

Inspire Science Coverage



تم تحميل هذا الملف من موقع المناهج الإماراتية

موقع المناهج ⇨ المناهج الإماراتية ⇨ الصف التاسع المتقدم ⇨ علوم ⇨ ملفات متنوعة ⇨ الملف

تاريخ إضافة الملف على موقع المناهج: 2026-06-10 16:42:45

ملفات اكتب للمعلم اكتب للطالب ا اختبارات الكترونية ا اختبارات ا حلول ا عروض بوربوينت ا أوراق عمل
منهج انجليزي ا ملخصات وتقارير ا مذكرات وبنوك ا الامتحان النهائي للمدرس

المزيد من مادة
علوم:

إعداد: Anwar Samah

التواصل الاجتماعي بحسب الصف التاسع المتقدم



صفحة المناهج
الإماراتية على
فيسبوك

الرياضيات

اللغة الانجليزية

اللغة العربية

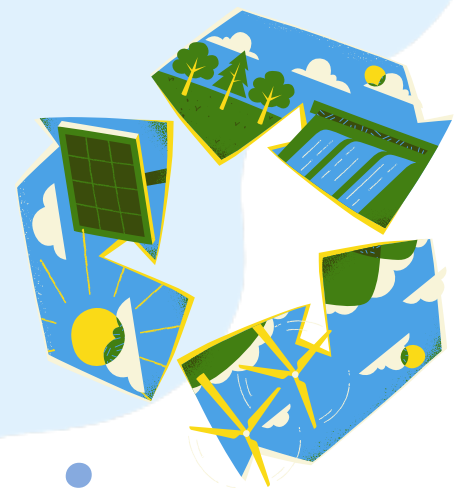
التربية الاسلامية

المواد على تلغرام

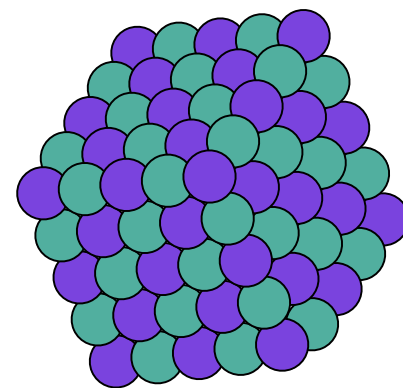
المزيد من الملفات بحسب الصف التاسع المتقدم والمادة علوم في

Inspire Science Coverage

1



Aljahil School



Principal: Ms Fatma Alnasri
V.P: Ms Asmaa Alghaithi



inspire science coverage grade

9 general term 3 2025-2026

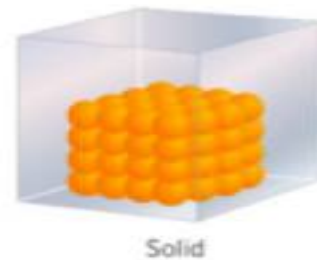
Student name: Amna Saif 9/G3

Ms. Samah Anwar



★ 1. Compare the states of matter in terms of volume, shape, intermolecular forces, and distances between particles.

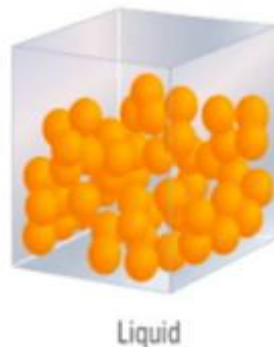
★ • **Solid**



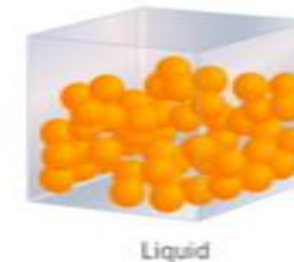
- Definite shape and volume
- Particles are **closely packed**
- Particles **vibrate in place** (do not move freely)
- Very low kinetic energy
- Strong attractions keep particles fixed
- Many solids have **crystalline structure** (Geometrically Arranged)



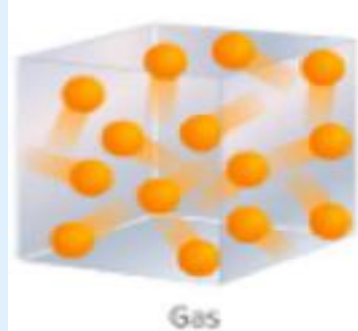
• **liquid**



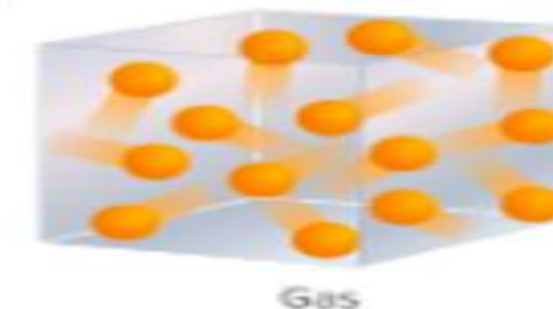
- Particles are **constantly moving** but slower than in gases
- Have **less kinetic energy** than gas particles
- Particles can **slide past each other** → liquid flows
- **No fixed shape**, takes shape of container
- **Definite volume** (particles still attracted and close)



