pH Review Problems

1) What is the molarity of a solution that has 450 grams of sodium chloride in 800 mL of water?

2) What is the molarity of a solution that contains 100 grams of iron (II) nitrate in 2.4 liters of water?

3) What is the pH of a solution that contains 2.4×10^{-5} moles of hydrobromic acid in 0.5 L of water?

4) What is the pH of a solution that contains 25 moles of nitric acid dissolved in 5000 liters of water?

5) What is the pH of a solution that contains 0.009 grams of hydrochloric acid in 100 mL of water?

6) What is an acid/base indicator used for?

7) Define “titration”:

8) In a few steps, describe how you would titrate a base of unknown concentration with an acid with concentration 1 M.

9) I did a titration where it took 50 mL of 0.1 M hydrochloric acid to neutralize 500 mL of a base with unknown concentration. Using this titration information, what was the concentration of the base?

10) I did a titration where it took 25 mL of 5 M NaOH to neutralize 1000 mL of an acid with unknown concentration. Using this information, what was the concentration of the acid?

pH Review Problems ANSWER KEY

1) What is the molarity of a solution that has 450 grams of sodium chloride in 800 mL of water? **9.61 M**

2) What is the molarity of a solution that contains 100 grams of iron (II) nitrate in 2.4 liters of water? **0.23 M**

3) What is the pH of a solution that contains 2.4×10^{-5} moles of hydrobromic acid in 0.5 L of water? **4.32**

4) What is the pH of a solution that contains 25 moles of nitric acid dissolved in 5000 liters of water? **2.30**

5) What is the pH of a solution that contains 0.009 grams of hydrochloric acid in 100 mL of water? **2.61**

6) What is an acid/base indicator used for? **An acid base indicator is used to determine whether a solution is acidic or basic, and in titrations to tell when the equivalence point has been reached.**

7) Define "titration": **The process of finding the unknown concentration of an acid (or base) by neutralizing it with a base (or acid) with known concentration. The equation $M_1V_1 = M_2V_2$ allows you to do this.**

8) In a few steps, describe how you would titrate a base of unknown concentration with an acid with concentration 1 M.
   1) Put a known amount of the base in a container
   2) Add a drop of indicator
   3) Add acid until the indicator changes color permanently
   4) Use $M_1V_1 = M_2V_2$ to find the concentration of the base

9) I did a titration where it took 50 mL of 0.1 M hydrochloric acid to neutralize 500 mL of a base with unknown concentration. Using this titration information, what was the concentration of the base? **0.01 M**

10) I did a titration where it took 25 mL of 5 M NaOH to neutralize 1000 mL of an acid with unknown concentration. Using this information, what was the concentration of the acid? **0.125 M**