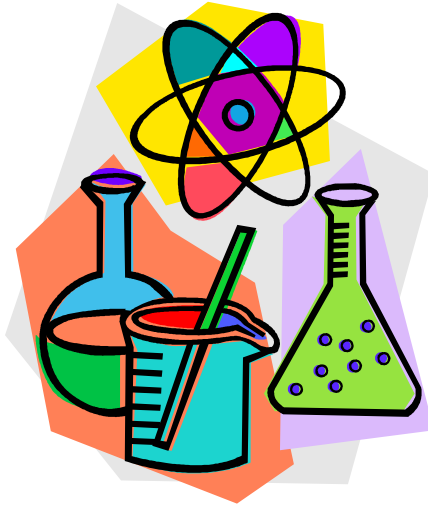




SAFALTA CLASSTM

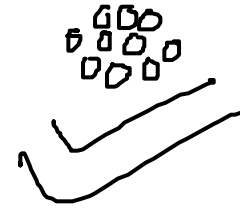
An Initiative by **अमरउजाला**



A Matter of Fact

Mixtures, Elements and Compounds

What is Matter (4619)



- Matter is anything that has mass and takes up space
- Matter is made up of atoms. An atom is the smallest unit of matter
- Atoms can combine or bond to form a molecule

Matter (પદાર્થ)
(Solid, liquid, Gas)

Pure Substances (શુદ્ધ)

Element
(તત્વ)

{
H
O
N

Compound
(યોગિક)

H_2O

CO_2

NH_3

(અશુદ્ધ)
Impure Subst.

Homogeneous
Mixture

(અસંગી)

Sugar
+
Water

Heterogeneous
Mixture

(વિઅસંગી)

Sand
+
Water

* Element:-

eg. \rightarrow H, N, C,
Si, Na

118

92 (Naturally occurrence)
26 (Lab में)

118 \rightarrow 91 \rightarrow metal (धातु)

7 \rightarrow Metalloids (उपधातु)

20 \rightarrow Non metal (अधातु)

* Compound:-

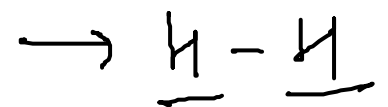
2 या 2 से ज्यादा \Rightarrow Pure Substance
✓ (elements)

Note:- Fixed Ratio constant Proportion.

e.g.:
H₂O \rightarrow H : O \Rightarrow 1 : 8 ✓
CO₂ \rightarrow C : O = 3 : 8 ✓

molecule

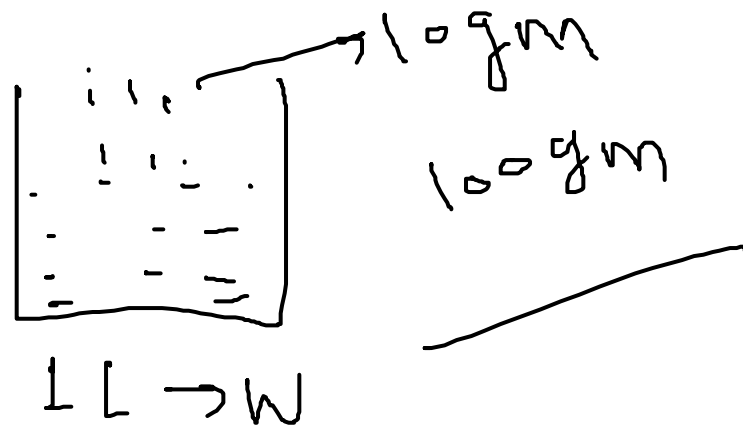
same element

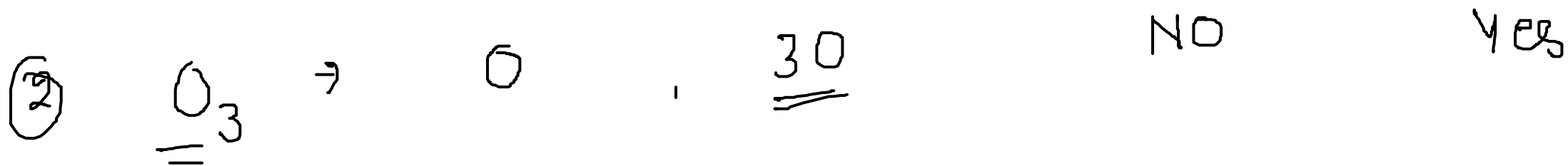
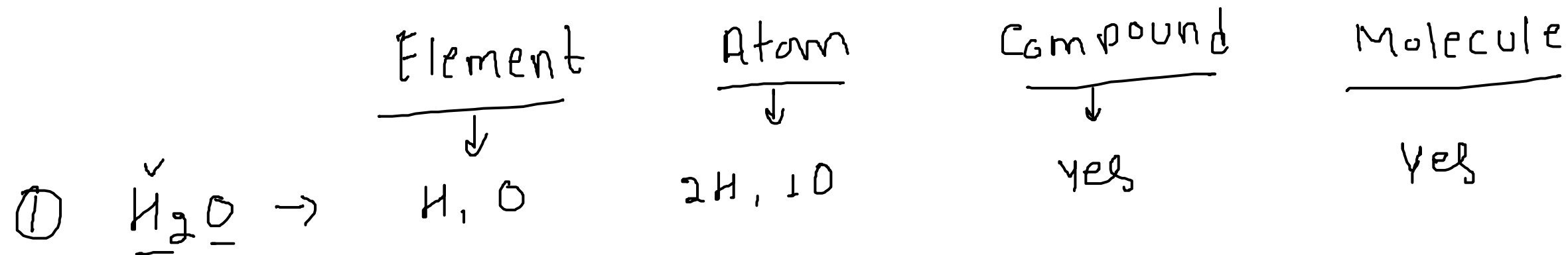


\Rightarrow H₂ \rightarrow molecule

* Mixture:- 2 या 2 से ज्यादा \Rightarrow Pure Substance

Note:- Any Proportion

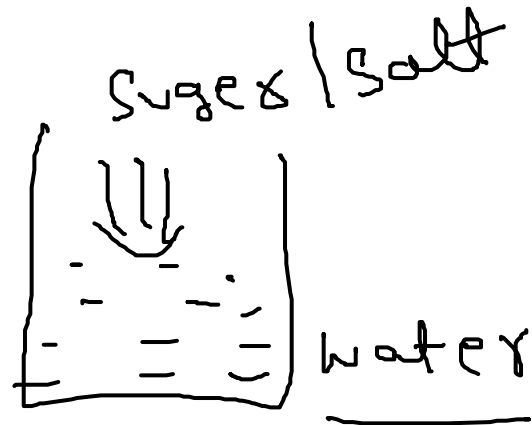




③

Mixture

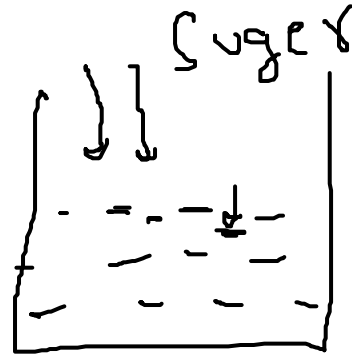
* Physical process → Substances can separate.