• **gas**



- Particles are **far apart** and move **freely**.
- **High kinetic energy** (move fastest)
- No fixed shape or volume.
- Fill **any container** completely.
- Collisions cause gas to **spread out**.

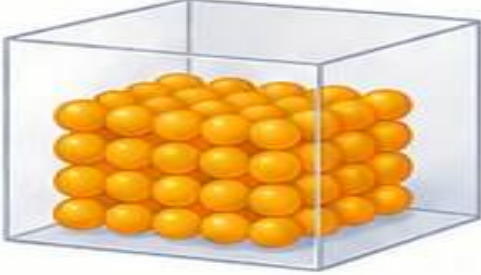
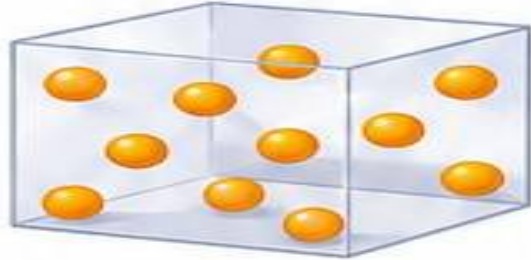
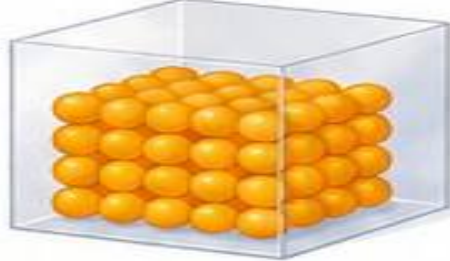
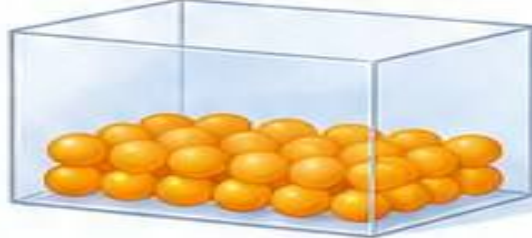
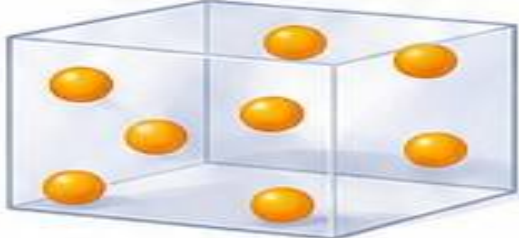
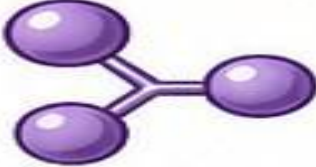
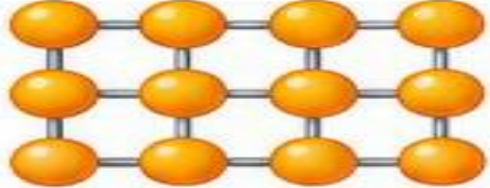
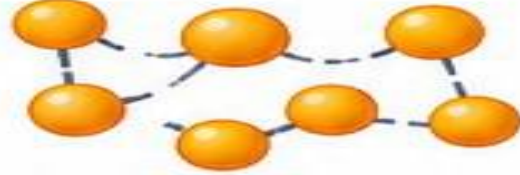
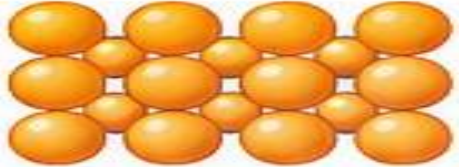
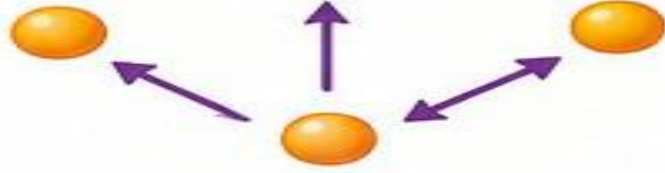


