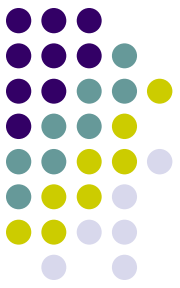


**Mrs. Bader**

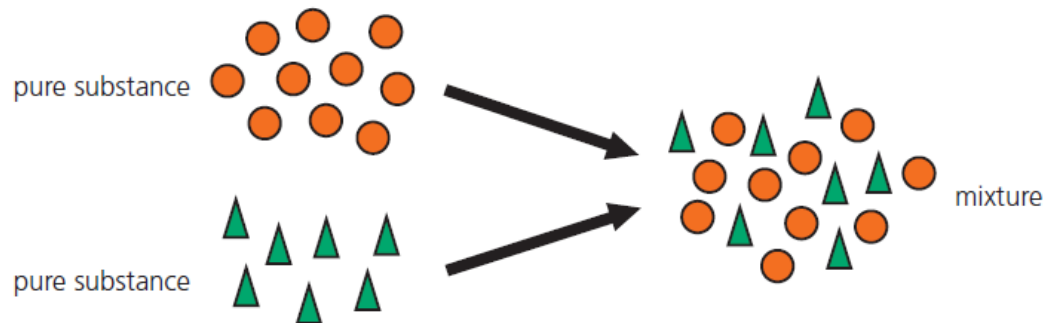


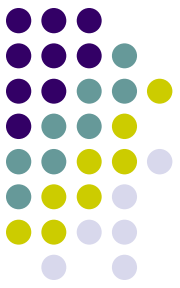
# Pure Substances and Mixtures



# Pure Substances and Mixtures

- A substance that contains only one kind of particle is called a **pure substance** (diamond, aluminum foil, table sugar)
- A **mixture** contains two or more pure substance. Mixtures can be any combination of solids, liquids, and gases (Breads are mixtures of yeast, flour, sugar, water, air, and other chemicals)





# Type of Mixtures

- gas in gas - The atmosphere is a mixture of gases, mostly nitrogen and oxygen.
- liquid in liquid - Wine is a mixture of mostly ethanol and water.
- solid in solid - Alloys, such as brass, are made up of a mixture of metals.
- gas in liquid - Soft drinks, such as cola, are mixtures of mainly carbon dioxide gas and water.
- solid in liquid - Sea Water is a mixture of salts dissolved in water.
- solid in gas - Smoke is mixture of tiny solid particles in atmospheric gases.

