

What's The Matter?



What is matter?

MATTER is anything that occupies space and has mass.

Is air considered matter?

Yes, even air is considered matter!

It occupies space: blow air into a balloon and it expands.

It has mass: weigh a "flat" balloon, then blow air into it and weigh it again, there will be an increase in its mass.

What happens when we add heat to matter?

Matter has **particles** (small parts) in it that reacts to heat and cold.

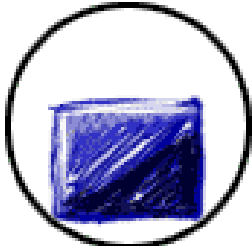
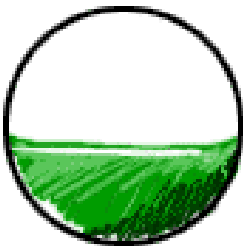
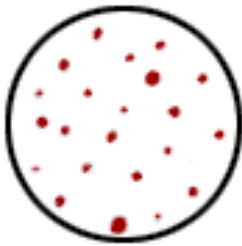
Water + Cold = Ice (**SOLID**)

Water + Heat = Steam (**GAS**)..... (**evaporation**)

Steam + Cold = Water (**LIQUID**).....(**condensation**)



States of Matter:

SOLID	LIQUID	GAS
<ul style="list-style-type: none">• Particles are stuck together• They have a definite volume*• They hold their shape	<ul style="list-style-type: none">• Particles fairly close together• They have a definite volume*• They take the shape of their container	<ul style="list-style-type: none">• Particles are far apart• They have no definitive volume*• They take the volume and shape of their container
<p><i>* Volume is the amount of space taken up by an object</i></p>		
<p>Examples:</p> <ul style="list-style-type: none">• Concrete• Steel• Plastic	<p>Examples:</p> <ul style="list-style-type: none">• Water• Milk• Vinegar	<p>Examples:</p> <ul style="list-style-type: none">• Oxygen• Carbon dioxide• Carbon monoxide
 <p>SOLIDS</p>	 <p>LIQUIDS</p>	 <p>GASES</p>

Three States of Matter



Solids



Liquids



Gases

hat
skateboard
pencil
table
snow
bicycle
apple
computer
treehouse

milk
water in pool
drink
hot chocolate
rain
soup
juice

wind
air
hot air balloon
wind from fan
steam
fog
wind

Put the following objects in the correct box.

States of Matter



ocean



pencil



book



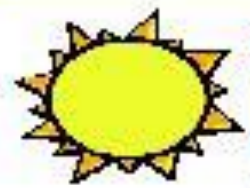
soup



tornado



apple



sun



juice



evaporation



rain



wind

Solids

Liquids

Gases

What is a Fair Test?

A **fair test** is an exploration carried out under strictly controlled conditions so results are reliable.

Variables: Factors that affect the results of an experiment.

You and your friend are using the same recipe for baking a cake. What variables should you consider in order to get the same results?

1. Follow each step
2. Use same ingredients
3. Same measurements
4. Same measuring utensils
5. Same baking time
6. Use all ingredients
7. Same brand of ingredients

*Page 11:
Testing running shoes.
What tests do they
use? Are they fair?*

Properties of Matter:

Properties are the characteristics of a substance.

<u>TEXTURE:</u>	The appearance and feel of the surface
<u>HARDNESS:</u>	How hard a substance is
<u>STRENGTH:</u>	The power to withstand strain or stress
<u>FLEXIBILITY:</u>	Capable of being bent or flexed
<u>SOLUBILITY:</u>	Being able to dissolve
<u>BUOYANCY:</u>	The ability to float in liquid or rise in air

Why is it important to know the properties of an object?