⇒ Boil ✓

⇒ compound → NaCl → Separation ⇒ Chemical process

* Homogeneous:- ✓



e.g.: Lemon + water

* Heterogeneous: ✓✓



Cu + Silver \Rightarrow $\overline{\text{Cu}_2\text{S}}$



* Types of Mixture:-

① Solution (विलयन) \Rightarrow A solution is a homogeneous mixture of two or more substances.



Solution

e.g. Lemonade ~~नींबू पानी~~
Soda water (water + CO₂)

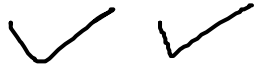
* Alloy (ਸਮੇਲ): - Two or more metals or a metal & non-metal & can't be separated into their components by physical process.

e.g.:- Brass \rightarrow Zinc + Copper
(ਸਮੇਲ) ✓ (30%) + (70%)

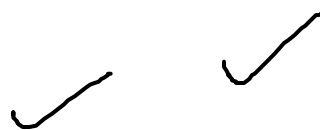
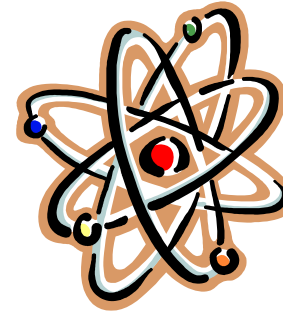
Pure Substances

- A sample of matter that has definite chemical and physical properties.

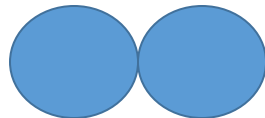
Elements



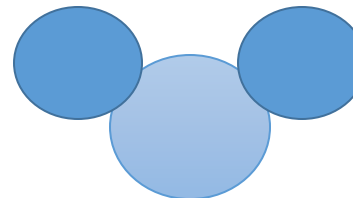
Atoms



Molecules



Compounds



Elements

- pure substance that cannot be separated into simpler substance by physical or chemical means.

Periodic Table of the Elements

1		IA										IIA												0		
1	H																							2		
2	Li	Be																								
3	Na	Mg																								
4	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr								
5	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe								
6	Cs	Ba	*La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn								
7	Fr	Ra	+Ac	Rf	Ha	Sg	Ns	Hs	Mt	110	111	112	113													

* Lanthanide Series

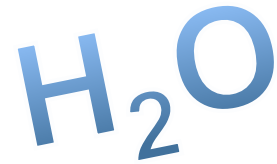
+ Actinide Series

58	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
90	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

Compounds

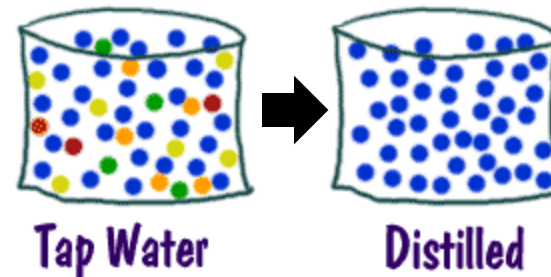
Pure substance composed of two or more *different elements joined by chemical bonds.*

- Made of elements in a specific ratio that is always the same
- Has a chemical formula
- Can only be separated by chemical means, not physically



Mixtures

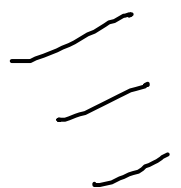
- A combination of two or more pure substances that are **not chemically combined**.
- substances held together by *physical forces, not chemical*
- No chemical change takes place
- Each item retains its properties in the mixture
- They can be separated physically



Can you identify the following?

You will be shown a series of photos. Tell if each photo represents an item composed of an element, compound, or mixture.

Review:

- 
- An **element** contains just one type of atom.
 - A **compound** contains two or more different atoms joined together.
 - A **mixture** contains two or more different substances that are only physically joined together, not chemically.
 - A mixture can contain both elements and compounds.

Element, Compound, or Mixture?

Rocks



Element, Compound, or Mixture?
Rocks

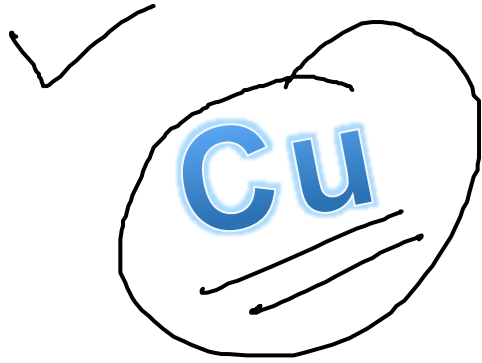


Element, Compound, or Mixture?

Copper



Element, Compound, or Mixture?



Copper



Element, Compound, or Mixture?

⇒ Jelly Beans



Element, Compound, or Mixture?

Jelly Beans ✓



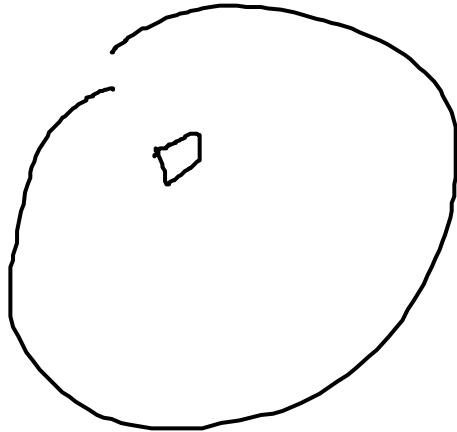
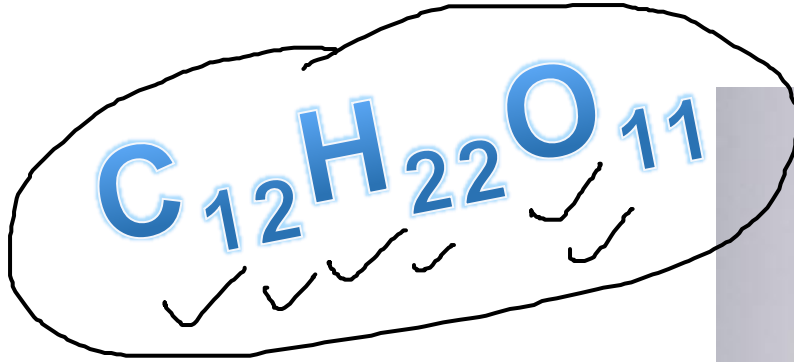
Element, Compound, or Mixture?

Table Sugar



Element, Compound, or Mixture?

Table Sugar



Element, Compound, or Mixture?

