

## Worksheet 14 Concentration

### **A. Concentration from Moles and Volume**

1. Copper (II) sulfate is used in copper electroplating cells, and to kill algae in swimming pools and water reservoirs. What is the molar concentration of an electroplating solution in which 1.50 mol of copper (II) sulfate are dissolved to make 2.00 L of solution?
2. What is the molar concentration of a solution in which 0.240 mol of washing soda,  $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$ , is dissolved to make 480. mL of a solution for softening wash water?

### **B. Concentration from Mass and Volume**

1. Household ammonia often contains 156 g of  $\text{NH}_3(\text{g})$  dissolved in water to form 2.00 L of solution. What is the molar concentration of the household ammonia solution?
2. What is the molar concentration of 500. mL of a solution that contains 12.7 g of swimming pool chlorinator,  $\text{Ca}(\text{OCl})_2$ ?

### **C. Moles from Volume and Concentration**

1. Sodium bicarbonate is used medicinally to counteract excess stomach acidity. How many moles of solid sodium bicarbonate would be needed to make 100. mL of a 0.600 mol/L solution suitable for use as an antacid?
2. TSP, sodium phosphate, is a useful tile and household cleaner. Find the number of moles of sodium phosphate in 2.00 L of a 0.100 mol/L  $\text{Na}_3\text{PO}_4(\text{aq})$  cleaning solution prepared for use at home.

### **D. Mass from Volume and Concentration**

1. A toilet bowl cleaner may be prepared by mixing sodium bicarbonate (baking soda) and sodium hydroxide (lye).
  - a) What mass of lye (NaOH) must be added a 2.50 L bowl to obtain a 0.075 mol/L solution?
  - b) What mass of sodium bicarbonate must be added to the bowl if the concentration of sodium bicarbonate must be 0.150 mol/L?
2. A hydrate of sodium thiosulfate known as hypo ( $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$ ) is used as a fixer in photography because it readily dissolves silver compounds. What mass is required to make 100. mL of a 0.120 mol/L hypo solution.

### **E. Volume from Moles and Concentration**

1. Sodium phosphate may be used to remove scale deposits from a car radiator. What volume of a 0.075 mol/L solution would contain the necessary 1.10 mol of sodium phosphate to remove the radiator scales?
2. A perspiration stain remover may be prepared from sodium perborate, ( $\text{NaBO}_2 \cdot \text{H}_2\text{O}_2 \cdot 3\text{H}_2\text{O}$ ). Calculate the volume of 0.600 mol/L perspiration stain remover that would be prepared from 0.300 mol of sodium perborate trihydrate.

### **F. Volume from Mass and Concentration**

1. Chlorine bleach in its solution form usually is sold as a 5% solution of sodium hypochlorite. How many litres of 0.800 mol/L solution would contain 119.2 g of NaOCl?
2. A 0.700 mol/L solution of sodium phosphate makes an efficient cleaner for old brushes hardened with paint. What volume of the solution can be prepared from 126 g of  $\text{Na}_3\text{PO}_4$ ?