Chem101 Midterm Exam study questions
Los Angeles City College
Cervantes/Cai

1) What is the molarity of a NaOH solution if 28.2 mL of a 0.355 M H_2SO_4 solution is required to neutralize a 25.0-mL sample of the NaOH solution?

2) Lead ions can be precipitated from aqueous solutions by the addition of aqueous iodide:

$$Pb^{2+}\ (aq) + 2I^{-}\ (aq) \rightarrow PbI_2\ (s)$$

Lead iodide is virtually insoluble in water so that the reaction appears to go to completion. How many milliliters of 3.550 M HI(aq) must be added to a solution containing 0.700 mol of $Pb(NO_3)_2$ (aq) to completely precipitate the lead?

3) According to the balanced equation shown below, 4.00 moles of oxalic acid, $H_2C_2O_4$, reacts with _____ moles of permanganate, MnO_4^-.

$$5\ H_2C_2O_4(aq) + 2\ MnO_4^-(aq) + 6\ H^+(aq) \rightarrow 10\ CO_2(g) + Mn^{2+}(aq) + 8\ H_2O(l)$$

4) How many milliliters of 0.200 M $FeCl_3$ are needed to react with an excess of Na_2S to produce 1.38 g of Fe_2S_3 if the percent yield for the reaction is 65.0%?

$$3\ Na_2S(aq) + 2\ FeCl_3(aq) \rightarrow Fe_2S_3(s) + 6\ NaCl(aq)$$

5) Calcium oxide reacts with water in a combination reaction to produce calcium hydroxide:

$$CaO\ (s) + H_2O\ (l) \rightarrow Ca(OH)_2\ (s)$$

In a particular experiment, a 5.00-g sample of CaO is reacted with excess water and 6.11 g of $Ca(OH)_2$ is recovered. What is the percent yield in this experiment?

6) A student dissolved 4.00 g of $Co(NO_3)_2$ in enough water to make 100. mL of stock solution. He took 4.00 mL of the stock solution and then diluted it with water to give 275. mL of a final solution. How many grams of NO_3^- ion are there in the final solution?

7) Balance the chemical equation given below, and determine the number of grams of MgO are needed to produce 10.0 g of Fe_2O_3 .

_____ MgO(*s*) + _____ Fe(*s*) → _____ Fe_2O_3(*s*) + _____ Mg(*s*)

8) How many liters of O_2 gas at 25°C and 1.00 atm pressure are needed to react with 60.25 grams of potassium hydride according to the chemical equation shown below?

$2\ KH(s) + O_2(g) \rightarrow H_2O(l) + K_2O(s)$

9) How many grams of XeF_6 are required to react with 0.579 L of hydrogen gas at 6.46 atm and 45°C in the reaction shown below?

$XeF_6(s) + 3\ H_2(g) \rightarrow Xe(g) + 6\ HF(g)$

10) What is the **total** volume of hydrogen gas and oxygen gas that can be produced from the thermal decomposition of 0.0425 grams of H_2O_2 at 700°C and 755 mm Hg according to the chemical equation shown below?

$H_2O_2(l) \rightarrow H_2(g) + O_2(g)$?

11) Methane and oxygen react to form carbon dioxide and water. What mass of water is formed if 0.80 g of methane reacts with 3.2 g of oxygen to produce 2.2 g of carbon dioxide?

12) Determine the empirical formula for a compound that is found to contain 10.15 mg P and 34.85 mg Cl.

13) A certain alcohol contains only three elements, carbon, hydrogen, and oxygen. Combustion of a 50.00 gram sample of the alcohol produced 95.50 grams of CO_2 and 58.70 grams of H_2O. What is the empirical formula of the alcohol? What is the name of the alcohol?

1) 0.801
2) 394 mL
3) 1.60
4) 102 mL
5) 92.5
6) 0.108 g
7) 7.57 g
8) 18.4 L
9) 11.7 g
10) 201 mL
11) 1.8 g
12) PCl_3
13) C_2H_6O (or C_2H_5OH), ethanol