Chapter 1

1. Chemistry is defined as the study of:
   a) the structure of matter b) substances and the changes they undergo
   c) formulas and equations d) the substances found on the periodic table

2. Indicate whether the following is a base unit or a derived unit:
   a) base unit b) derived unit

a) mass __b___ d) volume___d__ g) mole ____b__
b) width __b___ e) time ___b__ h) temperature ____b___
c) length __b___ f) force ___d__ i) energy ___d___

3. Identify the following as a picosecond, nanosecond, or megasecond.
   a) 10^{6} s __pico___ b) 10^{-9}s ___nano__

4. Which of the following equals 7698mm?
   a) 769800m b) 769.8m c) 76.98m d) 7.698m

5. What is the density of a block of ice that has a mass of 585g and a volume of 597mL?
.980g/ml

6. Chemistry is called the central science because it __overlaps so many sciences_____

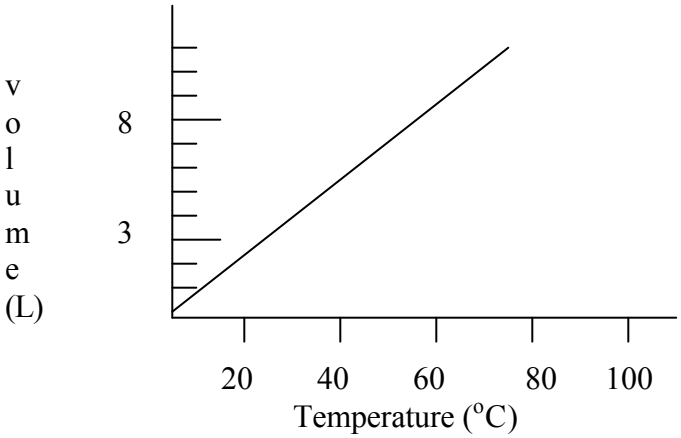
7. What is the chief advantage of the metric system over other measuring systems?
   It is base 10
8. Find the product of $(6.2 \times 10^{-2})(8.9 \times 10^{2})$ and put the answer in scientific notation.
   5.5×10^{1}

9. Five people weigh a standard 5.00g mass on the same balance. All five people get a reading of 10.20g for the standard mass. Write **yes** or **no** to answer the following questions.
   a) Were the results precise? ____yes_____
   b) Were the results accurate? ____no_____

10. Match the best word to each definition:
    a) the SI unit for mass 7
    b) equal to mass/volume 10
    c) the volume of a cube 1.0cm on a side 5
    d) a non-SI unit of volume 9
    e) force due to gravity 8
    f) known or estimated in a measurement 2
    g) narrowness of range of measurement 4
    h) closeness to true (accepted) value 6
    i) the factor being tested in an experiment 1
    j) a tentative or suggestive answer to a question 3

    1. variable
    2. significant figures
    3. hypothesis
    4. precision
    5. millimeter
    6. accuracy
    7. kilogram
    8. weight
    9. liter
    10. density

11.



a) From the graph, indicate which variable is the dependent variable?
_____volume____ _____

b) From the graph, indicate which variable is the independent variable?
_____temperature_____

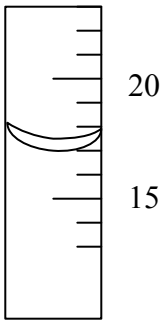
c) What is the volume at 30ºC? _____12L_____

d) What is the volume of 50ºC? _____16L_____

12. How would you read figure 2?

a) 17.00cm^3 b) 17.0cm^3
c) 18.00cm^3 d) 18.0cm^3

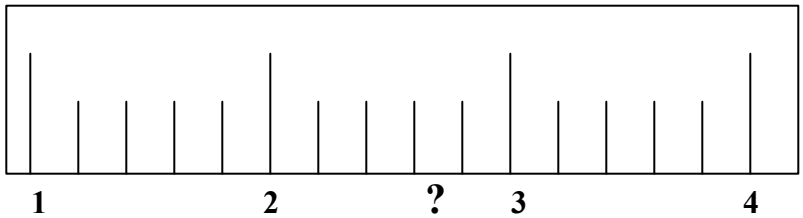
Fig. 2



13. How would you read Fig 3?

a) 2.6cm b) 2.7cm
c) 2.65cm d) 2.650cm

Fig. 3



14. If you determine the density of a secret super-super solution to be 369.7g/cm^3, when the accepted value for the density of this solution is 364.2g/cm^3, what is the % error?

$\frac{369.7 - 364.2}{3.642} \times 100\% = 1.51\ \%$

15. If the density of an unknown substance is 3.90g/cm^3, what is the mass of a cube of this substance that is 1.0cm on each side?