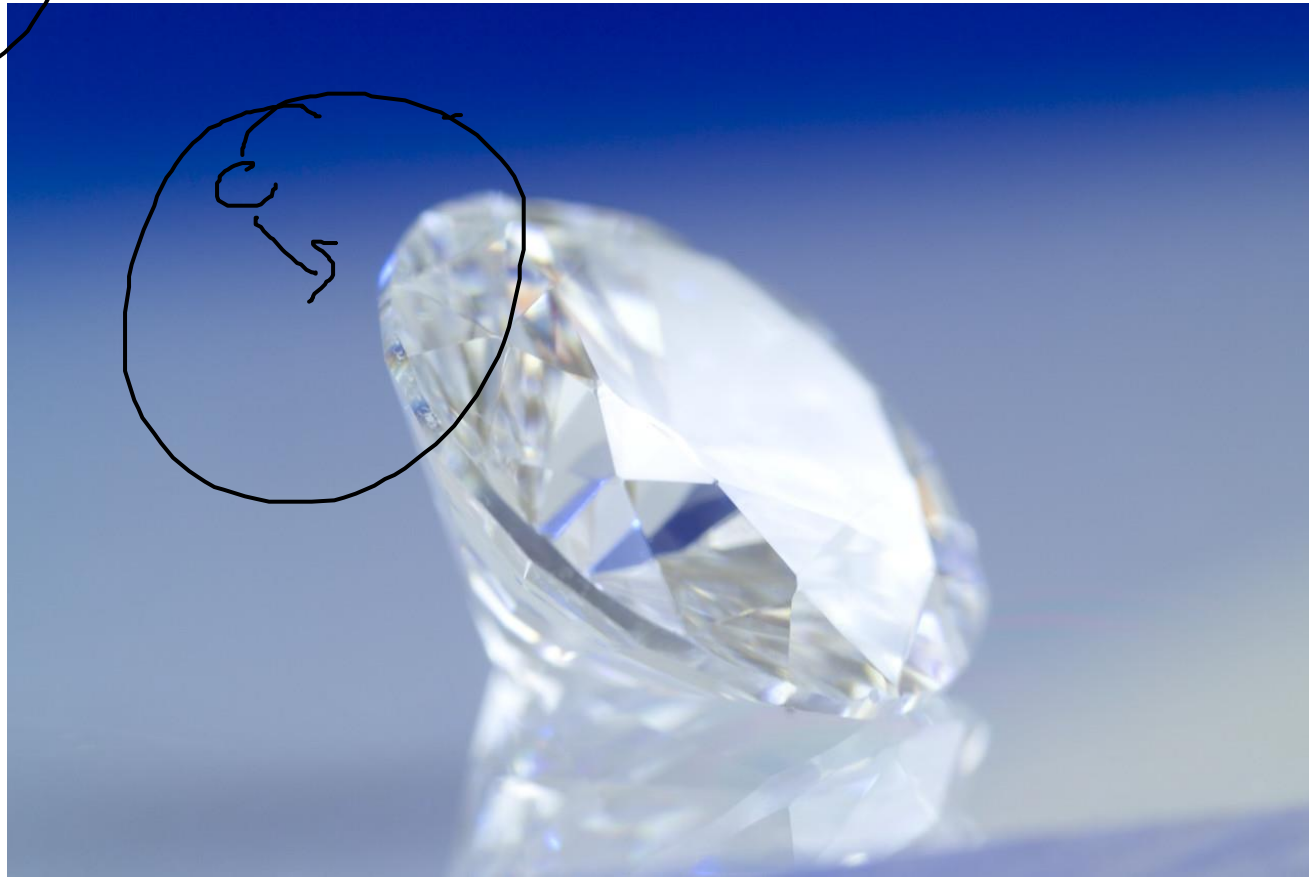
Diamond



Element, Compound, or Mixture?

C

Diamond



Element, Compound, or Mixture?

Tea



Element, Compound, or Mixture?

Tea ✓



Element, Compound, or Mixture?

Salt



Element, Compound, or Mixture?

NaCl

Salt



Element, Compound, or Mixture?

Neon Gas



Element, Compound, or Mixture?



Neon Gas



Element, Compound, or Mixture?

⇒ Salad



Element, Compound, or Mixture?

Salad



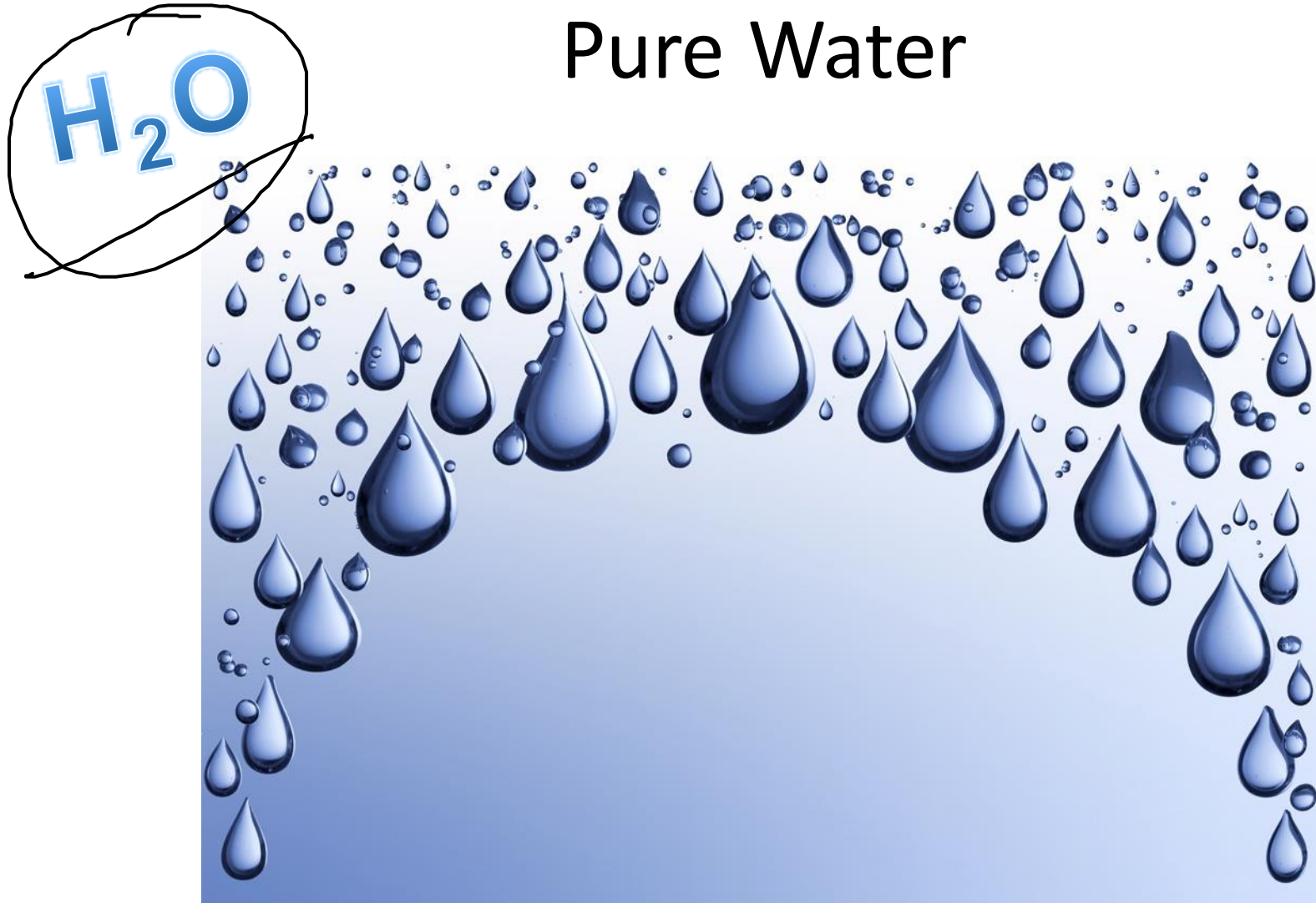
Element, Compound, or Mixture?