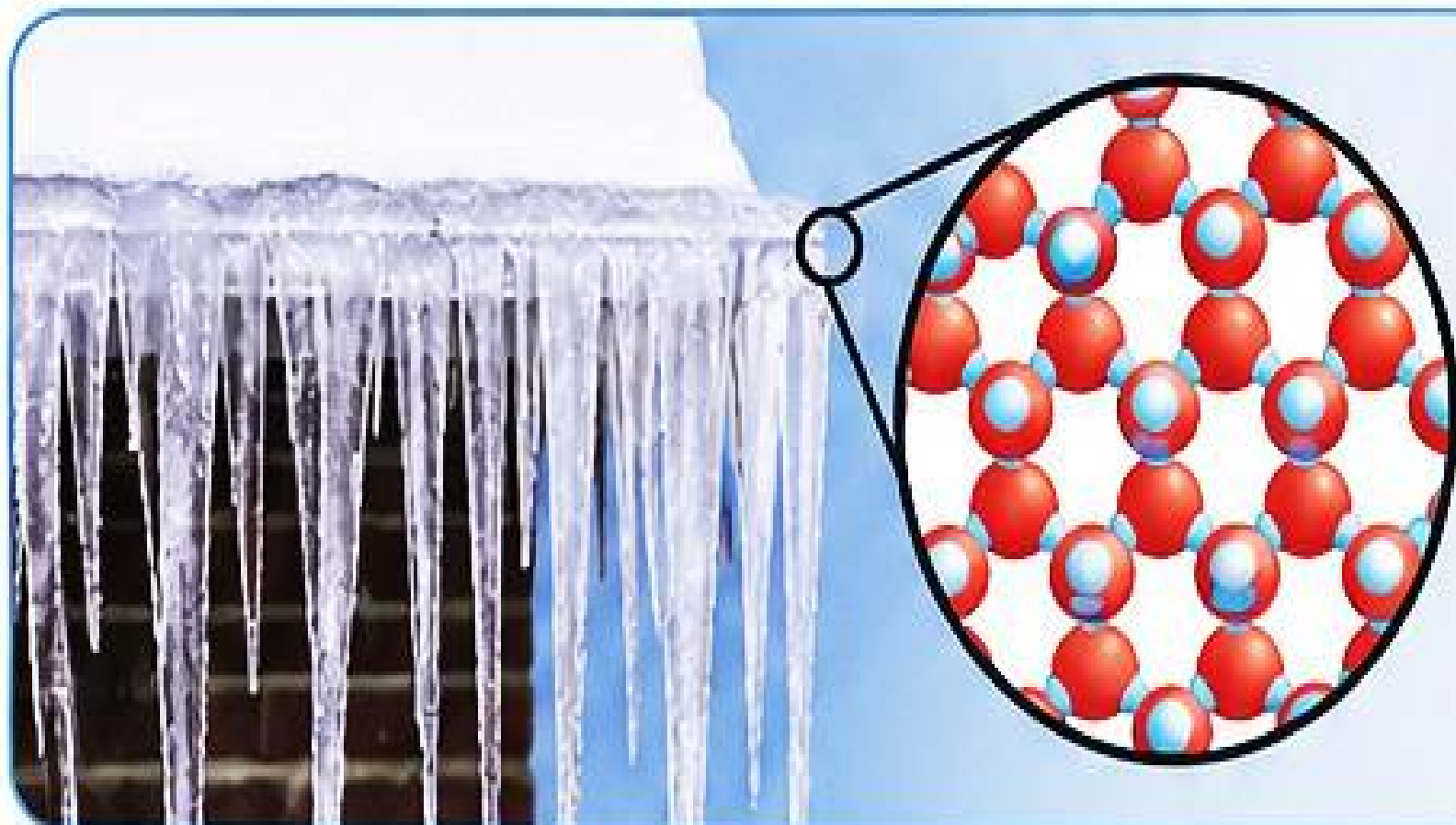


STATES OF MATTER



Compare the states of matter in terms of **volume**, **shape**, **intermolecular forces**, and **distances between particles**.

PROPERTY	SOLID	LIQUID	GAS
 VOLUME	Definite volume 	Definite volume 	No definite volume; expands to fill the container 
 SHAPE	Definite shape 	No definite shape; takes the shape of its container 	No definite shape; takes the shape of its container 
 INTERMOLECULAR FORCES	Strong (particles are strongly attracted to each other) 	Moderate (particles are attracted, but less strongly) 	Very weak (particles have very little attraction) 
 DISTANCES BETWEEN PARTICLES	Very close (particles are tightly packed) 	Close (particles are close together but can slide past each other) 	Far apart (particles are very far apart) 



THERMAL ENERGY

Even though ice is a solid with a definite shape and volume, its particles are still in constant motion. The attractions between the particles hold them in place, but their thermal energy causes them to vibrate.

