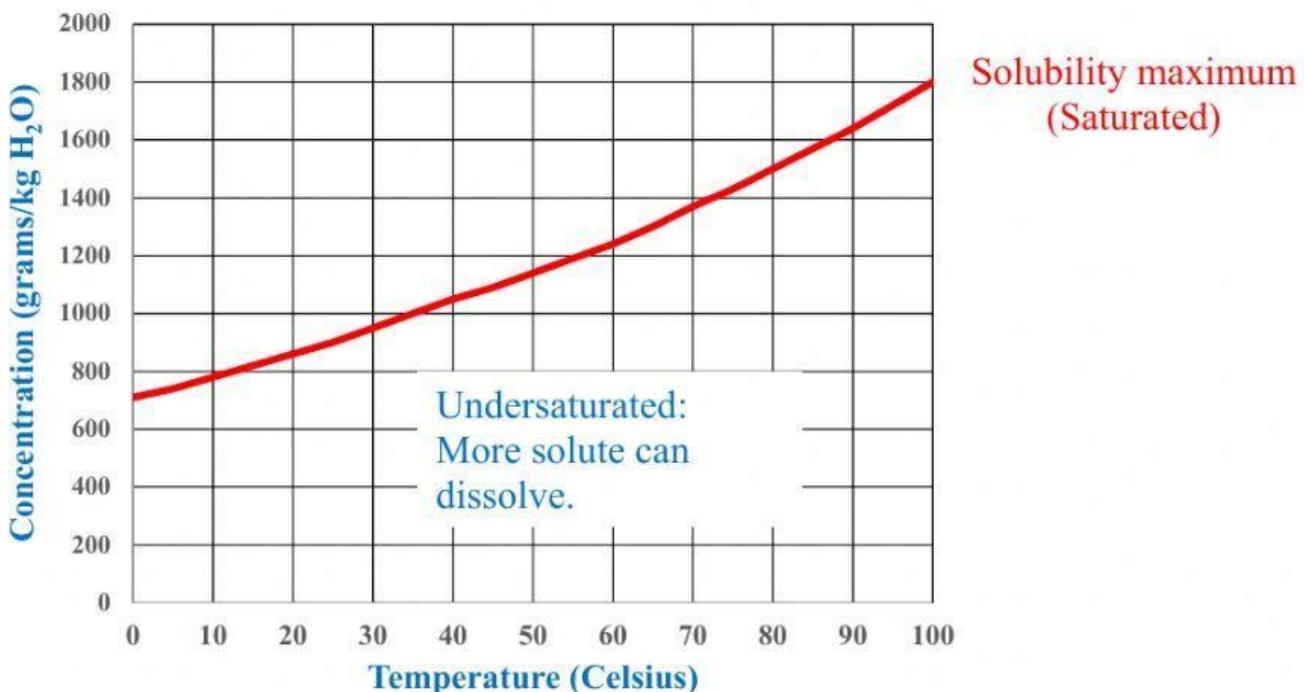


Name: _____ Date: _____

CHEMISTRY: SOLUTIONS

Solubility Curves

A **solubility curve** is a graph that shows the maximum amount of substance that can be dissolved into a solvent as a function of temperature.

