Lab 10.2 Solubility of Gases

Research Question:

What effect does temperature have on the solubility of gases?

Introduction:

When a solute is dissolved in a solution, the solute is often a solid. However, gases can also be soluble. Sometimes a gas is dissolved in a liquid. The solubility of gasses is affected by pressure and temperature. In this experiment, we will examine the effect of temperature on the solubility of gases by examining what happens to carbon dioxide (CO_2), which is dissolved in a soda to give it fizz.

Procedures:

Same as in book, except we added a control test tube to compare against the test tube we would be alternating from boiling water to ice water.

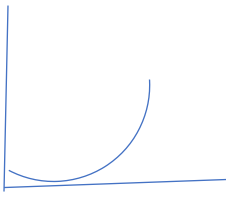
Data/Observations:

Sketch of two test tubes:

Observations:

Conclusion:

Solids are affected differently than gases by a change in temperature. For solids, when the temperature is increased, the solubility increases and vice versa. This is a direct relationship and results in a solubility curve with an upward slope.



Gases, on the other hand, are affected inversely by temperature increases and decreases. When the temperature increases of a gas that has been dissolved in a solvent, the gas becomes less soluble. If the temperature of a gas decreases, the solubility of the gas increases. This results in a solubility curve with

a downward slope. This downward slope on a solubility curve signifies that the substance is in its gas phase.

This is the reason why a carbonated soda that has been left open and has become warm is “flat.” The “flat” soda has no fizz because there is little CO_2 left in the soda. Carbonation (the presence of CO_2) gives the soda its fizz. Since CO_2 is a gas, it responds as other gases by becoming less soluble in higher temperatures.

Vocabulary:

Solubility –

Solubility Curve –

Inverse Relationship –

Direct Relationship –

Lab 10.3 – Reactions of Solutions

Research Question:

What is the effect of some solutes and solvents forming a solution?

Introduction:

When a solute and a solvent form a solution, the solute is dissolved into the solvent. Dissociation occurs. For ionic compounds, they separate into the anions and cations present in the solute. For example, salt will separate into sodium (positively charged) and chlorine (negatively charged). Its i-value equals 2. Sugar is covalent and its i-value equals one; it does not dissociate into anions and cations. Sometimes, this dissociation into anions and cations can result in heat being absorbed or given off. In this experiment sodium hydroxide (NaOH), commonly called Lye, will be dissolved into water.

Procedure:

Same as in textbook.

Data/Observations:

Sketch:

Observations/description:

Conclusion:

NaOH + H_2O = Na+ and OH- ions. The reaction will be Exothermic, where heat will be released. Sodium hydroxide is considered a strong base and as such is able to completely and fully disassociate in aqueous solution. The heat evolved as a result of mixing solid sodium hydroxide with water is due to the the -OH ions' incredible stability. Heat is emitted as a result of the chemical species being brought to a lower energy state. The sodium hydroxide crystals act as a powerful desiccant (it readily absorbs moisture from the air).

Vocabulary:

Exothermic –

Endothermic –