Ice is a crystalline solid—its particles have a specific geometric arrangement.

2. Describe the kinetic theory of particles.

- **Kinetic theory**

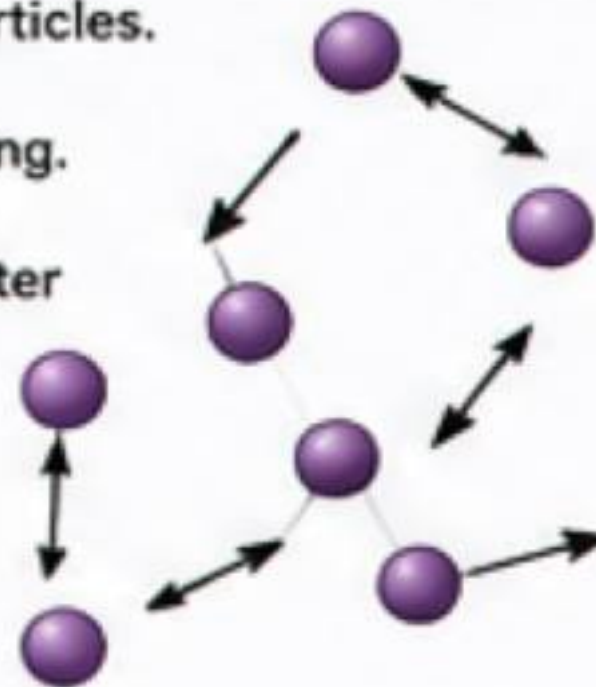
The kinetic theory explains how particles behave in matter

Main ideas of the Kinetic Theory:

2

Kinetic Theory of Particles

1. Matter is made of tiny particles.
2. Particles are always moving.
3. Higher temperature = faster movement.
4. Particles collide with each other.



Temperature measures the average kinetic energy of particles.

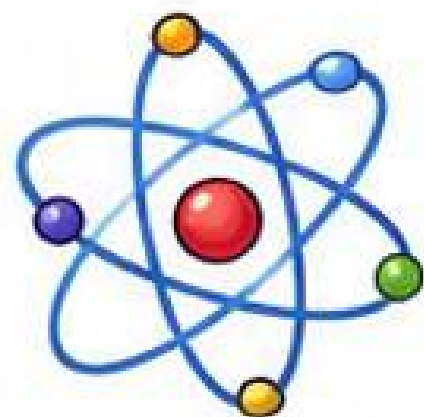
Study Notes

★ Temperature measures the average kinetic energy of particles.

- As particles gain energy, they move faster.
- As particles lose energy, they move slower.

• • Higher temperature → faster particle motion

lower temperature → slower particle motion



KINETIC THEORY

OF PARTICLES



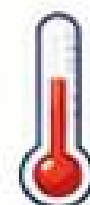
WHAT IS THE KINETIC THEORY?



The **Kinetic Molecular Theory (KMT)** explains the behavior of matter by describing how particles move.

MAIN ASSUMPTIONS OF KINETIC THEORY

- 1 All matter is made of tiny particles (atoms, molecules, or ions).
- 2 Particles are in constant random motion.
- 3 Particles collide with each other and with the walls of their container.
- 4 Collisions do not cause a significant loss of energy.
- 5 The speed of particles depends on their thermal energy.

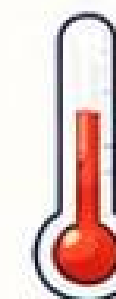


THERMAL ENERGY AND TEMPERATURE



THERMAL ENERGY

- The total energy of all particles in a substance.
- Includes both kinetic energy and potential energy.

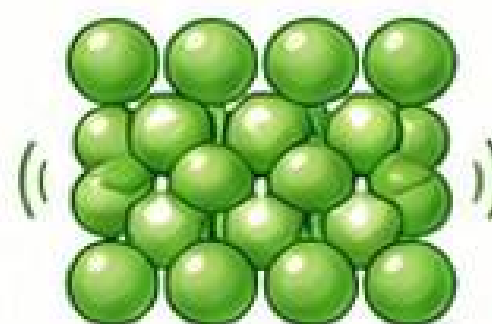


TEMPERATURE

- A measure of the average kinetic energy of particles.
- As temperature increases, particles move faster.
- As temperature decreases, particles move slower.