# Pure Substance OR Mixture

- Water



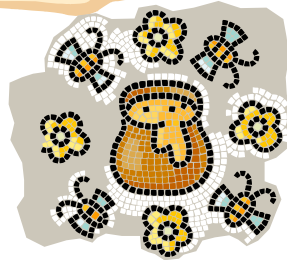
- Pizza



- Sand



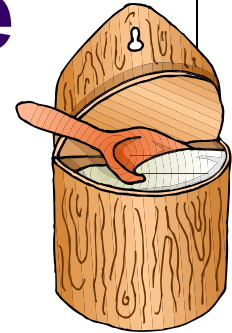
- Honey



- Cereal



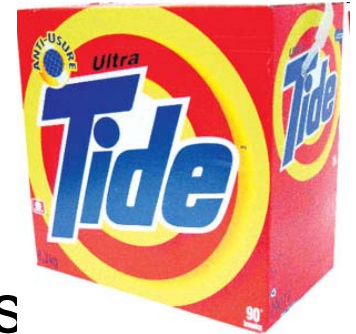
- Sugar



- Flour

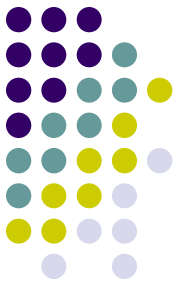


- Laundry detergent (contains white and blue crystals,



- Jello

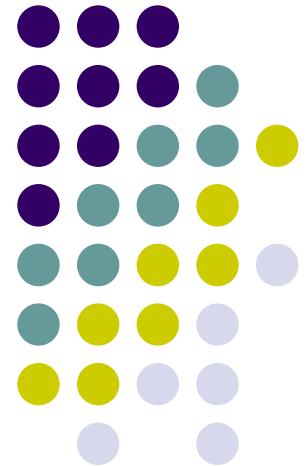
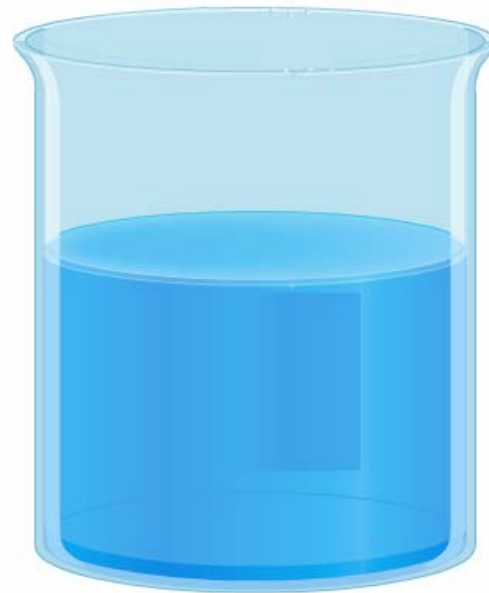


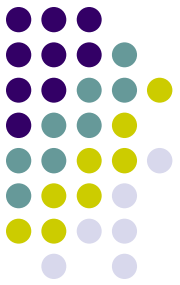


# Part 2

# Mixtures and Solutions

## Solute and Solvent





# Matter (Solid, Liquid, Gas)

## Pure Substances

You can only see one thing because there is only one kind of particle in it.

## Mixtures

- can see two parts

## Mechanical Mixture

- can see two parts

## Solutions

They're mixed together so well you only see one thing – it looks pure but it isn't

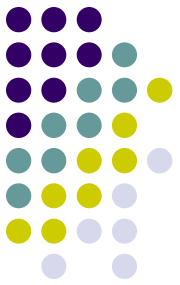
A **solute** is the substance to be dissolved (sugar).  
The **solvent** is the one doing the dissolving (water).



# Review Solutions

- Can you see two parts in solutions or are they mixed together so well you only see one thing?
  - you only see one thing
- Are solutions mixtures or pure substances?
  - Mixtures
- What kind of states can a solution be?
  - Solid, liquid, or gas
- What are the two “s” words that every solution must have?
  - A solute and a solvent



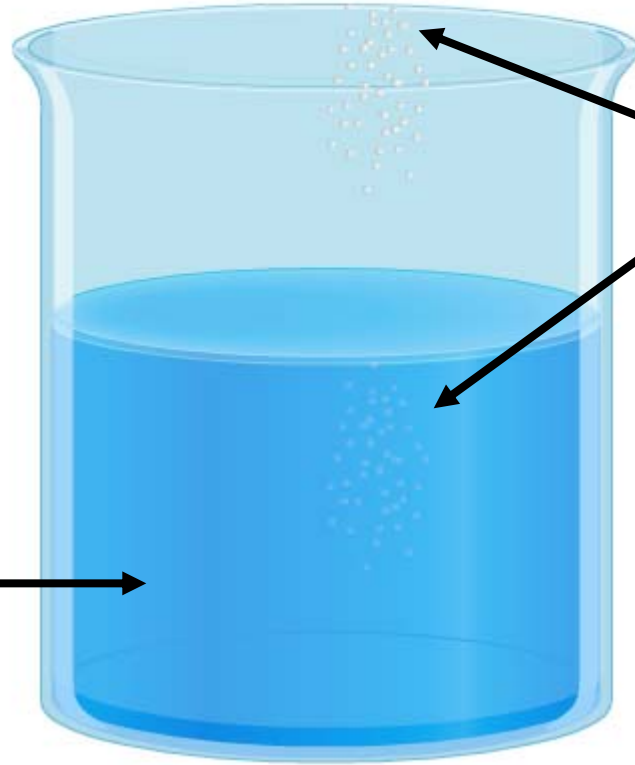


# In a salt water solution...

- Is salt the solute or the solvent?
  - Solute
- Is water the solute or the solvent?
  - Solvent
- What does the solute do?
  - Gets dissolved
- What does the solvent do?
  - Does the dissolving