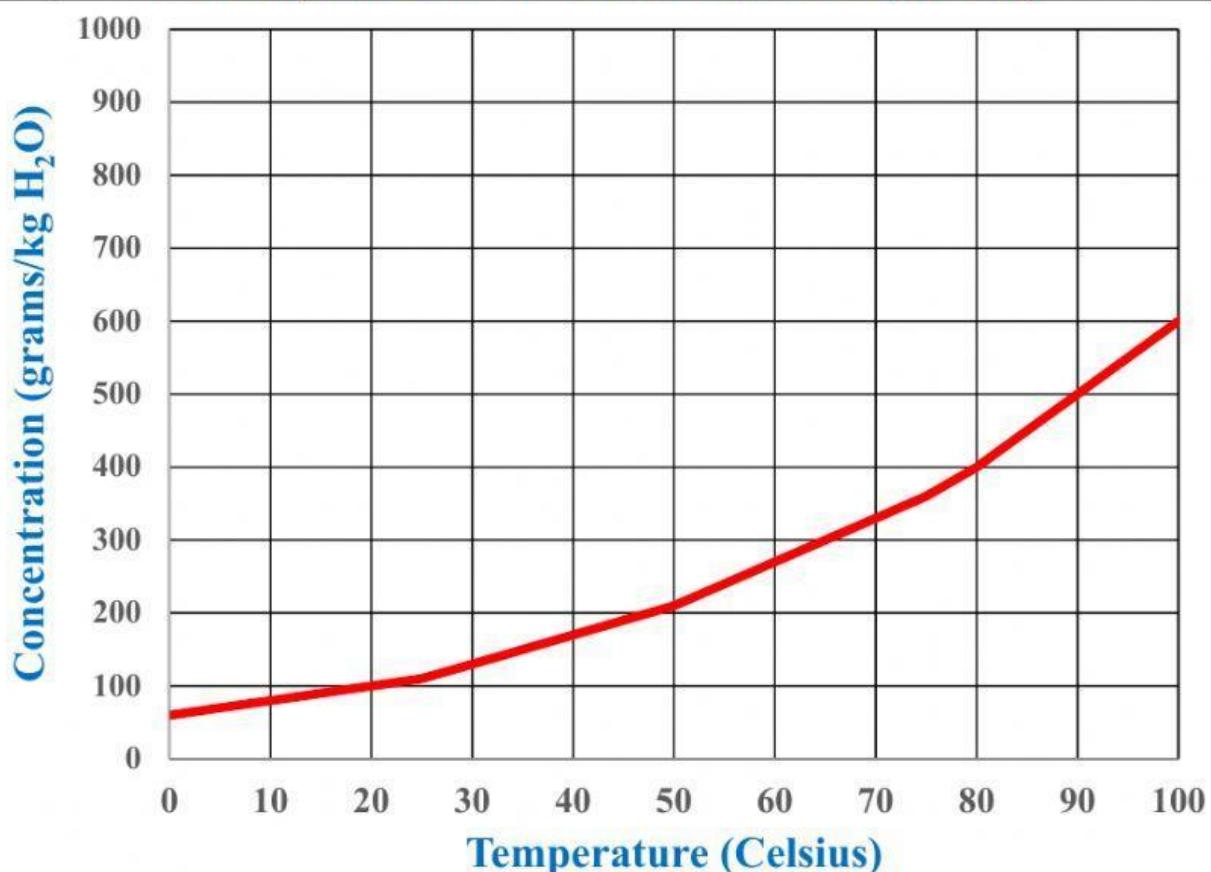


The solid curving line in the graph is the solubility curve. The solubility curve represents the **maximum amount of substance (solute) that can be dissolved into a solvent at a given temperature**. This is the condition of **saturation**. When a solution is at saturation, the solvent cannot hold any more solute. It is holding the maximum it can dissolve.

If the solvent has dissolved less than the maximum amount of solute at a given temperature (area below the solubility curve), the solution is **undersaturated**. More solute can be dissolved into the solvent.

If more solute than the maximum solubility amount is added to the solvent at a given temperature, the excess amount above the maximum soluble amount will flock to the bottom of the flask as solid. The solution will be **saturated** holding the maximum it can dissolve.

