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## ***Properties of Water Solutions***

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## **Nature of Solutes in Solutions**

- Spread evenly throughout the solution
- Cannot be separated by filtration
- Can be separated by evaporation
- Not visible, solution appears transparent
- May give a color to the solution

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## **Solutions occur in all phases**

- The solvent does the dissolving.
- The solute is dissolved.
- There are examples of all types of solvents dissolving all types of solute.
- We will focus on aqueous solutions.

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## Types of Solutions

air	O <sub>2</sub> gas and N <sub>2</sub> gas	gas/gas
Soda	CO <sub>2</sub> gas in water	gas/liquid
seawater	NaCl in water	solid/liquid
brass	copper and zinc	solid/solid

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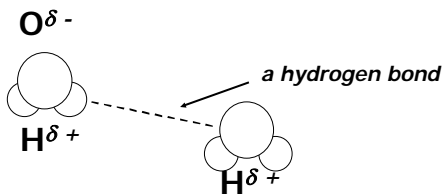
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## Water

- Most common solvent
- A polar molecule



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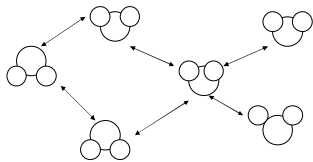
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## Hydrogen Bonds Attract Polar Water Molecules



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## Student activity

- 4 pennies
- 4 pipets
- 1 small towel
- 1 ea 125 ml flask w/ 100ml of water
- 1 ea 50 ml beaker
- Small packet of salt.
- Stirrer

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## Surface Tension

- Take a penny
- How many drops of water can you put on the penny without causing any water to run over?  
Predict \_\_\_\_\_  
Actual \_\_\_\_\_
- Explain your results



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## Surface Tension



- Water molecules within water hydrogen bond in all directions
- Water molecules at surface cannot hydrogen bond above the surface, pulled inward
- Water surface behaves like a thin, elastic membrane or "skin"
- Surfactants (detergents) undo hydrogen bonding

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## Solute and Solvent

Solutions are homogeneous mixtures of two or more substances

- Solute

The substance in the lesser amount

- Solvent

The substance in the greater amount



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## Like dissolves like

A \_\_\_\_\_ solvent such as water is needed to dissolve polar solutes such as sugar and ionic solutes such as NaCl.

A \_\_\_\_\_ solvent such as hexane ( $C_6H_{14}$ ) is needed to dissolve nonpolar solutes such as oil or grease.

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## Like dissolves like

A \_\_polar\_\_ solvent such as water is needed to dissolve polar solutes such as sugar and ionic solutes such as NaCl.

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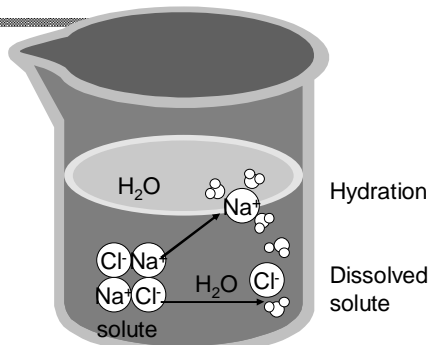
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## Formation of a Solution



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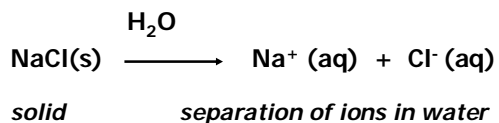
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## Writing An Equation for a Solution

When  $NaCl(s)$  dissolves in water, the reaction can be written as



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## Rate of Solution

You are making a chicken broth using a bouillon cube. What are some things you can do to make it dissolve faster?

- Crush it
- Use hot water (increase temperature)
- Stir it



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## Rate of Solution

- By increasing the surface area of solute that is exposed to the solvent, the solute will dissolve faster.

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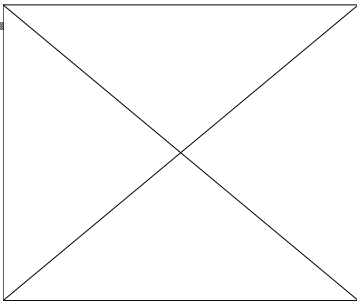
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