[Pure Water]



Element, **Compound**, or Mixture?

Pure Water



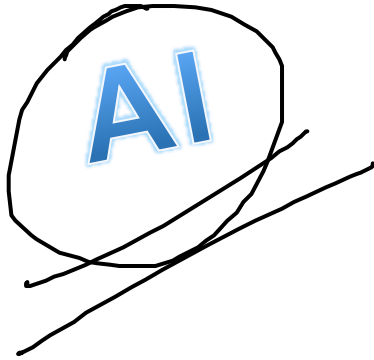
Element, Compound, or Mixture?

⇒ Aluminum



Element, Compound, or Mixture?

Aluminum



Element, Compound, or Mixture?

Lemonade



Element, Compound, or Mixture?

Lemonade



Element, Compound, or Mixture?

Silver



Element, Compound, or Mixture?

Silver

Ag



Element, Compound, or Mixture?

Sand



Element, Compound, or Mixture?

Sand



Types of Mixtures

- **Two main categories**
- ✓ • **Homogeneous** – molecules are mixed up in an even distribution
- ✓ • **Heterogeneous** – molecules are **not** mixed up in an even distribution

Homogeneous Mixtures

- **Solutions**- a well mixed mixture—appears to be a single substance

↗ • **Solute** - the substance being dissolved

↗ • **Solvent** – the substance in which the solute is being dissolved

- water is considered a universal solvent

↗ • Particles do not scatter light

- Ex: coffee, lemonade, Kool-Aid

Homogeneous Mixtures

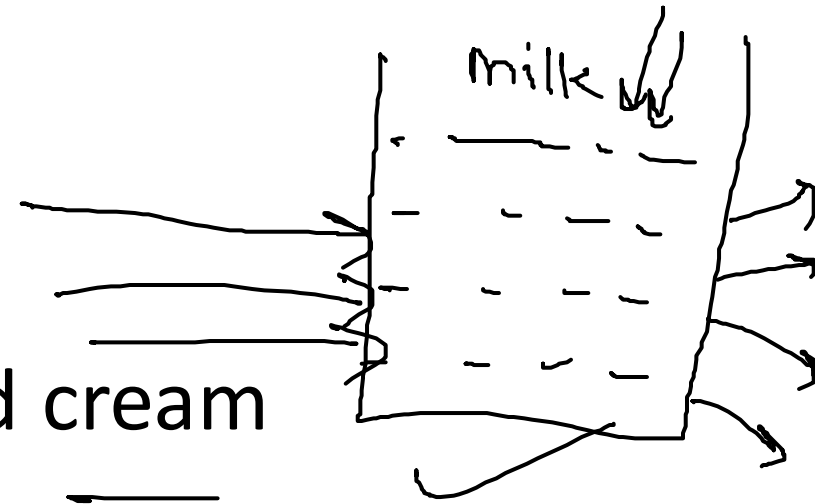
↑ पूरी तरह से नहीं छुटता

⇒ • **Colloids**- a mixture of tiny particles that are bigger than those in a solution, but smaller than in a suspension

- Do not settle out over time

- Scatter light ✓

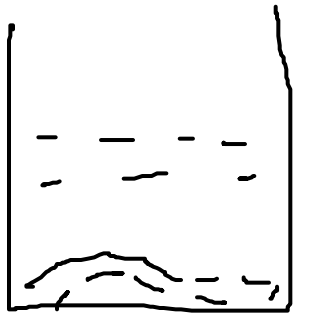
- Ex. Mayonnaise, milk, gelatin, whipped cream

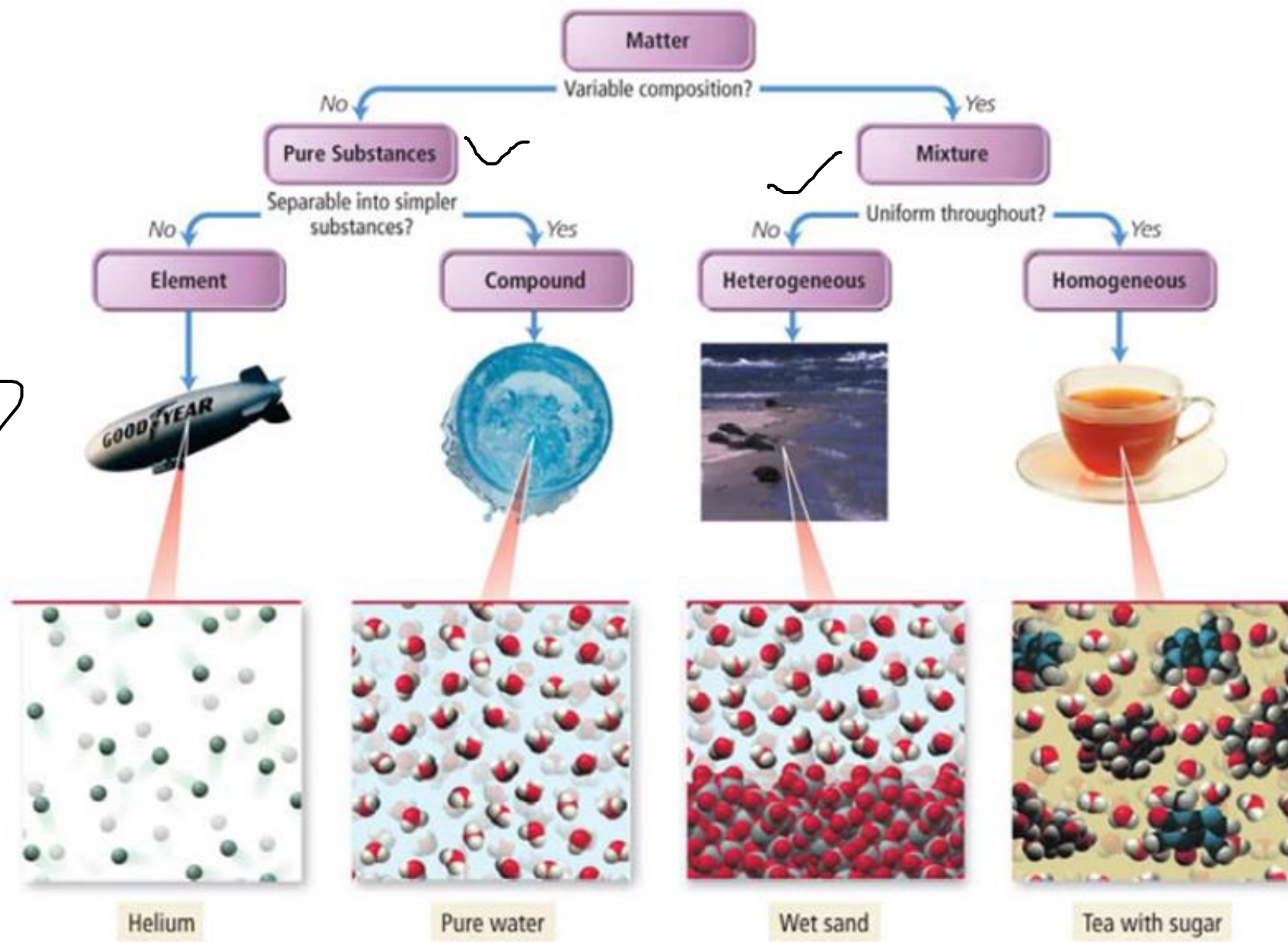


Heterogeneous Mixtures ✓

2 Substances मिलाकर → mix नहीं होता

- Suspensions – a mixture in which particles are dispersed in liquid or a gas and will eventually settle out
 - Particles can scatter light
 - Can be filtered out using a filter
 - Ex. Snow globe, sand in a bucket of water, muddy water, Italian salad dressing





