Solutions

1. Provide an example for each of the following solution types

   a) Solid in liquid-

   b) Gas in Liquid-

2. What are two physical characteristics of water that make it an important molecule in nature.

3. How does the structure of a salt crystal change when it is dissolved in water. (use a diagram)

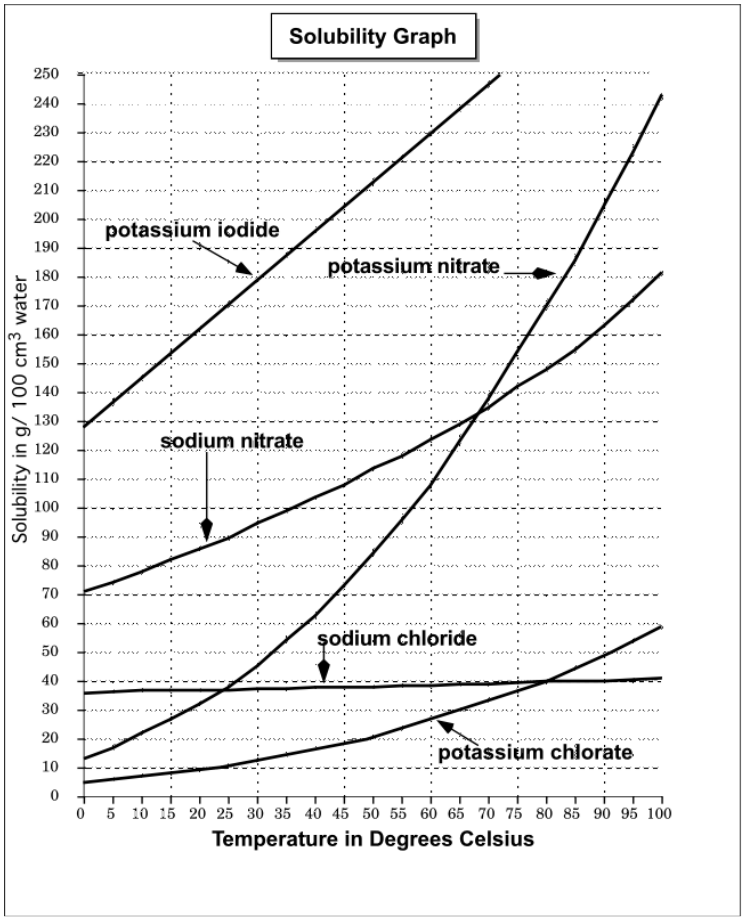
4. a) What will happen to the solubility of CO2 when you put an open carbonated drink in the fridge.

b) What will happen to the solubility of salt if you heat up the water it's in.

5. Calculate the number of moles of Cl^- ions in 15.0 mL of 0.2 mol L^{-1} $AlCl_3$ solution in water.

6. An aqueous solution of calcium chloride contains 2.00 g of calcium chloride (molar mass 110.98 g mol^{-1}) in 100.0 mL. Calculate the concentration of **chloride ion** (Cl^-) in the solution.

7. What volume of 0.200 mol L^{-1} Na_2CO_3 solution can be prepared from 21.20 g of Na_2CO_3 (molar mass = 106.0 g mol^{-1}).



8. Please refer to the diagram of solubility curves for the following questions.

a) What is the solubility of potassium iodide at 30ºC?

b) What mass of NaCl is needed to prepare a saturated solution in 200g H2O at 80 ºC?

c) What is the lowest temperature at which 130g of sodium nitrate will completely dissolve in 100 g of H2O? (1)

d) What mass of potassium nitrate precipitates from solution if a saturated solution in 150g of water is cooled from 82ºC to 40 ºC? (3)

9. Describe two differences between a saturated and supersaturated solution.

10. Describe how to make a 100 mL solution of 0.2 M potassium nitrate. Full marks will not be awarded without a concluding statement.

11. What volume of water will you need of 12.4M stock solution HCl to prepare a 1.0 L solution with a concentration of 5.00 M.

Solutions

Describe and give examples of various types of solutions.
Include: all nine possible types

Describe the structure of water in terms of electro negativity and the polarity of its chemical bonds.

Explain the solution process of simple ionic and covalent compounds, using visual, particulate representations and chemical equations.
Include: crystal structure, hydration, dissociation

Explain heat of solution with reference to specific applications.
Examples: cold packs, hot packs

Perform a lab to illustrate the formation of solutions in terms of the polar and non-polar nature of substances.
Include: soluble, insoluble

Construct, from experimental data, a solubility curve of a pure substance in water.

Differentiate among saturated, unsaturated, and supersaturated solutions.

Use a graph of solubility data to solve problems

Explain how a change in temperature affects the solubility of gases

Differentiate among, and give examples of the use of various representations of concentration.
Include*: g/L , % W/W, % W/V, % V/V, ppm, ppb, mol/L (molarity)*

Solve problems involving calculation for concentration, moles, mass, and volume.

Prepare a solution given the amount of solute (in grams) and the volume of solution (in mL) and determine the concentration in moles/liter.

Solve problems involving the dilution of solutions
Include: dilution of stock solutions, mixing common solutions with different volumes and concentrations

Perform a dilution from a solution of known concentration.