# A Salt Water Solution

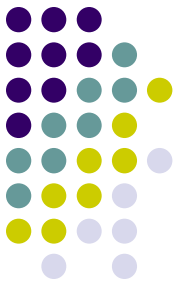
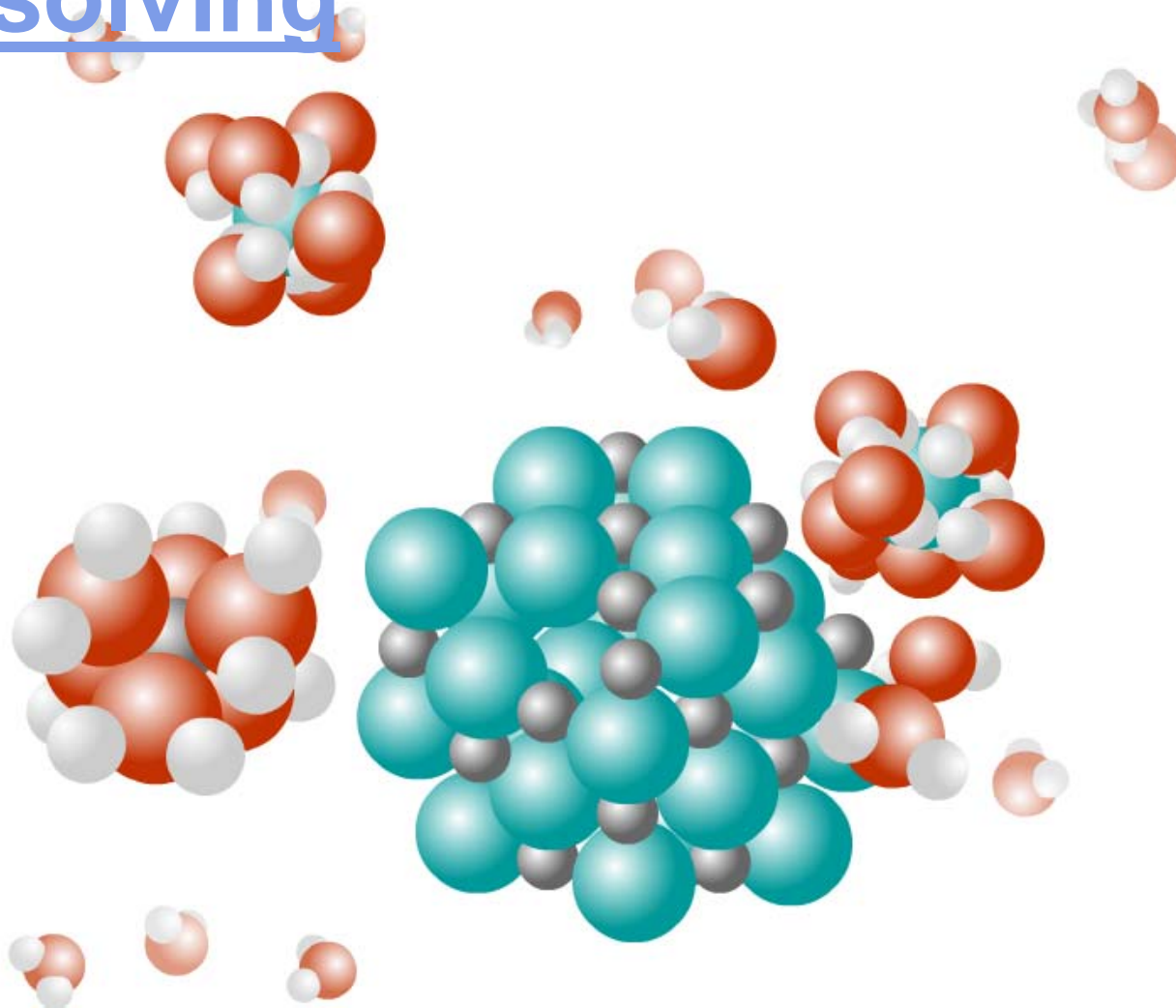


**Solute  
(salt)**

**Solvent  
(water)**

Animation

# Dissolving



# Types of Solutions



## Types of Solutions

Example		Solute	Solvent
air (hydrogen in oxygen)	→	gas	gas
pop (carbon dioxide in water)	→	gas	liquid
antifreeze (alcohol in water)	}	liquid	liquid
vinegar (acetic acid in water)			
dental fillings	}	liquid	solid
amalgams			
salt or sugar in water	→	solid	liquid
brass (copper in zinc)	}	solid	solid
solder (tin in lead)			
alloys like steel (carbon in iron)			

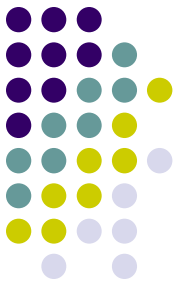
# Solution Worksheet



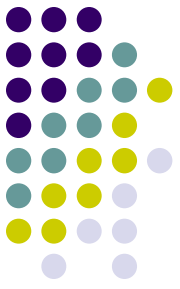
What is the Solute and what is the solvent? Label Each.