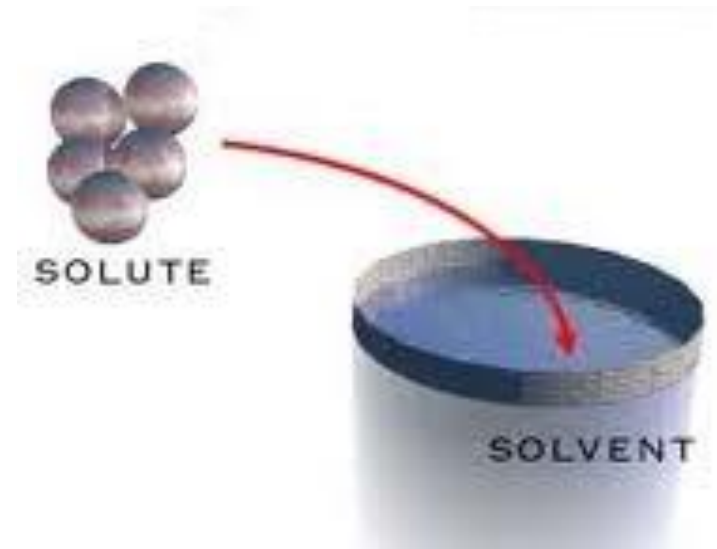
When we know the properties of an object, we can better understand its uses. For example, if I need an object to cut up wood, it would need specific properties:

- Strong
- Pointy
- Hard
- Inflexible
- Stiff
- Sharp
- Good grip (handle)
- Hard metal (blade)



Activity sheet, Lesson 4, Properties of matter.

What is a Solution?



A mixture in which one substance (the **SOLUTE**) is dissolved in another (the **SOLVENT**).

The solute seems to disappear, but it really doesn't.

How can you tell?

A saltwater solution would taste salty. And if the water evaporated, salt crystals would remain.

Solutions

List 5 solutions which can be found in your home.



1) Baking Soda + Vinegar = Fizz

2) Honey + Tea = Sweetened Tea

3) Bubble Bath + Water = Bubbly Water

4) Coffee + Creamer = Whitened Coffee

5) Chocolate Powder + Hot Water = Hot Chocolate



Solutions

Does HEAT affect SOLUBILITY?

ie. Does heat affect the rate at which a substance dissolves?



Sugar + Hot Water = _____

Sugar + Cold Water = _____

Honey + Hot Water = _____

Honey + Cold Water = _____



Solutions



Why do substances dissolve faster in hotter temperatures?

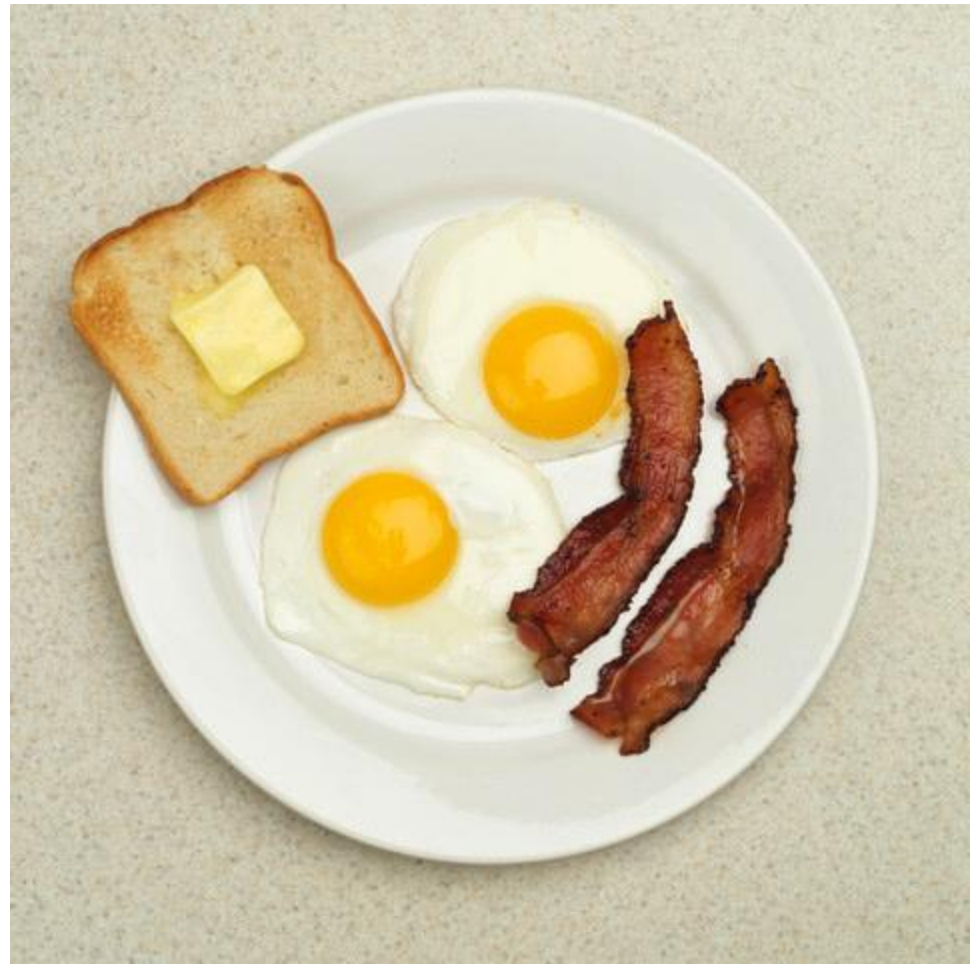
An increase in temperature causes the particles in the substance to move faster and move apart. This makes it easier to dissolve.

