Molarity, molality + mole fraction

$$M = \frac{n}{L}$$

2. $1.50M = \dfrac{\#\,mol}{0.750L} = 1.125\,mol \times 74.55\,g/mol = \boxed{83.9\,g}$

4. $1.90M = \dfrac{\#\,mol}{3.00L} = 5.70\,mol \times 40.01\,g/mol = \boxed{228\,g}$

6. $3.00M = \dfrac{\#\,mol}{2.00L} = 6.00\,mol \times 162.29\,g/mol = \boxed{973\,g}$

8. $2.50M = \dfrac{\#\,mol}{10.5L} = 26.25\,mol \times 56.11\,g/mol = \boxed{1470\,g}$

10. $m = ?$ $\dfrac{0.125g}{52.00\,g/mol} = 0.00240\,mol$ $\dfrac{81.3g}{1000\,g/kg} = 0.0813\,kg$

$\dfrac{0.00240\,mol}{0.0813\,kg} = \boxed{0.0295\,m}$

Small mass → mol   lg mass → kg

12. $m = ?$ $\dfrac{68.7g}{207.2\,g/mol} = 0.332\,mol$ $117g \times \dfrac{1kg}{1000g} = 0.117\,kg$

$\dfrac{0.332\,mol}{0.117\,kg} = \boxed{2.84\,m}$

14. $m = ?$ $\dfrac{16.6g}{102.90\,g/mol} = 0.161\,mol$ $1330g \times \dfrac{1kg}{1000g} = 1.33\,kg$

$m = \dfrac{n}{kg}$ (smaller mass → mol) (lg mass → kg) $\dfrac{0.161\,mol}{1.33\,kg} = \boxed{0.121\,m}$

16. $m = ?$ $\dfrac{15.2g}{110.91\,g/mol} = 0.137\,mol$ $345g \times \dfrac{1kg}{1000g} = 0.345\,kg$

$\dfrac{0.137\,mol}{0.345\,kg} = \boxed{0.397\,m}$

mole fractions
   Step 1 change grams → moles for each part (individual moles)
   Step 2 add all moles together (Total moles)
   step 3 individual moles / Total # of moles

18. $\dfrac{45.6g\ CO}{28.01\ g/mol}$ = 1.63 mol CO $\dfrac{1.63\ mol\ CO}{22.03\ mol}$ =

$\dfrac{899g\ CO_2}{44.01\ g/mol}$ = 20.4 mol CO_2 $\boxed{0.0740\ CO}$

20. $\dfrac{66.8g\ O_2}{32.00\ g/mol}$ = 2.09 mol O_2 $\dfrac{2.09\ mol\ O_2}{14.26\ mol}$ $\boxed{0.147\ O_2}$

$\dfrac{44.0g\ N_2}{28.02\ g/mol}$ = 1.57 mol N_2

$\dfrac{21.5g\ H_2}{2.02\ g/mol}$ = 10.6 mol H_2

22. NH_3 0.214   1.00 − 0.959 = $\boxed{0.041\ HCl}$
    Cl_2 0.452 ⎫
    NH_2Cl 0.118 ⎬add
    N_2 0.175 ⎭
    HCl   ?
           1.00

24. $\dfrac{70.25g}{18.02\ g/mol}$ = 3.90 mol H_2O $\dfrac{3.90\ mol\ H_2O}{4.863\ mol}$ = $\boxed{0.802\ H_2O}$

$\dfrac{1.470g}{2.02\ g/mol}$ = 0.728 mol H_2

$\dfrac{6.58g}{28.02\ g/mol}$ = 0.235 mol N_2

Name: _____ Block: ___ Date: _____

Chemistry Solutions/ Equilibrium Review

Fill in the blank (2pts each)

1. A homogenous mixture of two or more substances is known as a(n) _Solution_.
2. A solution in which the dissolved and undissolved solutes are coming in and out of solution at the same rate is said to be in _equilibrium_.
3. The solubility of a solute is defined as the _maximum_ amount of solute that can be dissolved in a given amount of the solvent at a specific temperature.
4. The rapid escape of gas from a liquid in which it is dissolved is called _effervescence_.
5. A solution where more than the maximum normal amount of solute has been dissolved is called _Supersaturated_.
6. A solution in which there is very little solute compared to the amount of solvent is called _unsaturated or dilute_.
7. A solution in which there is a large amount of solute compared to the amount of solvent is called _concentrated_.
8. A mixture whose visible parts will fall out of solution if not constantly mixed is called a(n) _emulsion / colloid_.
9. A solution that uses water as its solvent is called _aqueous_.
10. A solution that is made of two metals is called a(n) _alloy_.

Matching (2pts each)

_F_ 11. The term used to describe two liquids that will dissolve in each other.

_C_ 12. A solution in which alcohol is the solvent.

_E_ 13. Shows how much solute will dissolve in a given amount of solvent over a range of temperatures.

_D_ 14. Is a measure of how fast a substance dissolves.

_B_ 15. Liquids that do not dissolve in each other.

a. alamgam
b. immiscible
c. tincture
d. solubility rate
e. solubility curve
f. miscible

Multiple choice (2pts each)

16. All solutions have the following properties **except** that the:
    a. dissolved particles are very small.
    b. particles in solution are evenly distributed.
    c. solution particles do not separate.
    d. all solutions are liquid.

17. Solution concentration that is expressed as moles of solute per kilograms of solvent is known as:
    a. molarity.   c. mole fraction.
    b. molality.   d. millimolality.

18. All of the following will dissolve best in warm to hot water except:
    a. $NaCl$ (s)   c. NO_2 (g)   gases must be chilled to dissolve
    b. $C_6H_{12}O_6$ (s)   d. NH_4OH (l)

19. All of the following affect the rate of dissolving **except**:
    a. stirring   c. temperature
    b. molarity   d. surface area

20. Water is considered the universal solvent for polar substances, which would be a "universal" solvent for non-polar substances?
    a. Ammonia   b. Alcohol   c. Mercury   d. Sodium Chloride
                              ↑
                          hydrocarbon