Difference Between Compound and Mixture

Sl. No.	Differentiating Property	Compound	Mixture
1	Definition	Compound are substances which can be formed by chemically combining two or more elements.	Mixtures are substances that are formed by physically mixing two or more substances.
2	Types	<p>Compounds can be of three types, which are: covalent compounds, metallic compounds and ionic compounds.</p> <p>Note: Compounds can be classified as organic compounds or inorganic compounds depending on the presence of carbon in the molecular</p>	Mixtures are mainly of two types i.e. homogenous mixtures and heterogeneous mixtures.

3	Substance Category	Compounds fall under pure substances.	Mixtures can be categorized as impure substances.
4	Composition Details	The chemical composition of compounds is always fixed.	A mixture can have a variable composition of the substances forming it.
5	Nature	Compounds are always homogeneous in nature	Mixtures can either be homogeneous or heterogeneous in nature.
6	Separation of Constituents	The constituents of a compound can only be separated by either chemical or electrochemical methods(like extraction).	Mixtures can be separated into their constituents via physical separation methods such as filtration. Thus, the separation of mixtures is relatively easier than the separation of chemical compounds.

7	Properties	The properties of compounds are unique to themselves and need not necessarily reflect the properties of the constituent elements.	The constituents of a mixture do not lose their properties and so, the properties of a mixture are generally the sum of the properties of its constituents.
8	New Substance	A new substance is formed after the constituents are chemically combined. So, a compound has different properties from its constituents.	No new substances are formed in mixtures and their properties are dependent on the properties of their respective constituents.
9	Melting and Boiling Points	The melting & boiling points of a compound are always defined.	The melting and boiling points of a mixture is not defined.
10	Example	Water, salt, baking soda, etc.	Oil and water, sand and water, smog (smoke + fog), etc.

Chemical and physical changes

रासायनिक

भौतिक ✓



Physical Change

- A Physical change is a change in a substance that does not change what the substance is.



Wood (कच्चा)

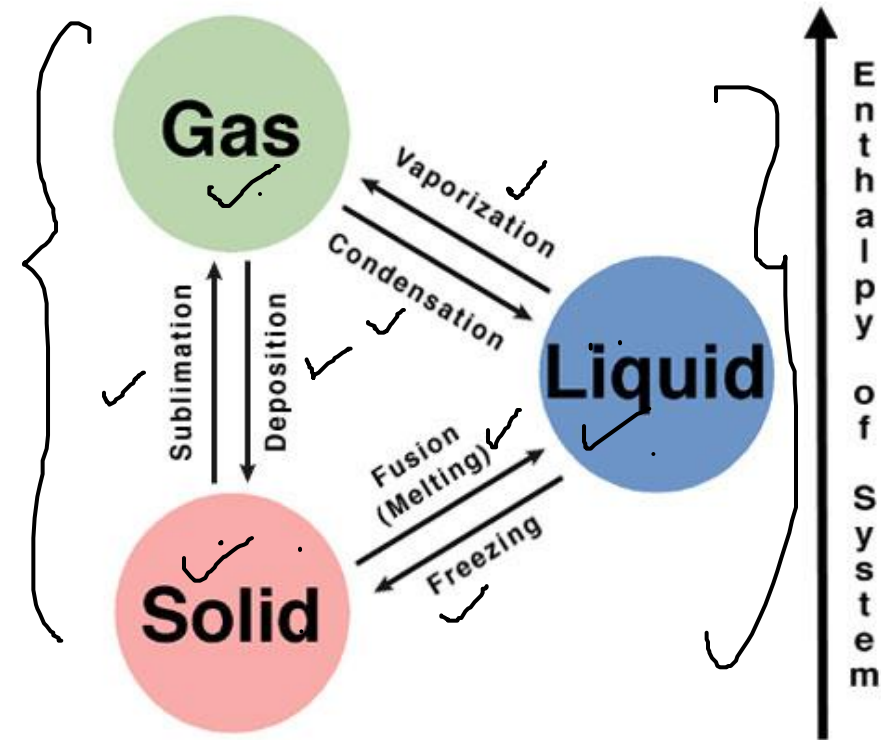


iron (Fe)
↓
chip ✓
rod ✓
chain ✓
:

Physical Change - examples

• **Examples** of physical change include:

- Change in shape ✓
- Change in size ✓
- Change in phase
 - Melting (solid to liquid)
 - Boiling (liquid to gas)
 - Evaporation (liquid to gas)
 - Condensation (gas to liquid)
 - Freezing (liquid to solid)
 - Sublimation (solid to gas)
 - Deposition (gas to solid)



Physical Change

- Physical changes might be caused by:

- ✓ • Grinding

- ✓ • Cutting ✓

- Crushing ✓

- Bending

- ✓ • Breaking

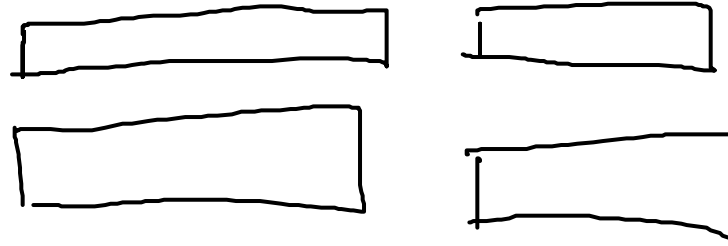
- ✓ • Heating/cooling
 - (change in phase)

- ✓ • squishing



Solid

Physical Change



• Evidence that a physical change has occurred might include:

- Change in shape ✓
- ✓ • Change in form ✓
- Change in size ✓
- Change in **phase** (This is always a physical change!) ✓
- Physical changes are usually reversible ✓



Physical change

- What could you do to these items to cause a physical change to occur?



Chemical change

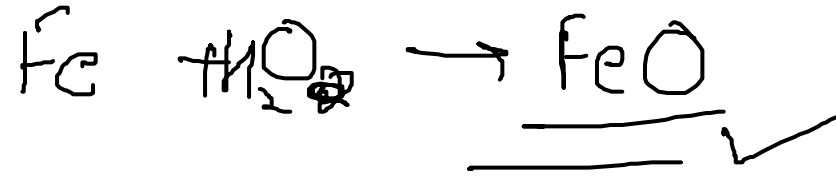
Milk \rightarrow Curd
~~get~~ \rightarrow ~~left~~

- A **chemical change** is a change in which a substance is changed into a different substance. ✓
(You've changed what it **is**.)