Which would dissolve faster:

- a sugar cube or a teaspoon of loose sugar?
- a snowball or handful of fluffy snow?



Physical Changes



Matter undergoes a **Physical Change** when there is a change in:

- ❑ a physical property of matter, such as **SIZE, SHAPE, TEXTURE...**
- ❑ **STATE**, such as solid to liquid.

There is no new substance created. The particles are just rearranged.

Examples of Physical Change

SUBSTANCE	CHANGE IN...
a. Ice cube melting	
b. Tearing paper	
c. Sharpening pencil	
d. Breaking a vase	
e. Cutting flowers	
f. Sanding wood	
g. Boiling water	
h. Mixing salt and water	

Physical Change:

In a physical change, will the volume or mass change?

In a physical change, the **volume** can change, but the **mass** remains the same. For example, breaking a glass will change the volume, but the mass remains the same.

In a physical change, will matter be destroyed or will new matter be created?

Neither. The particles are just rearranged.

Chemical Changes:

A **chemical change** is a change in matter that produces a new substance when one or more materials react.

Example: Baking a cake...



When we mix these ingredients and add heat, we get a cake. Particles have changed – we have a **new substance**.

Examples of Chemical Change

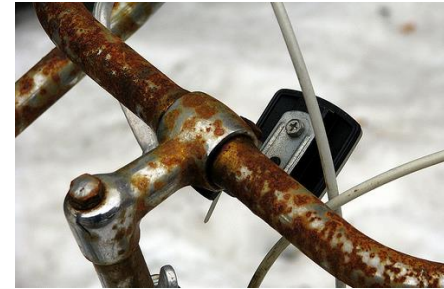
1. BURNING WOOD:

Wood + Heat = Ash (new substance)



2. BIKE RUSTING:

Bike (iron) + Oxygen = Rust (new substance)



3. MOLDY CHEESE



4. ROTTEN APPLE



5. SOUR MILK



Signs of a Chemical Change

Here are some signs of a **Chemical Change**:

1. Fizz or bubbles (eg. Soda and vinegar)
2. New colors (eg. Rust)
3. New texture (eg. Wood + fire = ash)
4. Explosions (hydrogen + oxygen)
5. New smell (smoke, burning)

Reversible & Non-reversible Changes

REVERSIBLE CHANGES: A change in matter that can go backwards and forwards. It can be restored to its original state.

Examples: _____

NON-REVERSIBLE CHANGES: A change in matter that cannot go back to its original state.

Examples: _____
