# Solutions

Mar 12-8:19 AM

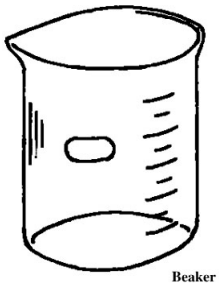
objective:List and explain 3 factors that affect the rate at which a solid solute dissolves in a liquid

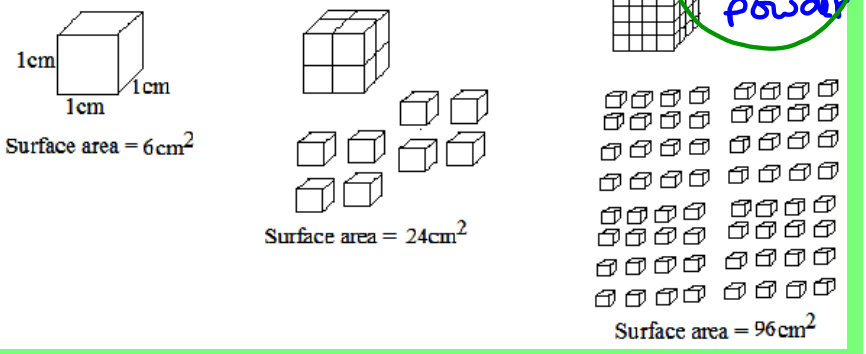
# Factors that affect the rate of dissolution:

Which will dissolve fastest?


## 1. **Increasing the surface area of the solute**

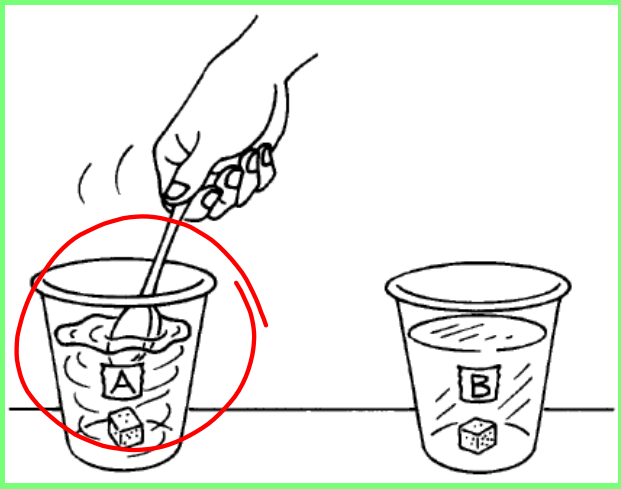
dissolving occurs at the surface of the solute