Substance \rightarrow change
↓
New Substance



Chemical change



- **Examples** of chemical changes include:

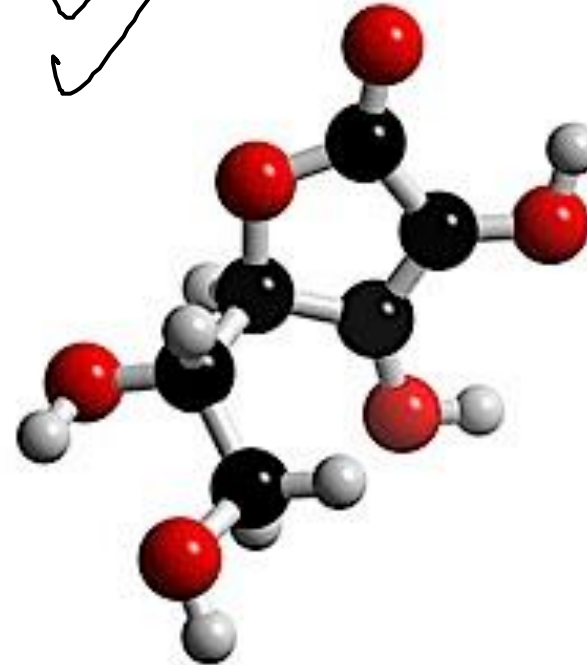
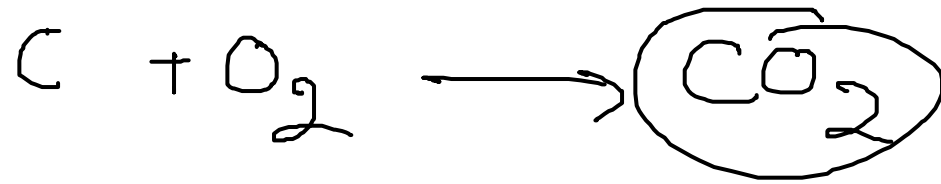
- Burning ✓
- Rusting ✓
- Tarnishing ✓
- Decomposing ✓
- Polymerization ✓



Phy Sicut melting of m Chemical change

Chemical ← Burning

- Chemical changes occur when a **chemical reaction** causes bonds between atoms to break or to form.



Chemical change – Chemical reactions

- There are **5 types of chemical reactions** that cause chemical changes to occur.

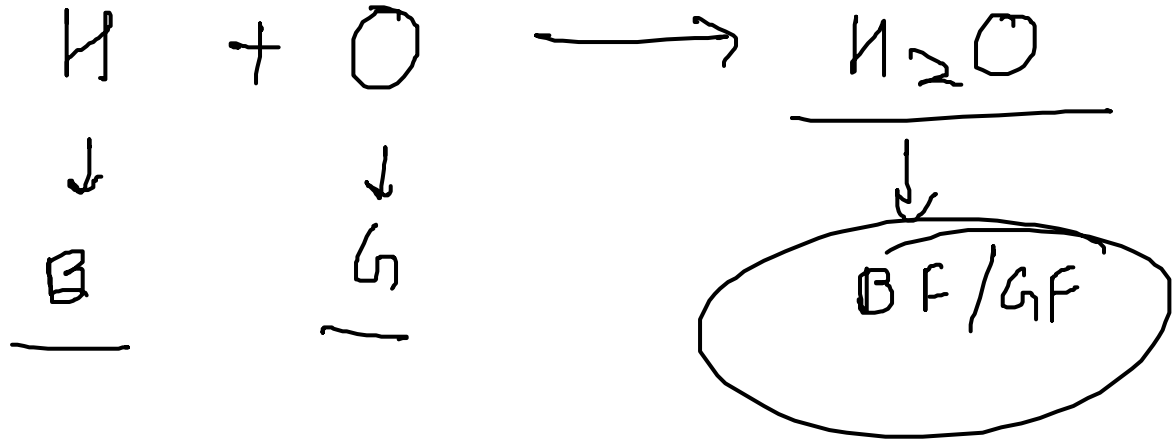
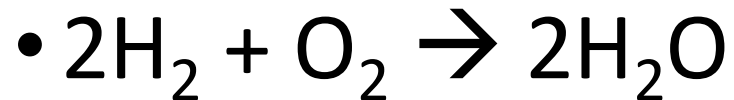
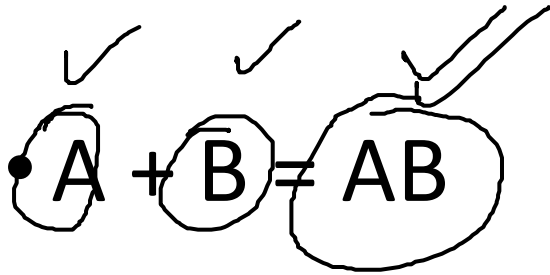


✓ 1 B & 1 G ✓

Chemical change – Chemical reactions

- 1- Composition reactions ✓✓

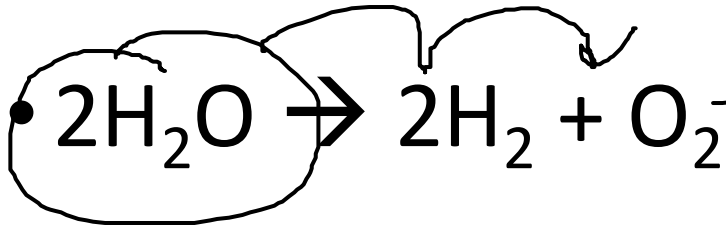
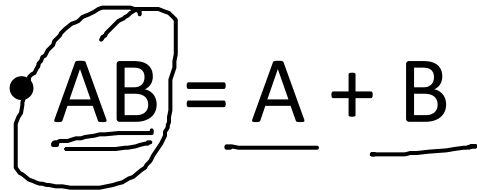
- Two things come together to form something new



Chemical change – Chemical reactions

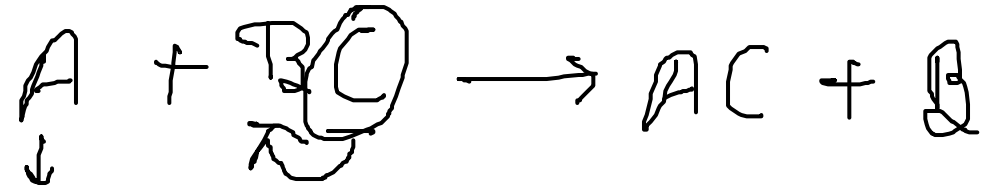
- 2- Decomposition reactions (Breakup)

- 1 thing breaks apart to form 2 or more things.



