Quiz 10A

Question 1. Calculate the mass percent of a solution that is prepared by adding 56.1 g of sodium hydroxide, NaOH, to 499 g of water (4 points).

$$mass\%=\frac{m\_{solute}}{m\_{solution}}×100=\frac{m\_{solute}}{m\_{solvent}+m\_{solute}}×100$$

$$mass\%=\frac{56.1 g}{(499 g+56.1 g)}×100=10.1\% NaOH$$

Question 2. Identify the solute and the solvent in each solution composed of the following (6 points):

1. 10.0 g of sodium choride, NaCl, and 100.0 g of water.

Solute: sodium chloride

Solvent: water

1. 50.0 mL of ethanol, C2H5OH, and 10.0 mL of water.

Solute: water

Solvent: ethanol

1. 0.20 L of oxygen, O2, and 0.80 L of nitrogen, N2.

Solute: oxygen

Solvent: nitrogen

Question 3. How many grams of sodium hydroxide, NaOH, are needed to make a 250.0 mL solution that is 0.536 M (5 points)?

$$250.0 mL×\frac{1 L}{1000 mL}×\frac{0.536 mol NaOH}{1 L}×\frac{40.00 g NaOH}{1 mol NaOH}=5.36 g NaOH$$

Question 4. If 15.44 mL of a calcium hydroxide solution completely reacts with 18.01 mL of a 0.125 M nitric acid solution, what is the molarity of the calcium hydroxide solution? Given the unbalanced equation (5 points):

Ca(OH)2 (aq) + 2 HNO3 (aq) 🡪 Ca(NO3)2 (aq) + 2 H2O (l)

$18.01 mL HNO\_{3} soln×\frac{0.125 mmol HNO\_{3}}{1 mL HNO\_{3} soln}×\frac{1 mmol Ca(OH)\_{2}}{2 mmol HNO\_{3}}×\frac{1}{15.44 mL Ca(OH)\_{2} soln}=0.0729 M Ca(OH)\_{2}$

Quiz 10B

Question 1. If 29.54 mL of a barium hydroxide solution completely reacts with 12.67 mL of a 0.328 M hydrochloric acid solution, what is the molarity of the barium hydroxide solution? Given the unbalanced equation (5 points):

Ba(OH)2 (aq) + 2 HCl (aq) 🡪 BaCl2 (aq) + 2 H2O (l)

$12.67 mL HCl soln×\frac{0.328 mmol HCl}{1 mL HCl soln}×\frac{1 mmol Ba(OH)\_{2}}{2 mmol HCl}×\frac{1}{29.54 mL Ba(OH)\_{2} soln}=0.0703 M Ba(OH)\_{2}$

Question 2. Calculate the mass percent of a solution that is prepared by adding 85.5 g of sodium hydroxide, NaOH, to 552 g of water (4 points).

$$mass\%=\frac{m\_{solute}}{m\_{solution}}×100=\frac{m\_{solute}}{m\_{solvent}+m\_{solute}}×100$$

$$mass\%=\frac{85.5 g}{(552 g+85.5 g)}×100=13.4\% NaOH$$

Question 3. How many grams of potassium chloride, KCl, are needed to make a 50.00 mL solution that is 0.153 M (5 points)?

$$50.00 mL×\frac{1 L}{1000 mL}×\frac{0.153 mol KCl}{1 L}×\frac{74.55 g KCl}{1 mol KCl}=0.570 g KCl$$

Question 4. Identify the solute and the solvent in each solution composed of the following (6 points):

1. 0.50 L of hydrogen, H2, and 0.95 L of helium, He.

Solute: hydrogen

Solvent: helium

1. 250.0 mL of ethanol, C2H5OH, and 120.0 mL of water.

Solute: water

Solvent: ethanol

1. 15.0 g of sodium choride, NaCl, and 150.0 g of water.

Solute: sodium chloride

Solvent: water