

Name: \_\_\_\_\_

## Physical science Review

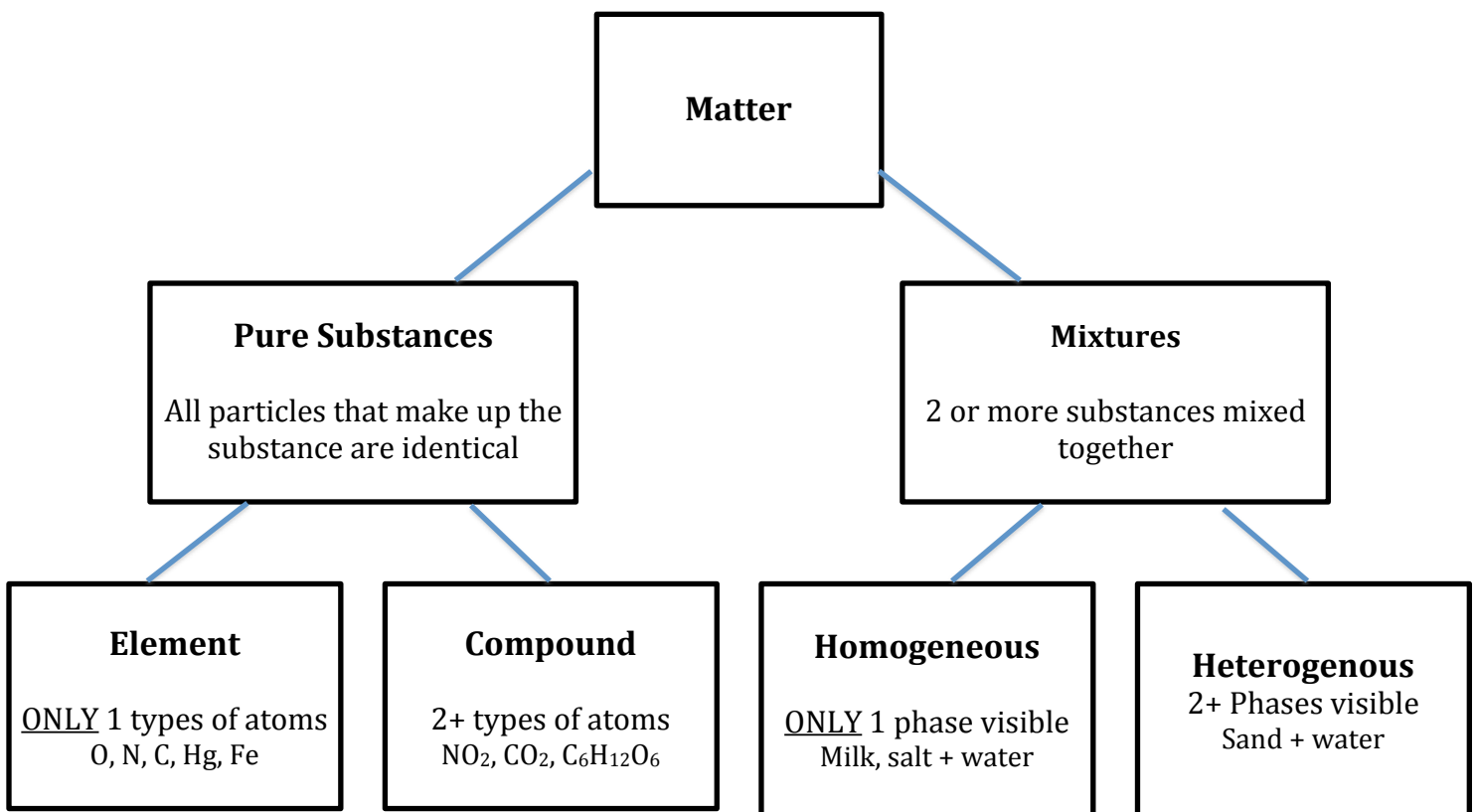
### Topics:

1. Organization of matter
2. Particle model of solids liquids and gases
3. Characteristic vs. Non characteristic properties
4. Changes of matter
5. Law of conservation of mass

### 1. Organization of matter

Matter is anything that has a mass and has a volume.

- Mass is a measure of how much matter is in an object
- Volume is how much space an object takes up.