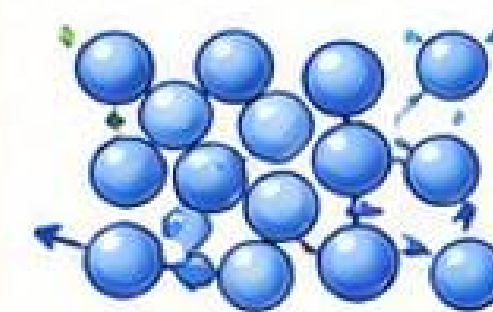
PARTICLE MOTION AT A GLANCE

SOLID



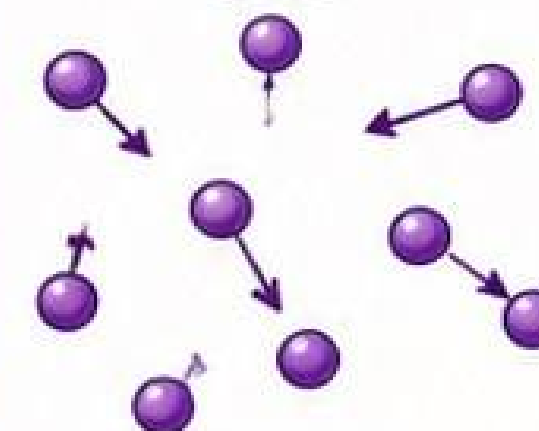
Particles vibrate in fixed positions.

LIQUID



Particles slide past each other.

GAS



Particles move freely and rapidly in all directions.



3. Use kinetic molecular theory to explain particle behavior.

- **Solid**

- Particles are tightly packed together.
- Vibrate in fixed positions.
- Have a definite shape and volume.



- **Liquid**

- Particles are close together but can move.
- Slide past one another.
- Have a definite volume but no fixed shape.

- **Gas**

- Particles are far apart.
- Move freely and rapidly in all directions.
- Have no definite shape or volume.

Study Notes

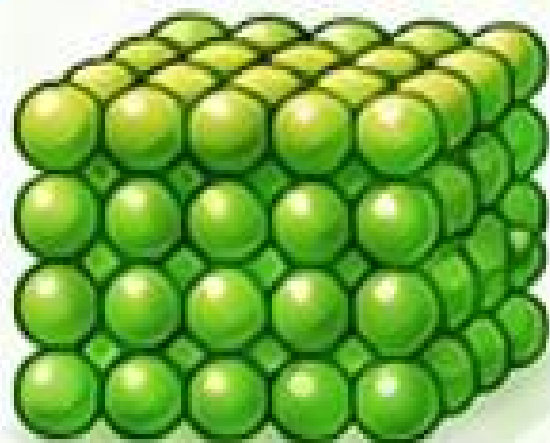
- The amount of energy determines particle movement.
 - When particles gain energy, they move faster.
 - When particles lose energy, they move slower.
- Kinetic molecular theory states that all matter is made of tiny particles that are always moving.



BEHAVIOR OF PARTICLES IN DIFFERENT STATES



SOLID

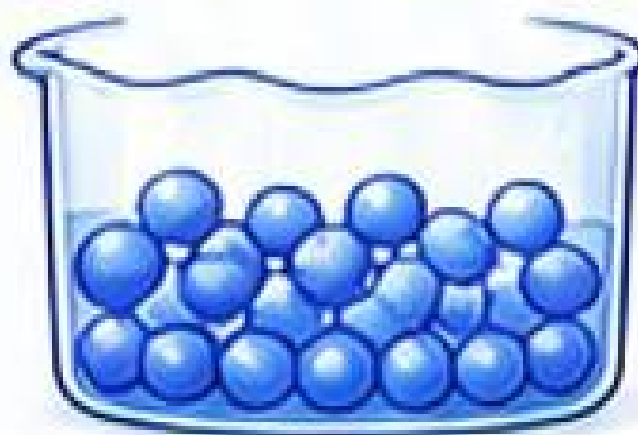


- Particles are tightly packed in fixed positions.
- Strong intermolecular forces hold particles together.
- Particles cannot move freely but vibrate in place.
- Solids have a definite shape and definite volume.