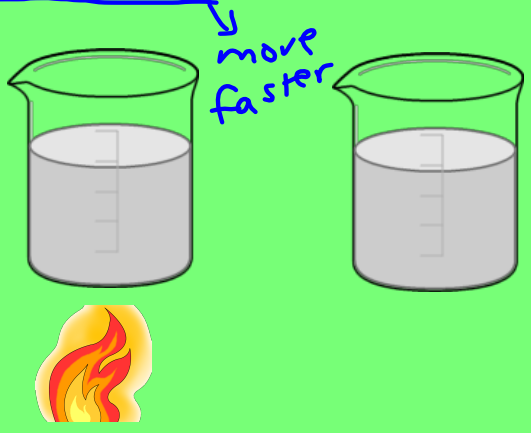

## 2. **Agitating a solution (stirring or shaking)**

increases contact with solvent and solute surface area




## 3. Heating a solvent

Increase kinetic energy of molecules disperses the solute molecules quicker

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# Concentration of Solute

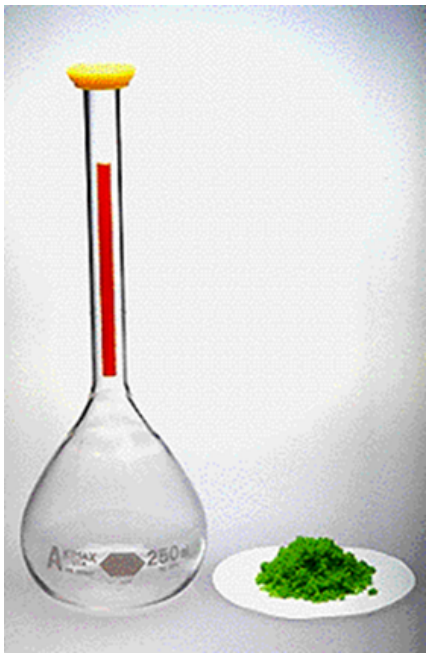
The amount of solute in a solution is given by its **concentration**.

$$\text{Molarity (M)} = \frac{\text{moles solute}}{\text{liters of solution}}$$

PROBLEM: Dissolve 5.00 g of $NiCl_2 \cdot 6 H_2O$ in enough water to make 250 mL of solution. Calculate the Molarity.

**Step 1:** Calculate moles of $NiCl_2 \cdot 6H_2O$

$$5.00\ g \cdot \frac{1\ mol}{237.7\ g} = 0.0210\ mol$$



**Step 2:** Calculate Molarity

$$\frac{0.0210\ mol}{0.250\ L} = 0.0841\ M$$

$$[NiCl_2 \cdot 6\ H_2O\ ] = 0.0841\ M$$

Mar 13-9:19 PM

4 moles of NaCl are dissolved in 5 L.
What is the molarity?

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You have 0.8L of a 0.5M KCl solution.
How many moles of KCl does this solution contain?

How many grams of HCl were used to make this solution?

Mar 7-12:45 PM

4 moles of NaCl are dissolved in 5 L.
What is the molarity?

$$M = \frac{mol}{L}$$

$$\frac{4\ mol}{5\ L} = 0.8\ Molar\ solution\ of\ NaCl$$

0.8 M NaCl solution

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You have 800mL of a 0.5M KCl solution.
How many moles of HCl does this solution contain?

$$M = \frac{mol}{L}$$

$$0.5M = \frac{x\ mol\ KCl}{0.8\ L}$$

$$x = 0.4\ mol\ KCl$$

$$\frac{800\ mL \mid 1L}{1000mL} = 0.800\ L$$

How many grams of KCl were used to make this solution?

K 39
Cl 35.5
74.5g/mol

$$\frac{0.4\ mol\ KCl \mid 74.5\ g\ KCl}{1\ mol\ KCl} = 29.8g KCl$$

**What mass of oxalic acid, $H_2C_2O_4$, is required to make 250. mL of a 0.0500 M solution?**

Mar 7-1:02 PM

**What mass of oxalic acid, $H_2C_2O_4$, is required to make 250. mL of a 0.0500 M solution?**

**Change mL to L.**

$$\frac{250\ mL \mid 1L}{1000mL} = 0.250\ L$$

**Calculate.**

$$M = \frac{mol}{L} \qquad 0.05M = \frac{x\ mol}{0.250\ L}$$

**x = 0.0125 mole $H_2C_2O_4$**

**Convert moles to grams.**

H 2x1 = 2
C 2x12= 24
O 4x16= 64
90 g/mol

$$\frac{0.0125\ mol \mid 90.00\ g}{1\ mol} = 1.13\ g\ H_2C_2O_4$$

Mar 13-9:37 PM

How many grams of NaOH are required to prepare 400. mL of 3.0 *M* NaOH solution?

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How many grams of NaOH are required to prepare 400. mL of 3.0 *M* NaOH solution?

$$M = \frac{mol}{L}$$

$$\frac{400\ mL \mid 1L}{1000mL} = 0.400\ L$$

$$3.0M = \frac{x\ mol}{0.400\ L}$$

x=1.2 mol NaOH

Na 23
O 16
H 1
40 g/mol NaOH

$$\frac{1.2\ mol\ NaOH \mid 40\ g}{1mol} = 48g\ NaOH$$

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## Attachments

soluble-salts_en-1.jnlp