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Rate of Solution

SOLIDS (S) → dissolve.

① Stir

② heat

③ ↑ surface area

GAS

↑ P

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Dilution

Never changes
moles sugar start = end

100g
20 tsp Sugar $C_6H_{12}O_6$ in 500ml H_2O

Too Sweet

↑ Concentration
↑ Molarity

Too concentrated

→ Dilute it with H_2O

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Dilution

$$\frac{\text{Molarity}}{1} = \frac{\text{moles solute}}{\text{l of soln}}$$

~~$\frac{M}{l} = \frac{\text{mole}}{l}$~~

Dilution

Moles NEVER changes

Moles = $M \times l$

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Dilution

Moles start = moles end

$$M \times l = M \times l$$

$$(18M) (ml) = (2M) (50ml)$$

$$\frac{18 (ml)}{18} = \frac{100}{18}$$

Start \Rightarrow $ml = 5.56 \text{ ml of } 18M$

5.56 ml + 44.44 ml = 50 ml
 18M DILUTE 2M

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Colligative Properties

CHANGES to FP, BP, VP, Osmotic Pressure
 Freezing Pt. Boiling Pt. Vapor Pressure

Add a solute to a solvent

Ex Pure water FP = 0°C, BP = 100°C

Salt water FP < 0°C, BP > 100°C ↑

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Why does BP ↑ when add solute to solvent

100° at STP

Boil $VP \geq P_{atm}$

Add SALT = 0

Hot gas \rightarrow slower escape
 \because deflected by S_{sol}
 \rightarrow stays longer $\uparrow \uparrow$

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Change in FP / BP

$\Delta T = (K \times m) \times \text{\# of ions in solution}$

- ΔT : Change in BP or FP
- K : Constant (0.52 for BP, 1.86 for FP)
- m : Molality (moles solute / kg solvent)
- \times : # of ions in solution (count them)

Examples:
 Water: 0.52 (BP), 1.86 (FP)
 $NaCl \rightarrow Na^+ + Cl^-$ (2 ions)
 $CaCl_2 \rightarrow Ca^{+2} + 2Cl^{-1}$ (3 ions)

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24g NaCl in 100ml H₂O

Pure water BP = 100 °C
FP = 0 °C

$K_b = 0.52$
 $K_f = 1.86$

Molality = moles Salt / Kg H₂O

$\frac{24g NaCl}{58g NaCl} = 0.414 \text{ mol}$
 $\frac{0.414 \text{ mol}}{0.1 \text{ Kg}} = 4.14 \text{ m}$

New FP

$\Delta T = (K \times M) \times \# \text{ ions}$
 $= (1.86 \times 4.14) \times 2$
 $\Delta T = 15.4^\circ \text{C}$

$0^\circ \text{C} - 15.4 = -15.4^\circ \text{C}$ new FP

New BP

$\Delta T = (K \times M) \times \# \text{ ions}$
 $= (0.52 \times 4.14) \times 2$
 $\Delta T = 4.31^\circ \text{C}$

$100^\circ \text{C} + 4.31 = 104.31^\circ \text{C}$

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