Examples:
Ice, metal, wood, rock



LIQUID

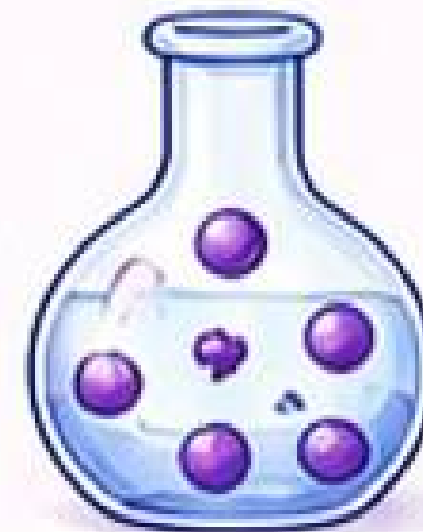


- Particles are close together but not fixed.
- Intermolecular forces are weaker than in solids.
- Particles slide past one another.
- Liquids have a definite volume but no definite shape.
- Liquids take the shape of their container.

Examples:
Water, milk, juice, oil



GAS



- Particles are far apart.
- Very weak intermolecular forces.
- Particles move rapidly in all directions.
- Gases have no definite shape and no definite volume.
- Gases expand to fill any container.

Examples:
Air, oxygen, water vapor



COMPARISON OF STATES OF MATTER

PROPERTY		SOLID	LIQUID	GAS
	Volume	Definite	Definite	No definite volume
	Shape	Definite	Takes shape of container	Fills container
	Intermolecular Forces	Strong	Moderate	Very weak
	Distance Between Particles	Very close		
	Particle Motion	Vibrate in place	Slide past each other	Move freely and rapidly
	Kinetic Energy	Lowest	Moderate	Highest

CHANGES OF STATE



MELTING Solid → Liquid

Particles gain thermal energy, vibrate faster and begin to slide.



FREEZING Liquid → Solid

Particles lose thermal energy, move more slowly and become fixed in position.



VAPORIZATION Liquid → Gas

Particles gain enough kinetic energy to escape attractive forces.
Occurs by evaporation or boiling.



CONDENSATION Gas → Liquid

Particles lose kinetic energy, move closer together and form a liquid.