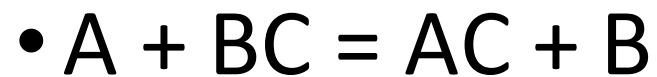
Chemical change – Chemical reactions

- 3- Single replacement reactions

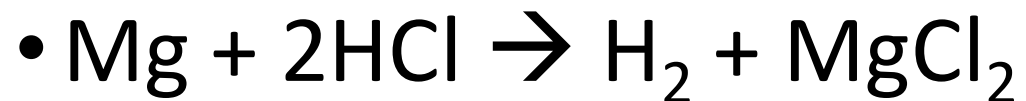
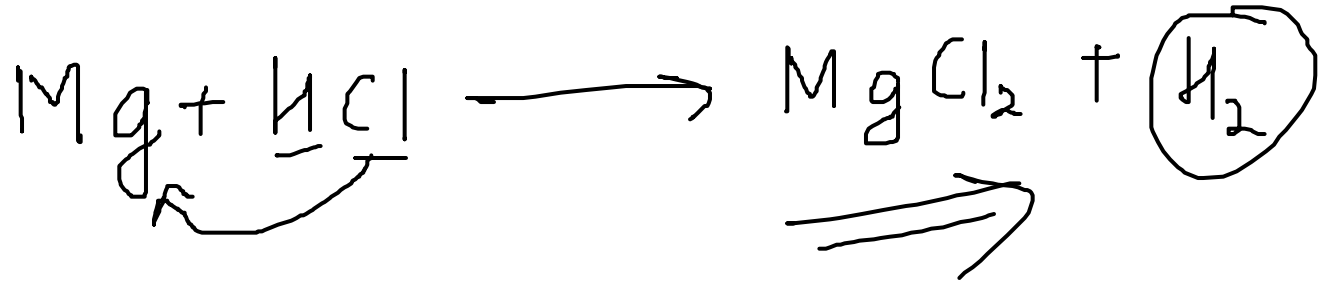
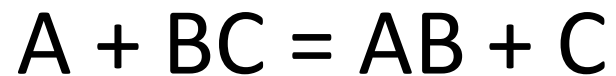


- One atom replaces another atom

Gov.
Job

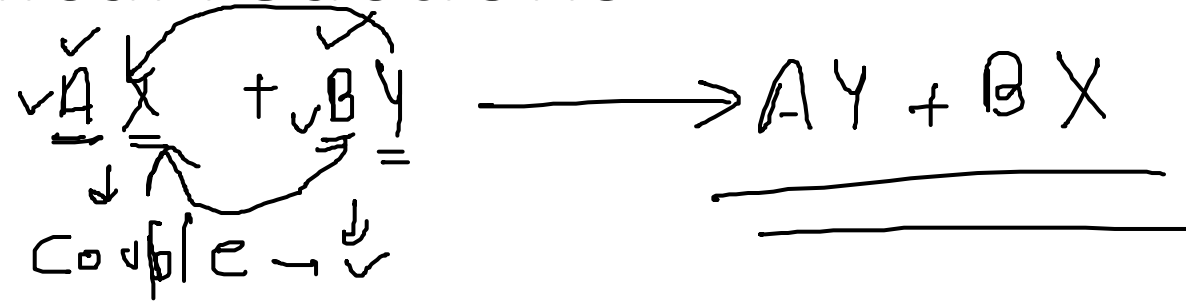


or

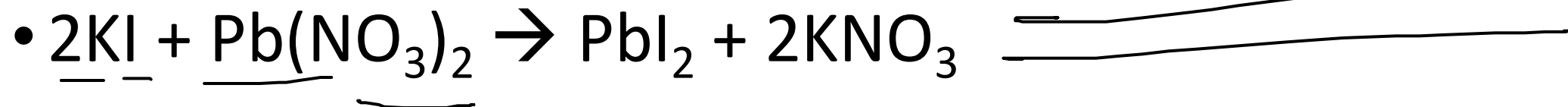
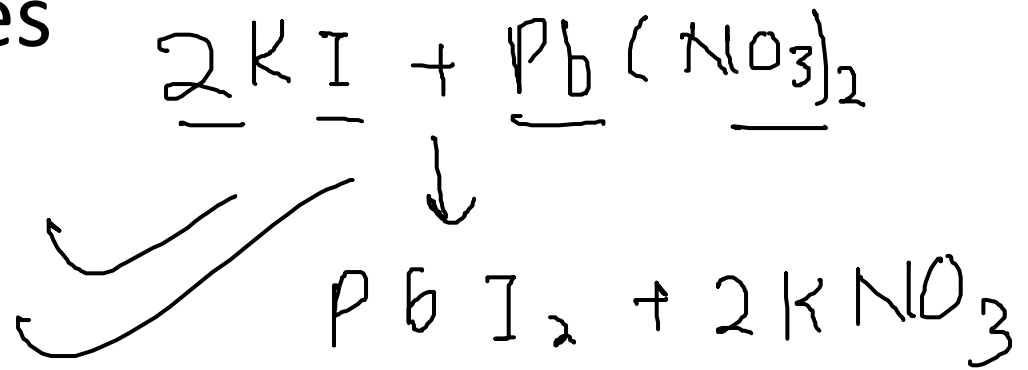
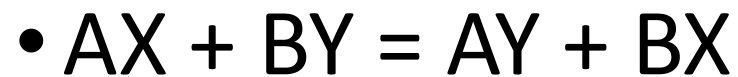


Chemical change – Chemical reactions

- Double replacement reactions



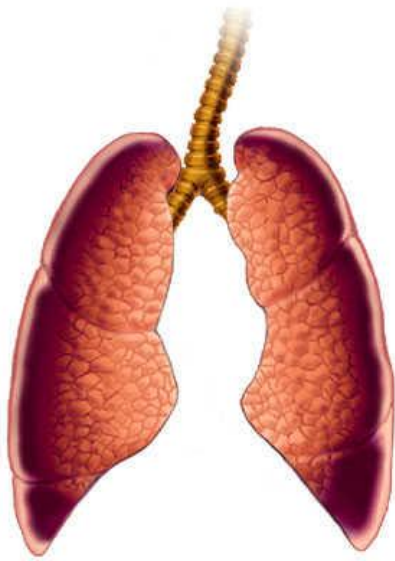
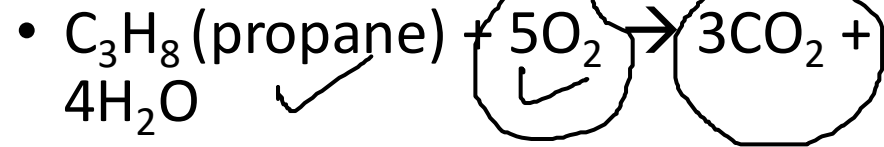
- Two chemicals switch places



Chemical change – Chemical reactions

- Combustion reaction

- A substance combines with oxygen and releases energy.



milk \longrightarrow curd

Chemical Change: Evidence

- **Evidence that a chemical change has occurred might include:**

- A color change ✓
- An odor change ✓ 31E1
- Formation of a precipitate (you mix two liquids and make a solid)
- Gas is formed (bubbles)
- Changes in physical properties.

