The universe is made up of two things: **\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**

**MATTER** is made up of **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**

* These particles are made up of elements from the periodic table:

****

**ENERGY** is the different \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that make particles do something

****i.e. fusion (stars), electromagnetic fields, fission (atomic bombs), a push or pull

****

**WHAT IS MATTER?**

MATTER is anything that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Mass is the amount of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in an substance.

Volume is the amount of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ occupied by a substance.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_is the study of matter.

**What is NOT matter?**

Energy (heat, light) because it has no \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**PARTICLE MODEL OF MATTER (kinetic theory of matter)**

Kinetic Molecular Theory:

1. All matter is made of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. There is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ between particles.
3. Particles are constantly \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with each other.

**Kinetic energy** is the energy of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Particles make up solids, liquids and gasses and are too small to be seen with the naked eye!

There are three ways we can describe matter:

****

As particles gain energy they move \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Particles at \_\_\_\_\_\_\_\_\_\_\_\_\_ temperature move \_\_\_\_\_\_\_\_\_\_\_\_\_\_than particles at lower temperatures.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **DISTANCE** | **MOTION** | **ENERGY** | **SHAPE** |
| **Solid** | **Picture 2**Packed closely together, spaces between are small |  |  |  |
| **Liquid** | Picture 3Particles have enough space between them to slide past each other.  |  |  |  |
| **Gas** | Picture 4Particles are far apart, mostly space |  |  |  |



**CHANGES OF STATE**

**PROPERTIES OF MATTER**

**Physical Properties:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_that can be **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** without changing it. **eg color**

|  |  |
| --- | --- |
| **PHYSICAL PROPERTY** | **DEFINITION** |
| **States of Matter** | solid, liquid, and gas. When a substance changes its \_\_\_\_\_\_\_\_\_\_\_, it does not \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.*Eg. ice (solid), water (liquid), and steam (gas) are all the same compound* |
| **Melting and****Boiling points** | MP = temperature a substance turns from \_\_\_\_\_\_\_\_\_to \_\_\_\_\_\_\_\_\_\_\_\_\_BP= \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| **Malleability** |   |
| **Ductility** |  Eg. Copper, aluminum |
| **Solubility** | How well a substance \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Eg. Salt is sluble in water (it dissolves in water) |
| **Conductivity** | Ability to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| **Density** | How \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or “heavy” something is.  |

**Chemical Properties:** a **characteristic** of a substance observed during a reaction in which the **chemical** composition or identity of the substance is changed:

|  |  |
| --- | --- |
| **CHEMICAL PROPERTY** | **DEFINITION** |
| Flammability | Rapid reaction of substance with \_\_\_\_\_\_\_\_\_\_\_\_\_ 🡪 releases \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(burning/ cumbustible)Eg. “burning” gas in car engines |
| Corrosion (Rusting) | Slow reaction of \_\_\_\_\_\_\_\_\_\_\_\_\_\_ with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_to form metal oxidesEg. Rusting of iron 🡪 iron oxide |
| Reacts with Acid | Reaction of some mteals…often produces \_\_\_\_\_\_\_\_\_\_\_\_\_\_Eg. CO2 or H2 gas |

**How can you tell if it’s a PHYSICAL or CHEMICAL change?**

**In a physical change** the object retains \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Eg. a cut strawberry is still as sweet

* A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a physical change.
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a physical change: when salt dissolves in water, the crystals disappear but the salty taste of water proves that the salt is still there. The salt can be re-crystallized by evaporating the water.
* A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (phase change): water boiling to steam.

**Evidence of a chemical change**: One or more \_\_\_\_\_\_\_\_\_\_\_\_\_ substances is formed.

* The change is irreversible (you can’t “go back” to the original starting material)
* New \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ formed (bubbles produced)
* New \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are observed (change in colour, odour)
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (heat or light given off or absorbed)



**Chemical Change POE**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Element** | **Element** | **Compound** |
|   | **iron** | **sulphur** | **iron sulphide** |
| colour |   |   |   |
| is it attracted to a magnet? |   |   |   |
| reaction with hydrochloric acid |   |   |   |

**There are TWO types of Matter:**

**PURE SUBSTANCES**

A pure substance is matter that contains \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Pure substance can be further classified as either:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - pure substance that cannot be changed into anything simpler.

Copper - an example of an element

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ pure substances that consist of two or more elements

Water - an example of a compound

**How can we tell the difference between elements and compounds?**

Compounds **can be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ into simpler units** by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_and/or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Elements **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** be broken down chemically into simpler units by heat or electricity

**MIXTURES**

A mixture contains \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ pure substances \_\_\_\_\_\_\_\_\_\_\_ chemically joined.

There are two types of mixtures:

* A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mixture is a mixture that is
	+ made of substances that are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_mixed together.
	+ The components are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ but \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ from each other.
	+ Has the same \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ throughout.
	+ Usuall one phase
	+ Ex. Salt dissolved in water, air
* A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mixture is a mixture that is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in its composition. 
	+ The components can be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_properties throughout
		- Ex. Granola, sulfur and iron, sand and marbles, salsa

**How can we separate an insoluble substance from mixture?**

Eg: Sand and water 🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



**How can we separate a soluble substance from a solution?**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Why do we care?** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What happens in a chemical reaction?

DENSITY

Density: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Density is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ property.

You can calculate density this way:

Symbols: Volume: \_\_\_\_\_\_\_\_\_ Mass: \_\_\_\_\_\_\_\_\_\_\_ Density: \_\_\_\_\_\_\_\_\_\_

Units: Volume: \_\_\_\_\_\_\_\_\_ Mass: \_\_\_\_\_\_\_\_\_\_\_ Density: \_\_\_\_\_\_\_\_\_\_

When you are comparing densities of a substances, you are comparing \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Comparing densities enables us to predict whether a substance will \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in its surroundings.

When something floats in water, it is because it is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ than water.

When something sinks in water, it is because it is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ than water.

POE: A grape is more/less dense than water because it sinks/floats.

**PRACTICE CALCULATIONS**

1. A substance weighs 0.56 grams. It has a volume of 3cm3. Calculate the density.

2. After each class, Ms. Wilson eats a chocolate bar that weights 12.5 grams. She measures its volume to be 6cm3. Calculate the density of the chocolate bar.

3. A crystal is found that has a volume of 1.5 cm3. If the crystal weighs 4 grams, what is its density?

4. You place a piece of wood in a graduated cylinder. The level of the water in the cylinder moves from 98 mL to 125 mL.

a) What is the volume of the piece of wood?

b) If the piece of wood weights 72 grams, what is its density?

5. A graduated cylinder is filled with water to the 55 mL mark. The graduated cylinder with water weights 132 grams. A piece of metal is placed in the water. The water rises to the 105 mL mar. When you re-weigh the cylinder, it now weighs 225 grams. Calculate the density of the metal.

6. How does the density of a cup of water compare to the density of a bathtub of water?