

Effect of Temperature on Solubility

Solubility → the maximum amount of a solute that will dissolve in a given quantity of solvent at specific temperature.

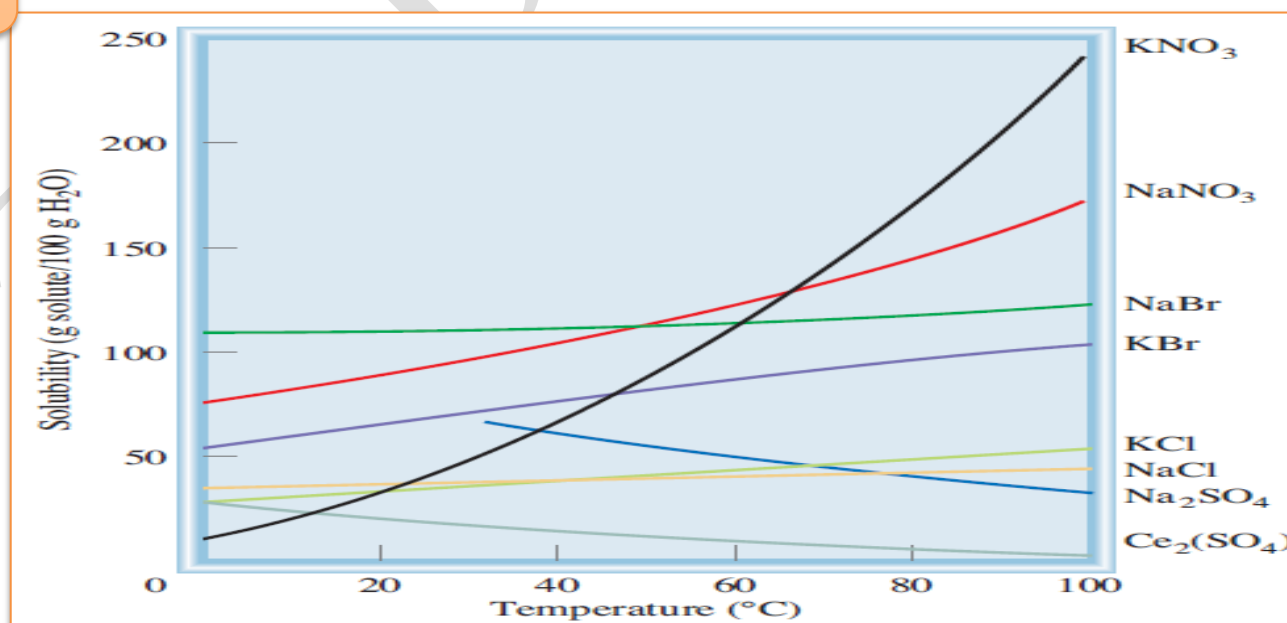
❖ **Solid Solubility and Temperature**

- Solubility depends on temperature in most but certainly not all cases.
- Solubility of solid increase with increasing temperature.

