**Quiz 10**

# Directions: Answer each of the following questions. Be sure to use complete sentences where appropriate. For full credit be sure to show all of your work. Where appropriate answers should be boxed for clarity, written to the correct number of significant figures, and, include the proper units.

1. Hydrochloric acid is sold as a concentrated aqueous solution. If the molarity of commercial HCl is 12.0 and its density is 1.18 g/cm3, calculate the following (12 points):
	1. the mass percent of HCl in the solution.

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

$$mass\%=\frac{12.0 mol HCl}{1 L soln}×\frac{1 L}{1000 mL}×\frac{1 mL}{1 cm^{3}}×\frac{1 cm^{3} soln}{1.18 g soln}×\frac{36.461 g HCl}{1 mol HCl}×100$$

$$mass\%=\frac{37.1 g HCl}{100 g soln}=37.1\% HCl$$

* 1. the molality of the solution;

$$mass\%=\frac{37.1 g HCl}{100 g soln}=\frac{37.1 g HCl}{37.1 g HCl+62.9 g H\_{2}O}$$

$$m=\frac{n\_{solute}}{kg\_{solvent}}$$

$$m=\frac{12.0 mol HCl}{1 L soln}×\frac{1 L}{1000 mL}×\frac{1 mL}{1 cm^{3}}×\frac{1 cm^{3} soln}{1.18 g soln}×\frac{1000 g}{1 kg}×\frac{100 g soln}{62.9 g H\_{2}O}$$

$$m=\frac{16.2 mol HCl}{kg H\_{2}O}=16.2 m HCl $$

1. What effect does dissolving a solute have on the following properties of a solvent (3 points)?
	1. its osmotic pressure? \_\_\_\_\_\_increase\_\_\_\_\_\_\_
	2. its freezing point? \_\_\_\_\_\_decrease\_\_\_\_\_\_
	3. its boiling point? \_\_\_\_\_\_increase\_\_\_\_\_\_\_
2. Define the colligative property (3 points).

A colligative property is a property that depends solely on the number of solute particles (ions or molecules) and is not dependent on the properties of those particles.

1. In the Freezing Point Depression Experiment part III (2 points):
	1. the solvent is \_\_\_\_\_\_lauric acid\_\_\_\_\_\_\_\_\_\_;
	2. the solute has a van’t Hoff factor of \_\_\_\_\_1\_\_\_\_\_\_\_\_.