D= m/V _ m=DxV=3.9g/cm ^{3} x 1.0 cm ^{3} = 3.90g

Ch. 2

1) What do we call anything that has mass or volume? ____matter_____-

2) True or false? T or F

a) Solutions are homogeneous mixtures __t__
b) Elements can be separated into simpler substances by ordinary chemical changes. __f__
c) Salt water is an example of a heterogeneous mixture. __f__
d) Homogeneous mixtures are easily filtered. __f__
e) Both elements and compounds appear on the periodic table. __f__
f) Combustibility is a chemical (burning) property. __t__
g) Nickel (Ni) can be broken down into simpler substances. __t__
h) The chemical symbol for magnesium is Mn.- __f__

3) What is a calorie? Energy needed to raise 1 gram of water by 1 degree celsius

4) What is a joule? SI unit of energy

5) `Convert the following. a. 35°C = ___308_____K . b. 305 K = __32_____ °C
. c. -52°C = __221_____K . d. 29 K = __-244_____ °C

6) State which of the following is a chemical or physical property.

a) density __p__ b) reacting with hydrogen _c___
c) flammability __c__ d) malleability __p__

7) What is a Quantitative measurement? Numerical/mathematical

8) What is a Qualitative measurement? Observed

9) State which of the following are heterogeneous or homogeneous?

a) air _homo___ b) salt dissolved in water _homo___
c) sand in water _hetero___ d) sawdust and nails __hetero__

10) Complete the following with the proper name or symbol for the element.

element	symbol	element	symbol	element	symbol	element	symbol
Zinc	Zn	arsenic	As	Chromium	Cr	Barium	Ba
antimony	Sb	potassium	K	iron	Fe	gallium	Ga
Cobalt	Co	Argon	Ar	bismuth	Bi	Phosphorus	P
Silver	Ag	mercury	Hg	iodine	I	lead	Pb

Chapter 15 solutions

Match the correct term to its definition.

1. solute ad

2. solvent ac

3. immiscible a

4. alloy be

5. gas solution bc

6. liquid solution ae

7. solid solution ad

8. solution ab

9. homogeneous mixture de

10. heterogeneous mixture ce

11. concentration abc

12. soluble cd

13. molarity b

14. saturated solution e

15. supersaturated solution d

a. two liquids that cannot dissolve in each other

b. unit of concentration that acids are measured in

c. solution that can have more solute dissolved in it

d. solution that has more solute dissolved in it than should be

e. solution that cannot have more solute dissolved in it

ab. A homogeneous mixture that exists in one phase

ac. Part of a solution that does the dissolving

ad. Part of solution that gets dissolved

ae. Solution with liquid as the solvent

bc. Solution with gas as the solvent

bd. Solution with solid as the solvent

be. Solution of two metals

cd. The ability to dissolve

ce. Mixture which parts are distinguishable

de. Mixture which parts aren't distinguishable

abc. The amount of solute per given amount of solvent

16. Will a sugar cube dissolve better in water if it is crushed or if it is whole?
a. better b. worse c. no difference

17. Will sugar dissolve better or worse in hot water.
a. better b. worse c. no difference

18. Does nitrogen dissolve better or worse in blood at low pressures?
a. better b. worse c. no difference

19. Are oil and water miscible?
a. yes b. no

20. 5 grams of solid sodium thiocyanate is added to 1mL of water. The two chemicals are then heated to produce a liquid solution. That solution is then cooled in ice water. The solution is
a. saturated b. unsaturated c. supersaturated d. none of these

Chapter 3

CHAPTER 3 REVIEW

1) Are the following numbers of protons and electrons correct for each element? Yes or No
a) Zn 30 p & 49 e__n__ b) F 19 p & 19 e__n__ c) In 49 p & 49 e_y___ d) Cs 55 p & 60 e __n__

2) Which of the following are true for all atoms? T or F
a) neutral, with a the number of protons equaling the number of electrons, which equals the number of neutrons. __f__
b) negatively charged, with the number of protons equaling the number of electrons. __f__
c) positively charged, with the number of protons exceeding the number of electrons. __f__
d) neutral, with the number of protons equaling the number of electrons. _t___

3) True or False
a) Protons have a positive charge. _t___ b) The nucleus of an atom is positively charged. __t_
a) Neutrons are found in the nucleus. _t___ d) Electrons are negatively charged with a mass of 1 a.m.u. _f__

4) Which is true about the nucleus of an atom?
a) Negatively charged with low density. _f___ c) Negatively charged with high density. _f___
b) Positively charged with low density.__f__ d) Positively charged with high density. __t__

5) Different elements have different numbers of . _protons___ (what determines their difference)

6) What is the approximate mass of an electron, in a.m.u.? _zero___

7) Which of the following are true about the atomic mass of an element?
a) Depends upon the relative abundance of each isotope of the element. __t__
b) Depends upon the mass of each isotope of the element __t__.
c) Depends upon the number of isotopes of that element. __t__

8) An atom of an element with atomic number 49 and mass number 119 contains how many
protons__49__ electrons_49___ neutrons__70__

9.

Isotope	Atomic #	Mass #	protons	electrons	neutrons	charge
J	35	76	35	33	41	+2
K	40	70	40	41	30	- 1

a) How many electrons in the ion of isotope K? _41___ b) How many neutrons in the ion of isotope K? 41___
c) What is the atomic number of isotope K? _40___ d) What is the charge of the ion of isotope J? +2___
e) What is the mass of number of isotope J? _76___ f) how many protons are in the nucleus of isotope J? 35__
g) How would you change isotope J so it has the same charge as isotope K? __add 3 electrons__

10) True or False
a) Dalton's theories are correct. __f__ b) Atoms of an element can have different numbers of protons. __f__
c) Atoms are divisible. _t___ d) All atoms of an element are not identical, but must have the same mass. _f__

12) Give the correct number of protons and neutrons for the following isotopes.