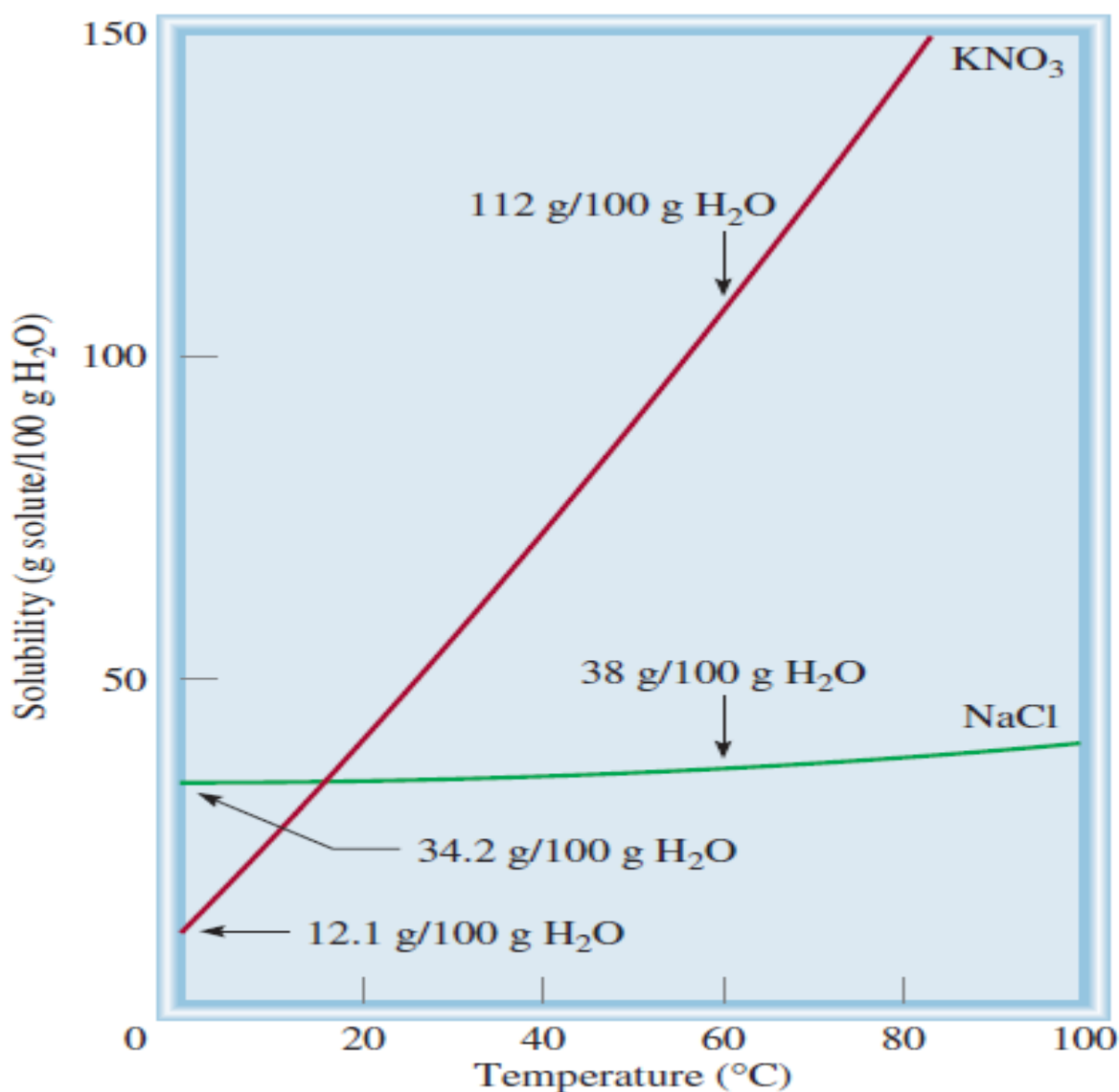
❖ **There is no clear correlation between the sign of (ΔH_{sol}) and the variation of solubility with temperature.**

- The solution process of $\text{CaCl}_2 \rightarrow$ exothermic
- The solution process of $\text{NH}_4\text{NO}_3 \rightarrow$ endothermic

But the solubility of both increase with temperature.



From the figure we note that



- Solubility of KNO₃ increase sharply with temperature.
- While that of NaCl changes very little and this wide variation provide a mean of obtaining a pure compound from mixture and this called fractional crystallization.

Fractional crystallization: → is the separation of mixture of substances into pure components on the basis of differing solubility.

Example on fractional crystallization:

The solubility of KNO_3 and NaCl at 0°C and 60°C , the difference in temp dependence enables us to isolate one of these compounds from a solution containing both of them.

Gas solubility and Temperature:

Solubility of gases in water decreases with increasing temp.

Examples

- When water is heated, bubbles of air form on the side of glass before water boils.
- As the temp. rises, the dissolved air molecules begin to boil out of the solution long before the water itself boils.
- Reduce the solubility of molecular oxygen in hot water has a direct bearing on thermal pollution.

Thermal pollution: → the heating of the environment to a temperature that is harmful to its living inhabitants.

Choose

1) However the solution process of CaCl_2 is exothermic and the solution process of NH_4NO_3 is endothermic but the solubility of two.....with temp.

A) increase

B) not change

C) decrease

D) increase and then decrease

2) The solubility of gas in water usually decreases with....

A) increasing pressure

B) increasing temperature

C) decreasing temperature

D) None of them

3) The solubility of CO_2 gas in water.....

A) increase with increasing temp.

B) decrease with decreasing temp.

C) decrease with increasing temp.

D) is not dependent on temp.

4)..... is the separation of mixture of substances into pure components on the basis of differing solubility.

A) distillation

B) solubility

C) fractional crystallization

D) None of them

5) Solubility of solid..... with increasing Temp.

- A) constant
B) increase
C) decrease
D) Not change

6) The heating of the environment to a Temperature that are harmful to its living inhabitants is called

- A) thermal heating
B) solvation
C) crystallization
D) solubility