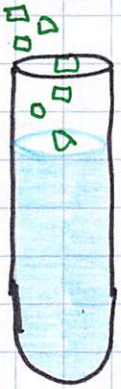
Solubility
the ability to dissolve

Saturation - point at which a substance cannot dissolve anymore

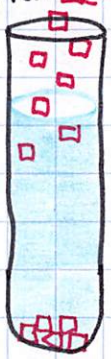
unsaturated



less than the maximum amount of solute has dissolved.

Add more solute, it will dissolve.

saturated solution



maximum amount of solute dissolved in a specific amount of solvent @ a specific temp.

supersaturated

more than the maximum amount of solute is dissolved at a specific temp.

Very unstable, easy to crystallize if you disturb the solution

Concentration - amount of solute dissolved in solution

dilute solution a small amount of solute dissolved in a given amount of solvent.

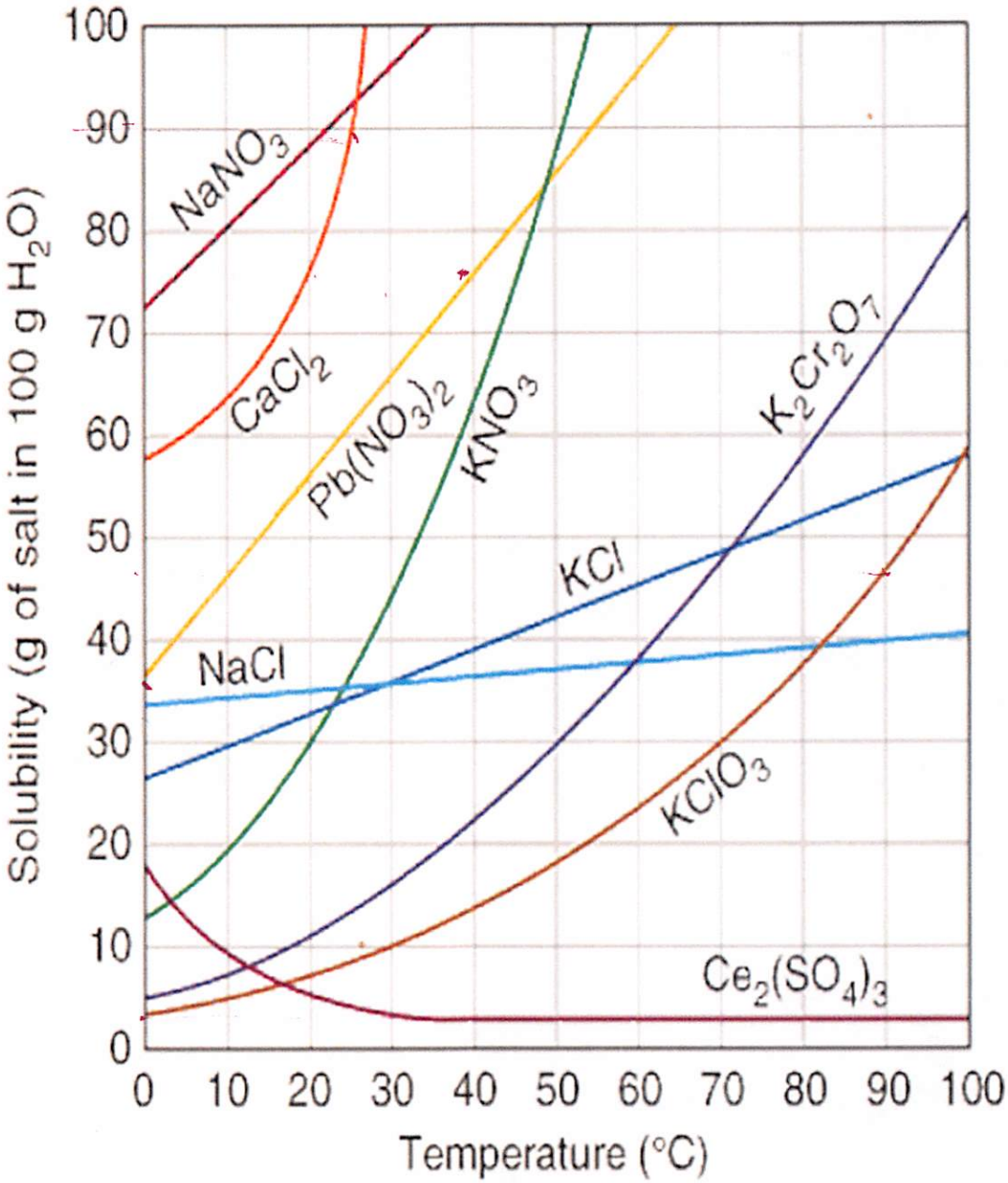
vs.

concentrated solution a large amount of solute dissolved in a given amount of solvent.

Ex) Can a solution be both concentrated and unsaturated at the same time? Explain.

Yes, because unsaturated only means that the maximum amount of solute has NOT been dissolved BUT it can still be a relatively large amount (concentrated) is dissolved.

Solubility Graph



Solubility Graphs

show the amounts of solute that can dissolve in a specific amount of solute at specific temperatures to make a SATURATED solution.

Examples & Practice

1. What mass of potassium nitrate is needed to create a saturated solution in 100. g of water at 30°C?

   ~44 g KNO_3

2. How much potassium chlorate is required to make a saturated solution in 100. g of water at 90°C?

   ~47 g $KClO_3$

3. What temperature should your solution be at to dissolve exactly 80. g of sodium nitrate in 100. g of water?

   ~10°C

4. How much potassium chloride is required to make a saturated solution in 200. g of water at 20°C?

   ~69 g KCl

5. How much calcium chloride is needed to make a saturated solution in 300. g of water at 25°C?

   ~270 g $CaCl_2$

6. Determine if the following solutions are: unsaturated (US), saturated (S), or supersaturated (SS).

   A. 20. g of sodium chloride at 30°C. US
   B. 8 g of cerium(III) sulfate at 40°C. SS
   C. 45 g of potassium chloride at 60°C. S
   D. 70. g of lead(II) nitrate at 40°C. US
   E. 80. g of sodium nitrate at 10°C. S