1. Cigarette Smoke and Air
2. Caffeine and Water (Cup of Coffee) **solute**
3. Water and Oxygen (Water in a Fish Tank)
4. Carbon Dioxide and Sugar Water (Sealed Can of Pop)
5. Oxygen and Nitrogen (Air)
6. Minerals and Water (Hard Water)
7. Water and Sugar (Maple Syrup) **solvent**
8. Acetic Acid and Water (Vinegar)
9. Salt and Water (Ocean Water)
10. Make your own

# Solubility of Substances



- **Insoluble and Soluble**
- **unsaturated:** This means that if you were to add more solute to the liquid, it would keep dissolving. For example, if you take one teaspoon of salt and put it in a bucket of water, you've made an unsaturated solution. (In other words, if you added another teaspoon of salt, it would dissolve, too). An unsaturated solution is one in which more of the solute could dissolve at the same temperature.
- **saturated:** This means that the liquid has dissolved all of the solute that is possible. If any of you have a little brother or sister who adds sugar to iced tea, you know what I'm talking about. If you add one teaspoon of sugar to iced tea, you've got an unsaturated solution. If you keep adding sugar to iced tea, you eventually get to the point where the rest of the sugar just sinks to the bottom. When this happens, it means that the solution is saturated, because no more sugar could dissolve. A saturated solution is one in which no more of the solute will dissolve at a specific temperature.



# Insoluble and Soluble

After each of these substances, determine if it is soluble or insoluble.

- Sand
- Salt
- Sugar
- Rice



# Part 3



# Separating Mixtures & Solutions

## Separation of Mixtures


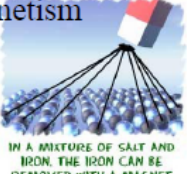



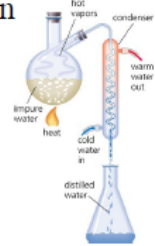


Solutions and mechanical mixtures can be separated in many ways.

1. **Evaporation**: the liquid evaporates and a solid (residue) is left behind.
2. **Distillation**: a two step process that:
  - a) heats a solution to change one part into gas and then,
  - b) cools the gas/vapour to liquid form and collects it
3. **Filtration**: the use of a funnel and filter paper to separate a solid from a liquid. The liquid passes through the filter paper and is called filtrate. The solid remains in the filter paper and is called residue.
4. **Sifting**: using a sieve, different sized substances can be separated.
5. **Magnetism**: a magnet can be used to remove metal from non-metallic substances.



## Separating Mechanical Mixtures (Review chart)

separation method	example	used for separating...
Settling and Flotation 	- salad dressing	- heavy parts of a mixture from lighter parts - mixtures in which one component of the mixture floats in water and the other component sinks in water
Magnetism 	- paper clips and staples from paper to be recycled	- mixtures in which one component of the mixture, but not the other, is attracted to a magnet
Sieving or Sifting 	- spaghetti from boiling water	- larger substances that will be trapped by the sieve and smaller or liquid substances that will pass through the sieve
Filtration 	- liquid or gas passes through, solid (residue) remains in filter	- solids that are too small to be trapped by sieves
Evaporation 	- reducing maple syrup	- liquid evaporates and a solid (residue) is left behind
Distillation 	- 100% pure water	- a two step process that heats a solution to change one part into gas and then cools the gas/vapour to liquid form and collects it
Dissolving	- salt and pepper	- pour water into salt & pepper mixture, dissolving salt and leaving pepper (salt water can be boiled to recover salt)
Picking apart	- raisins and cereal	- manually separating mixtures
Centrifuging	- washing machine	- centrifuge spins, centripetal forces act on the contents of the tube – the components of the mixture



# Separating Mixtures & Solutions



After each of these observations, determine what is described as either a pure substance or a mixture.

- Tap water leaves behind a white substance when it evaporates.
- When wet sand is filtered, the sand stays in the filter paper and the water goes through
- Distilled water leaves nothing behind when it evaporates.