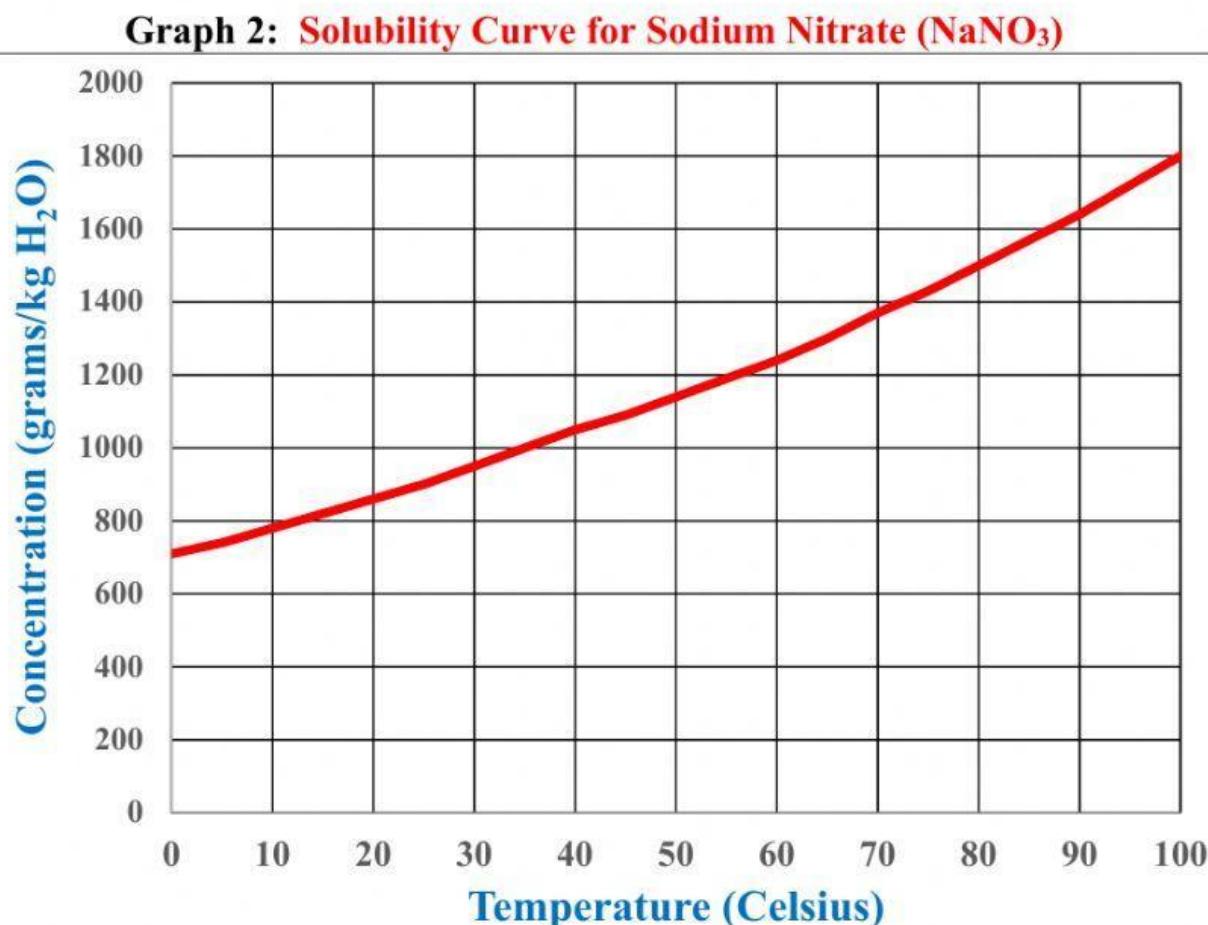
Graph 1: Solubility Curve for Potassium Perchlorate (KClO₄)



- 1 _____ What is the maximum amount of KClO₄ that can be dissolved into 1 kg of water at 20° C?
- 2 _____ What is the maximum amount of KClO₄ that can be dissolved into 1 kg of water at 80° C?
- 3 _____ If you try to dissolve 150 g of KClO₄ into 1 kg of water at 10° C, will all of the KClO₄ dissolve?
- 4 _____ If you try to dissolve 300 g of KClO₄ into 1 kg of water at 70° C, will all of the KClO₄ dissolve?
- 5 _____ If you try to dissolve 500 g of KClO₄ into 1 kg of water at 80° C, how much of the 500 g will NOT dissolve, but sink to the bottom of the flask?

If you try to dissolve 420 g of KClO_4 into 1 kg of water at 60°C ,
how much of the 420 g will NOT dissolve, but sink to the
bottom of the flask.

6



What is the maximum amount of NaNO_3 that can be dissolved
into 1 kg of water at 20°C ?

7

What is the maximum amount of NaNO_3 that can be dissolved
into 1 kg of water at 80°C ?

8

If you try to dissolve 1200 g of NaNO_3 into 1 kg of water at 70°C , will all of the NaNO_3 dissolve?

9

If you try to dissolve 1000 g of NaNO_3 into 1 kg of water at 20°C , will all of the NaNO_3 dissolve?