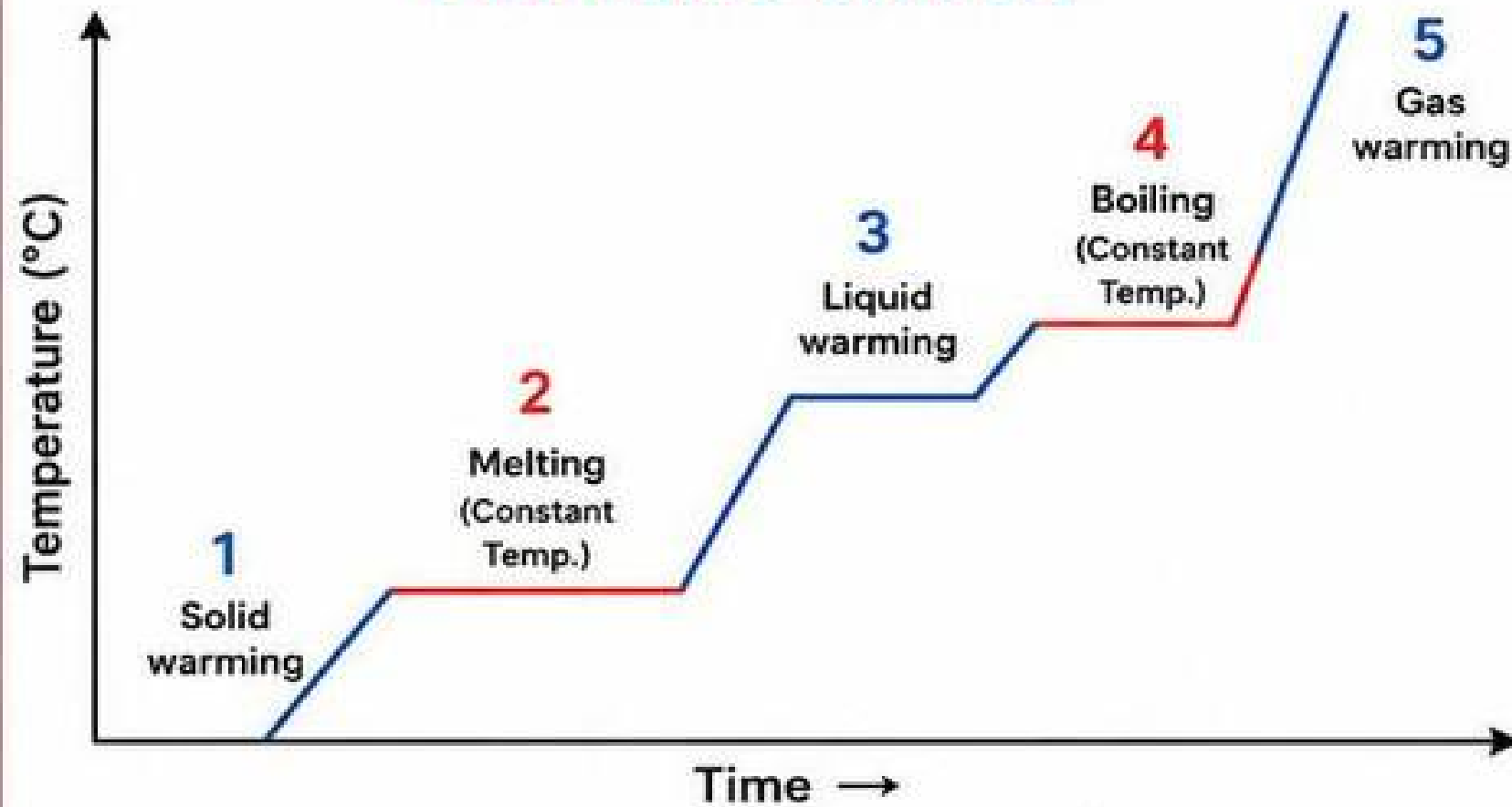


SUBLIMATION Solid → Gas

Particles gain enough energy to change directly into a gas without becoming a liquid.
Example: Dry ice (solid CO_2)

