

CHEM BASICS

(Holt Ch1+2)

- Convert 0.85 L to cm^3 .
- Convert 340,000 cm^3
- The mass of an unknown piece of metal is 25.9g. The volume is measured by water displacement. The initial volume of the water is 45.0 mL. The volume of the water with the piece of metal is 60.0 mL. What is the density of the metal?
- What is the density of a piece of wood that has a length of 50. mm, width of 9.00 cm and height of 1.59 m and a mass of 2500 g?
- A steel cylinder is 34.8 cm tall and 18.6 cm in diameter. It weighs 7.45×10^6 mg. If you throw it in the pool, will it float or sink in the water? Prove it.
- A block of aluminum has a mass of 25.5 g. What is the volume of the block? The density of aluminum is 2.7 g/cm^3 .
- Calculate the following and express the answer with the correct number of sig. figs.
(68.95g) / (64.0 mL – 58.4mL)

Terms

Element, Compound, mixture; heterogeneous and homogeneous, Density, scientific method, atom, Molecules, endothermic and exothermic reaction, hypothesis, accuracy, precision, The difference between the 3 fundamental states of matter, Evidence of a chemical reaction, significant figures. How to prove a chemical reaction has occurred

Know prefixes: kilo, deci, centi, milli, micro, nano

ATOMIC STRUCTURE

(Holt :Ch3)

- Determine the number of protons, neutrons and electrons in
 - ${}_{16}^{31}\text{Si}$
 - Zn - 70
 - Write the isotope symbol for an element with 17 protons, 17 electrons and 20 neutrons.
 - The green line in the hydrogen line emission spectrum has a wavelength of 486 nm. What is the frequency of this line?
 - One of the lines in the spectrum of sodium has a frequency of 7.5×10^{14} Hz. What is the wavelength of this light?
 - What is the energy of a photon of microwave radiation with a frequency of 3.20×10^{11} 1/s?
 - Yellow light has sufficient energy to produce the photoelectric effect in potassium. The energy of one photon of the yellow light is 3.45×10^{-19} J. What is the frequency of this light?
 - What is the wavelength of the yellow light in problem 7?
 - Write the electron configuration for
 - barium (BA)
 - selenium (Se)
 - Draw the orbital diagram for aluminum.
 - Which elements have the following electron configurations?
 - $1s^2 2s^2 2p^5$
 - $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2$
 - $[\text{Ne}] 3s^2 3p^1$
 - What is the maximum number of orbitals in the $n=2$ energy level? What is the maximum number of electrons that can occupy the $n=2$ level?
 - Arrange the colors of visible light in order of increasing energy.
- Know Thomson's and Rutherford's experiments and what they showed about the structure of the atom., Know Dalton's atomic theory., Know the 4 quantum numbers., Know what the atomic mass scale is based on.

(Holt: Ch 4) PERIODIC TABLE / NOMENCLATURE

Write the formula for the following compounds and identify as ionic or covalent compound.

1. iron (II) phosphate
2. potassium bromide
3. barium sulfide
4. potassium permanganate
5. copper (I) oxide
6. carbon dioxide
7. sodium nitride
8. ammonium phosphate
9. mercury (II) chloride
10. carbon tetrachloride
11. dinitrogen tetroxide
12. cobalt (II) phosphate
13. potassium cyanide
14. lead (IV) chromate
- 15a. calcium sulfate dihydrate
- 15b. hydrobromic acid

Name the following compounds and identify as ionic or covalent compound.

16. CaI
17. CuNO_3
18. SnCl_4
19. MgO
20. N_2O_5
21. BaCO_3
22. NaOH
23. $\text{Fe}_2(\text{SO}_4)_3$
24. NH_4ClO_4
25. PBr_5
26. $\text{Co}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$
27. S_2Cl_2
28. ZnCrO_4
29. $\text{Cu}(\text{ClO}_3)_2$
- 30a. Rb_3N
- 30 b. H_2SO_3

Explain:

31. the difference between covalent and ionic bonds
32. why some compounds require Roman numerals in their name and some don't
33. using electron configurations why group 1 elements form +1 ions and group 17 elements form -1 ions
34. what a hydrate is
35. what a polyatomic ion is
36. Periodic trends in atomic radius, ionization energies, electron affinities, electronegativity and why
37. Know periodic table, metals, nonmetals, metalloids, alkaline-earth metals, alkali metals, halogens, noble gases, transition metals, lanthanides, actinides

BONDING

(Holt: Ch. 5 Ch 6)

For each molecule draw the Lewis structure,

1. CS_2
2. NH_4^+
3. PF_5
4. HF
5. IF_3
6. BF_3
7. CCl_4
8. KrF_4
9. SO_2
10. H_2Se

Identify the following bonds as ionic, polar covalent or nonpolar.