## 2. Particle model of solids, liquids and gases

➔ The smallest unit of matter is the atom

**Atoms in solids liquids and gases follow 3 rules:**

1. They have space between them
2. They are attracted to one another
3. They are always moving

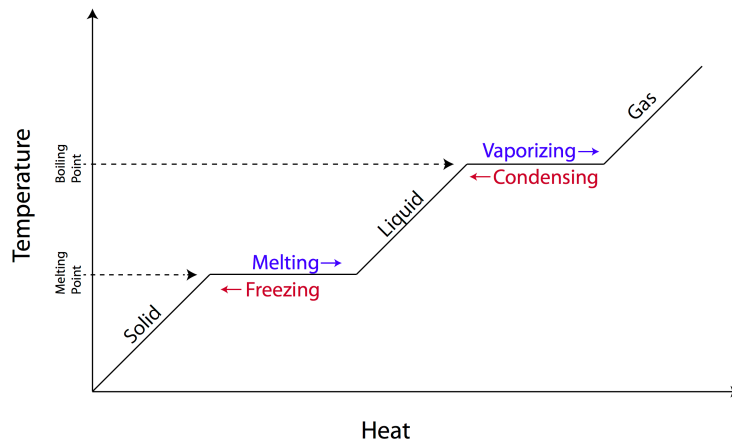
Solids	Liquids	Gases
<ul style="list-style-type: none"><li>• Atoms have <u>LITTLE</u> space between them</li><li>• Atoms are <u>VERY</u> attracted to each one another</li><li>• Atoms have <u>LITTLE</u> movement (vibration)</li></ul>	<ul style="list-style-type: none"><li>• Atoms have <u>SOME</u> space between them</li><li>• Atoms are <u>SOMEWHAT</u> attracted to each one another</li><li>• Atoms have <u>SOME</u> movement (vibration, rotation)</li></ul>	<ul style="list-style-type: none"><li>• Atoms have <u>A LOT</u> of space between them</li><li>• Atoms are <u>NOT</u> attracted to each one another</li><li>• Atoms have <u>A LOT</u> of movement (vibration, rotation, translation)</li></ul>
<b>Solids have a definite shape</b>	<b>Liquids take the shape of the container</b>	<b>Gases take the shape of the container</b>

**As atoms are heated:**

- ✓ They get further apart
- ✓ They are less attracted to one another
- ✓ They move more

The opposite happens when you remove heat...

**THIS IS WHY SUBSTANCES GO THROUGH PHASES CHANGES!!**



### 3. Characteristic vs. non characteristic properties

Characteristic properties that are specific to a substance, and can be used to identify an unknown substance.

Non-characteristic properties provide vague information about a substance

Examples of non-characteristic properties:

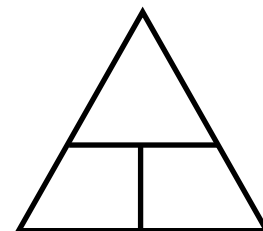
- Colour
- Odour
- Mass
- volume

Examples of characteristic properties:

- Melting point
- Boiling point
- Density: amount of matter in a given space

**Density = mass / volume**

By using the triangle we can also calculate mass or volume



- Litmus paper:

Acid		Base		Neutral	
Red litmus	Blue litmus	Red litmus	Blue litmus	Red litmus	Blue Litmus
No reaction	Turns red	Turn blue	No reaction	No reaction	No reaction

Acid → turns red

Base → turns blue

- Cobalt chloride paper:  
Turns pink in the presence of water
- Limewater:  
Turns cloudy in the presence of CO<sub>2</sub>
- Burning splint test:  
A lit splint makes a popping sound in the presence of H<sub>2</sub>
- Glowing splint test  
A blown out splint re-ignites in the presence of O<sub>2</sub>

#### 4. Changes of matter

2 types:

Physical	Chemical
<ul style="list-style-type: none"> <li>• Substance looks different <u>BUT IT'S NOT</u></li> <li>• Molecular makeup stays the same</li> <li>• Characteristic properties remain the same</li> </ul> <p style="text-align: center;"><b>Can get the original substance back</b></p>	<ul style="list-style-type: none"> <li>• Substance is <u>DIFFERENT</u> (new product formed)</li> <li>• Molecular makeup <u>IS NOT</u> the same</li> <li>• Characteristic properties <u>DO NOT</u> remain the same</li> </ul> <p style="text-align: center;"><b>Cannot get the original substance back</b></p>

#### Examples of physical changes:

1. Phase changes  
Solid  $\leftrightarrow$  liquid  $\leftrightarrow$  gas
2. Dissolution
3. Deformation

#### Examples of chemical changes:

1. Synthesis:
  - 2 simple molecules react to form a more complex molecule
  - Example:  $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$

## 2. Decomposition:

- A more complex molecule breaks down into 2 simpler ones
- Example:  $2\text{H}_2\text{O} \rightarrow 2\text{H}_2 + \text{O}_2$

## 3. Oxidation:

- ANY reaction where oxygen is one of the reactants (i.e. On the left side of the arrow)
- Example:  $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O} + \text{energy}$   
 $4\text{Fe} + 3\text{O}_2 \rightarrow 2\text{Fe}_2\text{O}_3$

## 4. Precipitation:

- A solid is formed when 2 substances react
- Example: Enzymes are added to milk to make yogurt  
Limewater turning cloudy in the presence of  $\text{CO}_2$

## Signs of a chemical reaction:

- colour change
- heat production
- light formation
- gas formation (bubbles)
- Precipitate

## 5. Law of conservation of mass

Matter can never be created or destroyed, only transformed

### Chemical Reaction:



Reactants = Products

What you start with = What you end up with

This applies to:

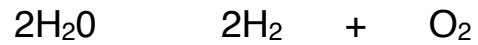
### Mass:



$$10\text{g} + 5\text{g} = 3\text{g} + 12\text{g}$$

**AND:**

**Number of atoms:**



Balanced

(same # of atoms on both sides)

**Where do they numbers come from???**

- The numbers IN FRONT is the number of molecules.
  - Example:  $2\text{H}_2$  means we have 2 molecules of water
- The numbers IN BACK is the number of atoms.
  - Example:  $\text{H}_2$  means we have 2 atoms of hydrogen