Chemistry

Chapter 15 Review

Name Key

Date _____ Period _____

**Define the following terms:**

Solvent the substance into which the solute is dissolved to form a solution

Solute the substance in a solution which is dissolved in the solvent

Solution a homogeneous mixture

Molarity = $\frac{\text{moles of solute}}{\text{Liters of solution}}$

Dilute Describes a solution in which a small amount of solute is dissolved

Saturated Describes a solution in which the maximum amount of solute is dissolved

Super-saturated Describes a solution which has more solute dissolved than it should be able to at a given temperature

Concentrated Describes a solution with a large amount of solute dissolved

**Solve the following problems in the space provided:**

1. What mass of strontium chloride is needed to make 255 mL of .470 M solution?

$$.470\ M = \frac{\text{moles}}{.255\ L}$$

$$.120\ \text{moles}\ SrCl_2 \left| \frac{158.52\ g}{1\ \text{mole}\ SrCl_2} \right| = 19.0\ g\ SrCl_2$$

2. What is the mass percent of a solution if 9.63 grams of ammonium carbonate are dissolved in 238 grams of water?

$$\frac{9.63\text{ g}}{9.63 + 238} \times 100\% = 3.89\%$$

3. What volume of 18.0 M sulfuric acid solution is needed to make 785 mL of a solution with a molarity of 2.75?

$$(18.0\text{M})(V_1) = (2.75\text{M})(785\text{ mL})$$

$$V_1 = 120.\text{ mL}$$

4. What volume of 1.25M $Pb(NO_3)_2$ solution would be required to completely react .843 grams of magnesium in a single replacement reaction?

$$Pb(NO_3)_2 + Mg \rightarrow MgNO_3 + Pb$$

$$.843\text{ g Mg} \left| \frac{1\text{ mole Mg}}{24.31\text{ g}} \right. = .0347\text{ moles Mg} \left| \frac{1\ Pb(NO_3)_2}{1\ Mg} \right. = .0347\text{ moles } Pb(NO_3)_2$$

$$1.25\text{M} = \frac{.0347\text{ moles}}{V} \qquad V = .0278\text{L} = 27.8\text{ mL}$$

5. What volume of water must be added to 56.9 mL of 8.23 M hydrochloric acid solution in order to bring its molarity down to .750 M?

$$(8.23\text{M})(56.9) = (.750\text{M})(56.9 + w)$$

$$468 = (.750)(56.9 + w)$$

$$624 = 56.9 + w$$

$$567\text{ mL} = w$$

6. What is the molarity of a solution in which 21.2 grams of potassium chloride is dissolved to make 135 mL of solution?

$$21.2\text{ g KCl} \left| \frac{1\text{ mole KCl}}{74.55\text{ g}} \right. = .284\text{ moles KCl}$$

$$M = \frac{.284\text{ moles}}{.135\text{L}}$$

$$M = 2.10\text{ M}$$

7. If 37.8 mL of 4.75 M HCl solution is mixed with 128.1 mL of 1.23 M HCl solution, what is the molarity of the resulting mixture?

$4.75\,M = \frac{\text{moles}}{.0378}$ $\qquad$ $1.23\,M = \frac{\text{moles}}{.1281}$

$.180$ moles $\qquad$ $.158$ moles

$$M = \frac{(.180 + .158)}{(.0378 + .1281)}$$

$$M = 2.04\,M$$

8. How many milliliters of .845 M solution can be made with 24.6 grams of lithium nitrate?

$$24.6\text{ g } LiNO_3 \left| \frac{1\text{ mole } LiNO_3}{68.95\text{ g}} \right| = .357\text{ moles } LiNO_3$$

$$.845\,M = \frac{.357\text{ moles}}{V} \qquad V = .422\,L = 422\,mL$$

9. What is the limiting reactant if 58.9 mL of .275 M strontium chloride solution reacts with 44.3 mL of silver nitrate solution in a double replacement reaction? $SrCl_2 + 2AgNO_3 \rightarrow Sr(NO_3)_2 + 2AgCl$

.345M

$$.275\,M = \frac{\text{moles}}{.0589\,L} \qquad .0162\text{ moles } SrCl_2 \left| \frac{2\,AgCl}{1\,SrCl_2} \right| = .0324\text{ moles } AgCl$$

$$.345\,M = \frac{\text{moles}}{.0443\,L} \qquad .0153\text{ moles } AgNO_3 \left| \frac{2\,AgCl}{2\,AgNO_3} \right| = .0153\text{ moles } AgCl$$

$AgNO_3$ is L.R.

10. What volume of 2.50 M sulfuric acid solution can be made by adding water to 34.5 mL of 9.65 M solution? What volume of water must be added?

$$(9.65\,M)(34.5\,mL) = (2.50\,M)(V_2)$$

$$V_2 = 133.2\,mL$$

$133.2 - 34.5 = 98.7\,mL$ of water

11. What mass of nickel II chloride would you need to add to 1250 mL of water to make a 7.25% solution?

$$7.25\% = \frac{x}{1250 + x} \times 100\%$$

$$90.6 + .0725x = x$$

$$90.6 = .9275x$$

$$97.7\,g$$