Hydrogen-1__1-P, 0-N_____ Hydrogen-2__1-P, 1-N_____ Hydrogen-3_____1-P, 2-N____

14) How many neutrons are in ^{206}Pb. __124_____

16) What is the ion formula that has 17 p & 18 e? ___Cl^{-1}____

17) What is an element's identity based on?___number of protons in nucleus_____

18) What is an ion?__ different # of P than e -s19) What is an isotope?__ same # P, different # N_____

20) The smallest particle of an element that retains the properties of that element is called __an atom_____

Nomenclature

Give the name of each compound

1. $LiC_2H_3O_2$ 2. P_2N_5

lithium acetate diphosphorus pentanitride

3. Mn_3P_4 4. $Cu(OH)_2$

manganese (IV)phosphide copper (II) hydroxide

5. I_4S_7 6. AgF

tetraiodine heptasulfide silver fluoride

GIVE THE FORMULA FOR EACH NAME

11. aluminum carbide

Al_4C_3

12. cesium phosphide

Cs_3P

13. phosphorus trinitride

PN_3

14. manganese (II) nitrite

$Mn(NO_3)_2$

15. lead (II) sulfide

PbS

16. lithium oxide

Li_2O

Chapter 10: The mole

1) Define Mole

Standard unit of amount

2) A mole is what number?
$6.02x10^{23}$

3) Define molar mass
the mass of one mole of a substance

4) How many atoms are in 58.9g of cobalt? __$6.02x10^{23}$_____

5) How many atoms are in 32.1g of sulfur? _$6.02x10^{23}$_____

6) How many atoms are in one half mole of carbon? __$3.01x10^{23}$_____

7) How many grams are in $3.01x\ 10^{23}$ atoms of nitrogen? ___7.0g_____

8) How many moles are in 12.0 grams of carbon? ____1_____

9) How many moles are in 6.0 grams of carbon? ____.5_____

10) How many atoms are in 8.0 grams of helium? ____2_____

Find the molar masses of the following substances

11) Copper

63.5g

12) LiCl

42.4g

13) $Fe_3(PO_4)_2$

357.4g

14) K_2S

110.3g

15) Manganese (IV) Oxide

MnO_2

86.9g

16) $(NH_4)_3N$

68g

Chapter 9 Balancing equations

BALANCE THE FOLLOWING EQUATIONS **AND** LIST THE TYPE OF REACTION.

1) $6K + N_2 \Rightarrow 2K_3N$

TYPE:combination__

2) $2Al + 3Pb(NO_3)_2 \Rightarrow 2Al(NO_3)_3 + 3Pb$

TYPE:_single replacement_____

3) $2Na_3PO_4$ + $3BaCl_2 \Rightarrow$ $Ba_3(PO_4)_2$ + $6NaCl$

TYPE:_double replacement_____

4) $2Al_2O_3 \Rightarrow$ $4Al$ + $3O_2$

TYPE: decomposition

5) C_2H_6 + $3.5O_2 \Rightarrow$ $2CO_2$ + $3H_2O$

TYPE:_combustion_____

6) Ca + $Pb(NO_3)_2 \Rightarrow$ Pb + $Ca(NO_3)_2$

TYPE:__single replacement_____

7) K + $NaCl \Rightarrow$ KCl + Na

TYPE: single replacement

8) $2Al$ + $Ba_3(PO_4)_2 \Rightarrow$ $2AlPO_4$ + $3Ba$

TYPE: single replacement

9) $2Na_3PO_4$ + $3CaCl_2 \Rightarrow$ $6NaCl$ + $Ca_3(PO_4)_2$

TYPE: double replacement

Chapter 12 Stoichiometry

1. How many grams of ammonia are needed to produce 55.6g of nitrogen?

$2NH_3 \Rightarrow \quad N_2 \quad + \quad 3H_2$

67.5g_____

2. How many moles of aluminum will combine with 80.0g of copper (II) chloride to complete the reaction.

$2Al \quad + \quad 3CuCl_2 \Rightarrow \quad 3Cu \quad + \quad 2AlCl_3$

0.397g_____

3. How many moles of water will be produced when 10.5 moles of hydrogen peroxide decomposes?

$2H_2O_2 \Rightarrow \quad 2H_2O \quad + \quad O_2$

`

10.5moles_____

4. How many grams of iron are needed to produce 20.5g of iron (III) oxide?

$4Fe \quad + \quad 3O_2 \Rightarrow \quad 2Fe_2O_3$

14.33g_____

5. How many moles of hydrochloric acid are needed to create 6.35moles of calcium chloride?

$Ca \quad + \quad 2HCl \Rightarrow \quad H_2 \quad + \quad CaCl_2$

12.7_moles