==



Physical and Chemical change

• During a chemical change **energy can be released** in the form of:

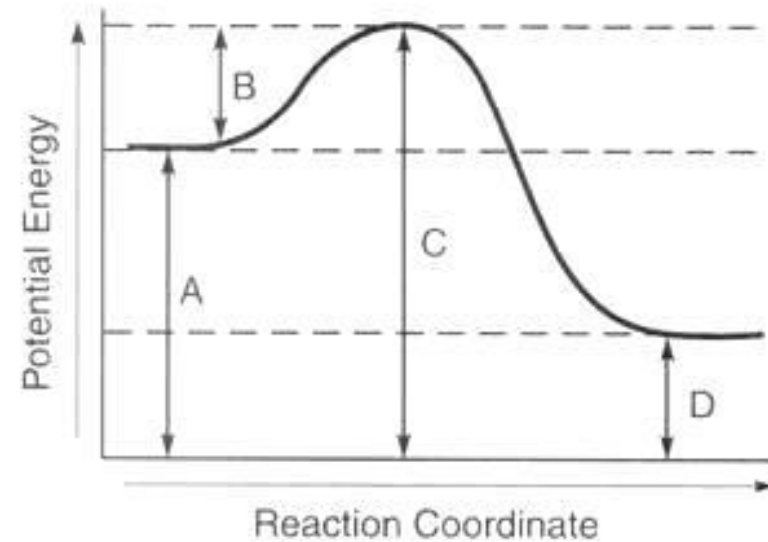
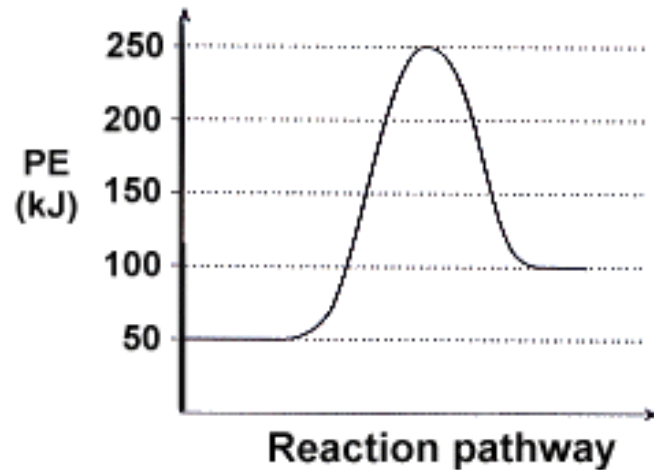
• Heat

• Light



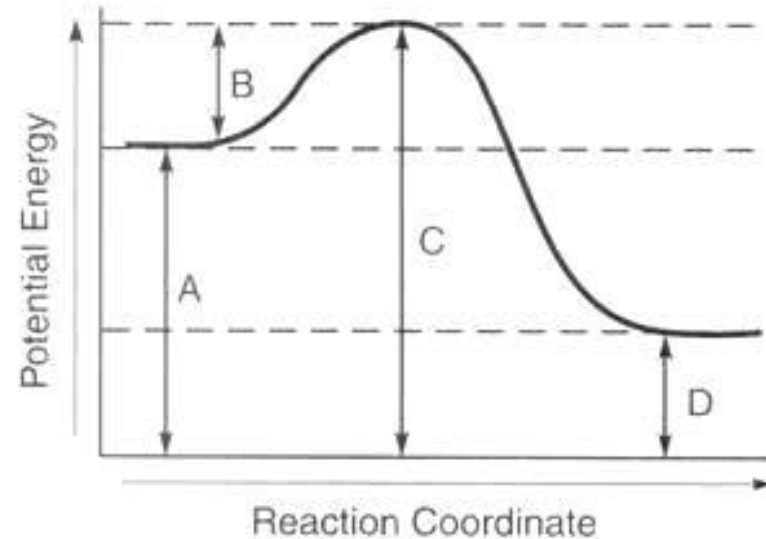
Chemical change – Chemical reactions

- When a chemical change occurs,
energy is either released or
absorbed.



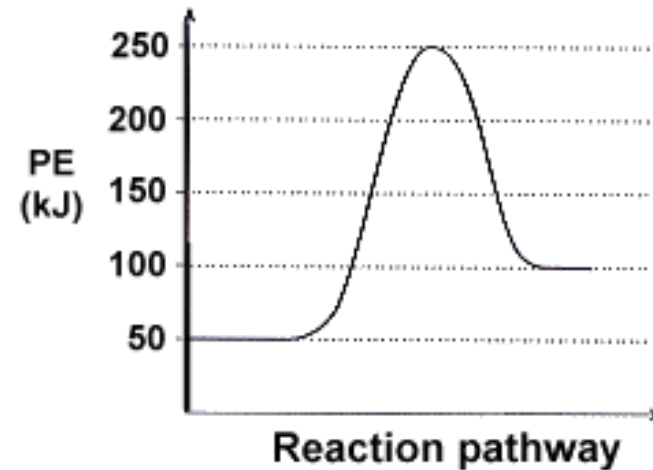
Physical and Chemical change - heat

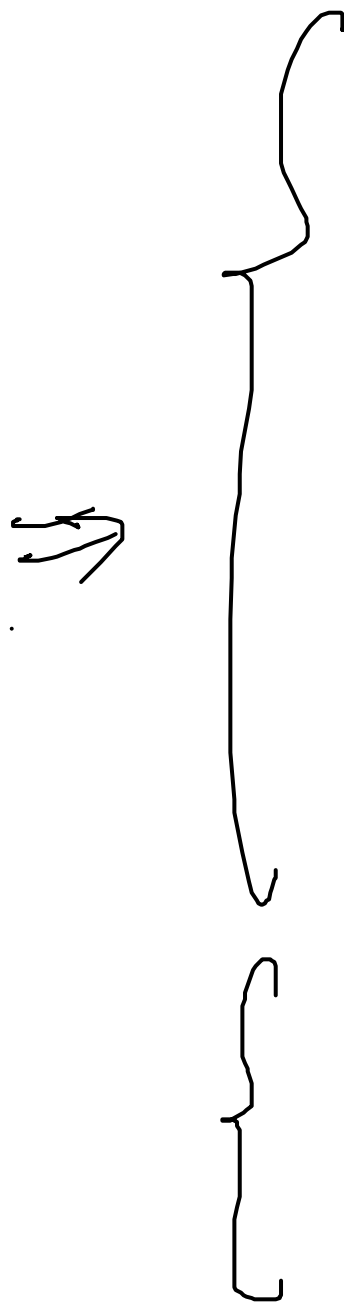
- A chemical reaction that releases energy in the form of heat is called **exothermic**.
 - Heat comes OUT
 - Exo = out
 - Thermic = heat
 - It will feel HOT.



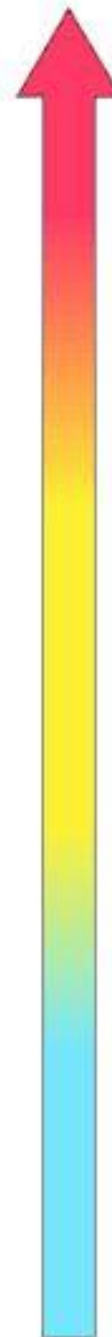
Physical and Chemical change - heat

- A chemical reaction that absorbs energy in the form of heat is called **endothermic**.
 - Heat goes IN
 - Endo = in
 - Thermic = heat
 - It will feel COLD





Metals
Potassium
Sodium
Lithium
Barium
Strontium
Calcium
Magnesium
Aluminium
Manganese
Zinc
Chromium
Iron
Cadmium
Cobalt
Nickel
Tin
Lead
Hydrogen
Antimony
Bismuth
Copper
Mercury
Silver
Gold
Platinum



Reactivity
Reacts with water
Reacts with acids
Included for comparison
Highly unreactive

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