2.6: Molecules and Ions

Molecule: bonded collection of two or more atoms of different or same elements. Bond is formed from sharing electrons

Ion: charged particle formed by the loss or gain of an electron.

Cation: positive ion formed when an atom loses one or more electrons (typically metals)

Anion: negative ion formed when an atom gains one or more electrons. (typically non-metals)

Ionic Bond: force of attraction between the positive and negative ions: salt.

2.7: Periodic Table

Review location of:

Metals, non-metals, periods. Gain or lose electrons. Increase trend of metallic character.

Families and major oxidation charge: alkali metals(+1), alkaline earth metals (+2), halogens (-1), noble gases (0).

2.8: Naming Simple Compounds

Some Funny Names of Molecules

Binary Ionic (Type I): See Fig. 2.24

Name cation then anion, add “ide” to ending of monoatomic anion

*Special note: peroxide: O_2^{2-} mercury (I) = Hg_2^{2+}

Binary Ionic (Type II)

Need to specify the charge on the cation **if** metal forms more than one type of cation. Usually the transition elements. No need to use Roman Numerals if element forms only one kind of cation, Group IA, IIA and Al

Higher charge has “ic” lower charge ending of “ous”

Ex. Cu^+ = copper(I) or cuprous Cu^{2+} = copper(II) or cupric

Ionic Compounds with Polyatomic Ions

Oxyanions: look at number of oxygen atoms, lower number suffix ends in “ite”, higher number ends in “ate”. If more than 2 oxyanions use prefix “per” for more than and prefix “hypo” for less than.

Ex. 1: SO_4^{2-} = sulfate SO_3^{2-} = sulfite

Ex. 2: ClO_4^- = perchlorate, ClO_3^- = chlorate, ClO_2^- = chlorite, ClO^- = hypochlorite

Naming Acids: in aqueous solutions

If no oxygen in acid: use prefix “hydro” and suffix “ic”. Ex. HCl = hydrochloric acid
Compare HCl(g) as hydrogen chloride

If oxygen present:

Suffix “ate” becomes “ic” ex: H_2SO_4 (with sulfate) becomes sulfuric acid

Suffix “ite” becomes “ous” ex.: H_2SO_3 (with sulfite) becomes sulfurous acid

Chapter 2 homework:

Read Chapter 2

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