10

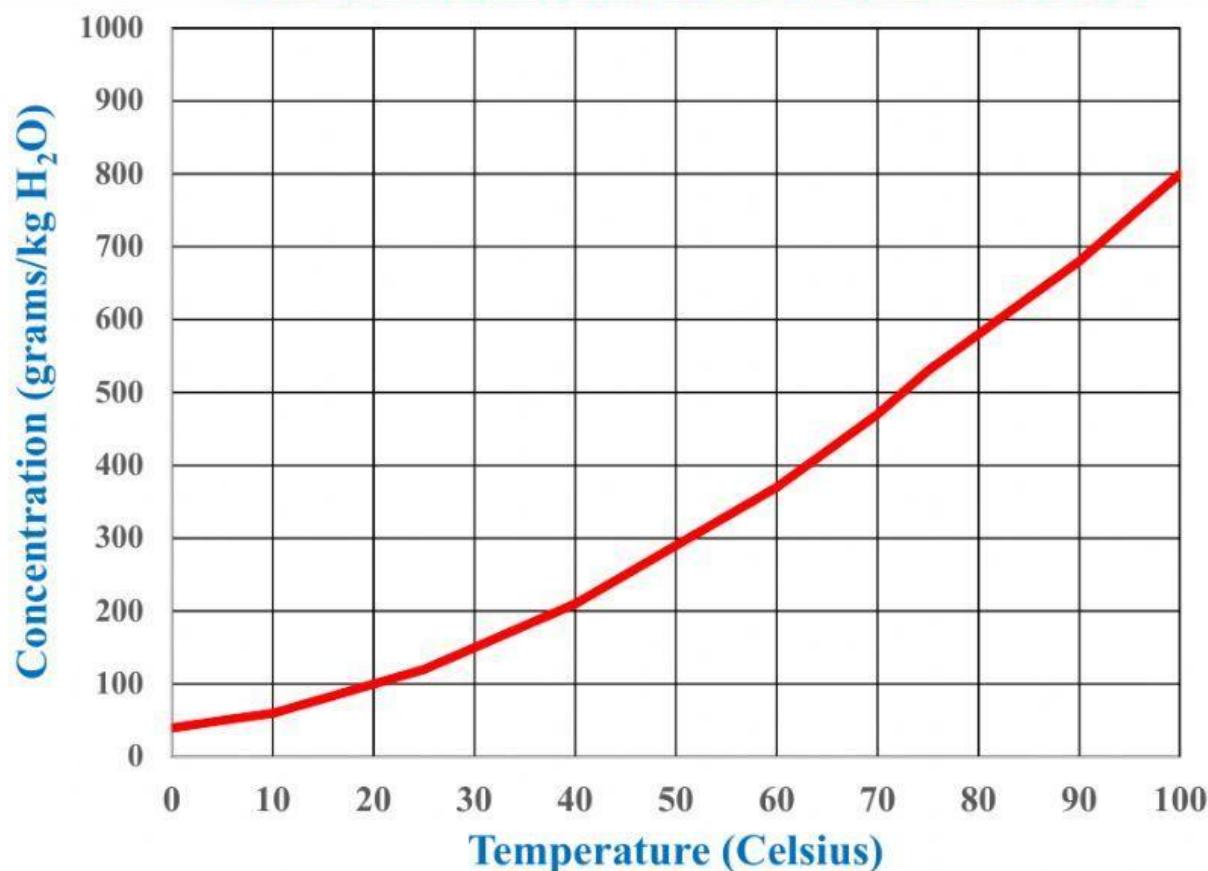
If you try to dissolve 1500 g of NaNO_3 into 1 kg of water at 50° C, how much of the 1500 g will NOT dissolve, but sink to the bottom of the flask?

11

If you try to dissolve 1400 g of NaNO_3 into 1 kg of water at 60° C, how much of the 1400 g will NOT dissolve, but sink to the bottom of the flask.

12

Graph 3: Solubility Curve for Potassium Dichromate ($\text{K}_2\text{Cr}_2\text{O}_7$)



You dissolved 300 g of $\text{K}_2\text{Cr}_2\text{O}_7$ into 1 kg of water. At which temperature must the water be to make an exact saturated solution?

13

You dissolved 600 g of $\text{K}_2\text{Cr}_2\text{O}_7$ into 1 kg of water. At which temperature must the water be to make an exact saturated solution?

14

15 How much $K_2Cr_2O_7$ must be dissolved into 1 kg of water at 30°C to make an exact saturated solution?

16 How much $K_2Cr_2O_7$ must be dissolved into 1 kg of water at 70°C to make an exact saturated solution?

17 You prepared an exact saturated solution of $K_2Cr_2O_7$ at 70°C in 1 kg of water. You cool the water to 40°C. How much $K_2Cr_2O_7$ stayed dissolved in the 1 kg of water?

18 You prepared an exact saturated solution of $K_2Cr_2O_7$ at 70°C in 1 kg of water. You cool the water to 40°C. How much $K_2Cr_2O_7$ flocked out of solution as a solid?

19 How much $K_2Cr_2O_7$ must be dissolved into 1 kg of water at 90°C to make an exact saturated solution?

20 You prepared an exact saturated solution of $K_2Cr_2O_7$ at 90°C in 1 kg of water. You cool the water to 50°C. How much $K_2Cr_2O_7$ stayed dissolved in the 1 kg of water?

21 You prepared an exact saturated solution of $K_2Cr_2O_7$ at 90°C in 1 kg of water. You cool the water to 50°C. How much $K_2Cr_2O_7$ flocked out of solution as a solid?