11. N_2
12. HCl

13. NaO

14. Draw the resonance structures for NO_3^- .

15. Arrange the following in order of increasing boiling point (increasing strength of intermolecular forces)

a. Ar, He, Ne, Kr

b. H_2O , H_2S

c. CH_4 , NH_3

419 Know the following terms: London dispersion forces, dipole – dipole, hydrogen bonding, intermolecular forces, VSEPR, Lewis structure, arrange intermolecular forces in order of increasing strength

QUANTITATIVE COMPOSITION

(Holt ch 8)

1. Determine the empirical formula for a compound that has the following analysis:

77.3 % silver, 7.4% phosphorus and 15.3% oxygen

2. Determine the empirical formula for a compound that has the following analysis:

13.07 g sample of an unknown substance is composed of 9.48 g barium, 1.66 g carbon and 1.93 g nitrogen

3. Determine the molecular formula for compounds that having the following empirical formulas and molar masses:

$\text{C}_2\text{H}_4\text{O}$; experimental molar mass 176 g/mol

4. A 10.64 g sample of a lead compound is analyzed and found to be made up of 9.65 g of lead and 0.99 g of oxygen. Determine the empirical formula for this compound.

5. A 2.65 g sample of a salmon colored powder contains 0.70 g of chromium, 0.65 g of sulfur and 1.30 g of oxygen. The molar mass is 392.2 g/mol. What is the formula of the compound?

6. Determine the molecular formula for a compound that has the following analysis:

64.27% carbon, 7.19% hydrogen and 28.54 % oxygen;

experimental molar mass is 168.19 g/mol

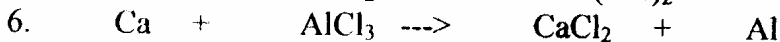
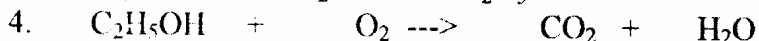
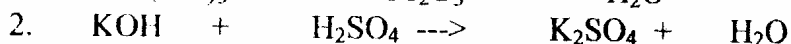
7 Calculate the percentage composition of nitric acid, HNO_3 .

8. Calculate the percentage of water in zinc sulfate heptahydrate, $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$.

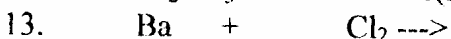
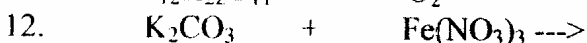
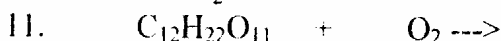
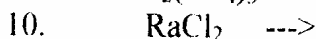
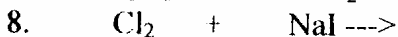
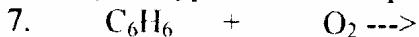
EQUATIONS

(Holt ch 9)

Balance the following equations. Identify the type of reaction (synthesis, decomposition, single replacement, double replacement or combustion)



Identify the type of reaction, products formed and balance the equation.



Using the activity series, predict whether the following reactions will occur. For those which occur, write balanced chemical equations.



Know activity series, symbols used in chemical equations, evidence of a chemical reaction, numbers of moles and molecules indicated by a chemical equation

Nuclear Chem

(Holt Ch 18)

1. The half-life of radon-222 is 3.824 days. If 19.12 days ago a sample contained 5.0 mg of radon-222, how many milligrams of radon-222 does the sample contain today?

2. The half-life of uranium-238 is 4.46×10^9 years. After what time will 7/8 of a given amount of uranium-238 have decayed?

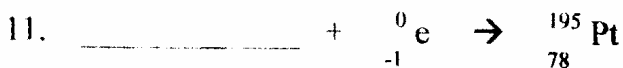
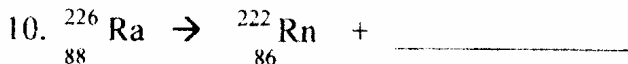
3. The half-life of carbon-14 is 5715 years. What fraction of carbon-14 remains after 17145 years have passed

4. Electron Capture by ${}_{42}^{93}Mo$ _____

5. Beta emission of ${}_{83}^{214}Bi$ _____

6. Positron emission of ${}_{6}^{11}C$ _____

7. Alpha emission of ${}_{90}^{230}Th$ _____



Know nuclear reaction, half-life, radioactive decay, alpha, beta, gamma, positron, decay series, transmutation, fusion, fission

Add the recent Review on Stoichiometry Ch.10