Heating and Cooling Curves

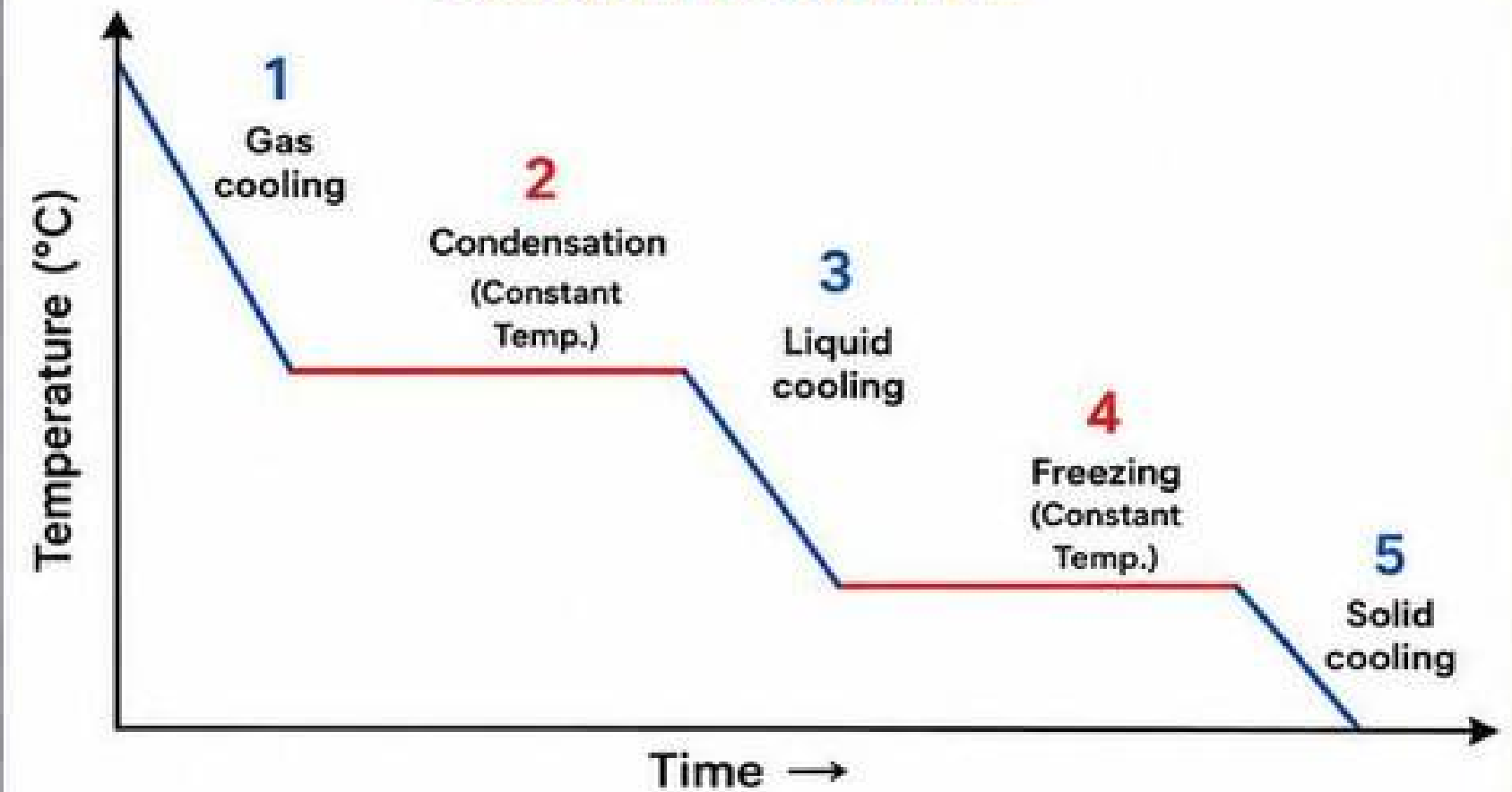
HEATING CURVE



HEATING CURVE – KEY POINTS

- ★ Temperature remains **constant** during phase changes (melting and boiling).
- ★ During phase changes, Potential Energy (PE) **increases** while Kinetic Energy (KE) stays constant.
- ★ During warming stages, Kinetic Energy (KE) increases and Potential Energy (PE) remains constant.

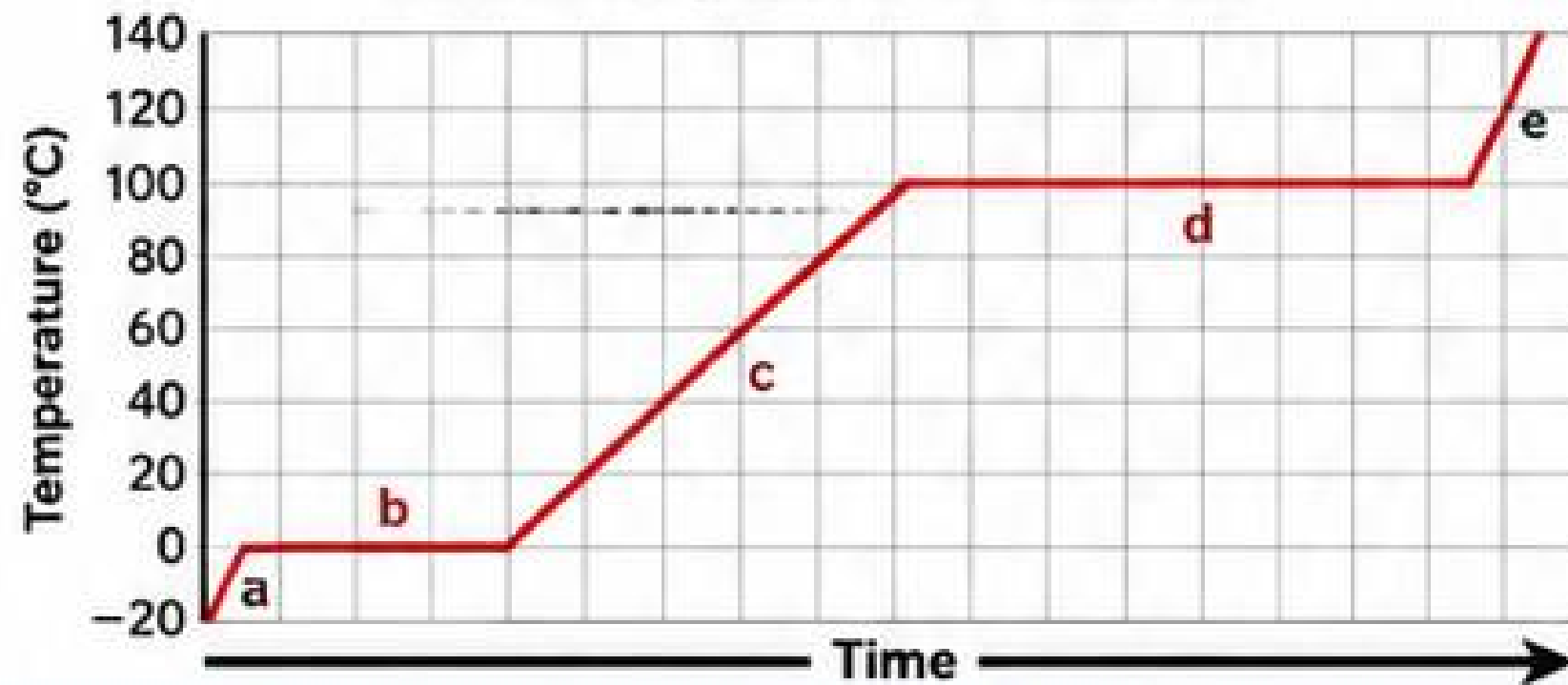
COOLING CURVE



COOLING CURVE – KEY POINTS

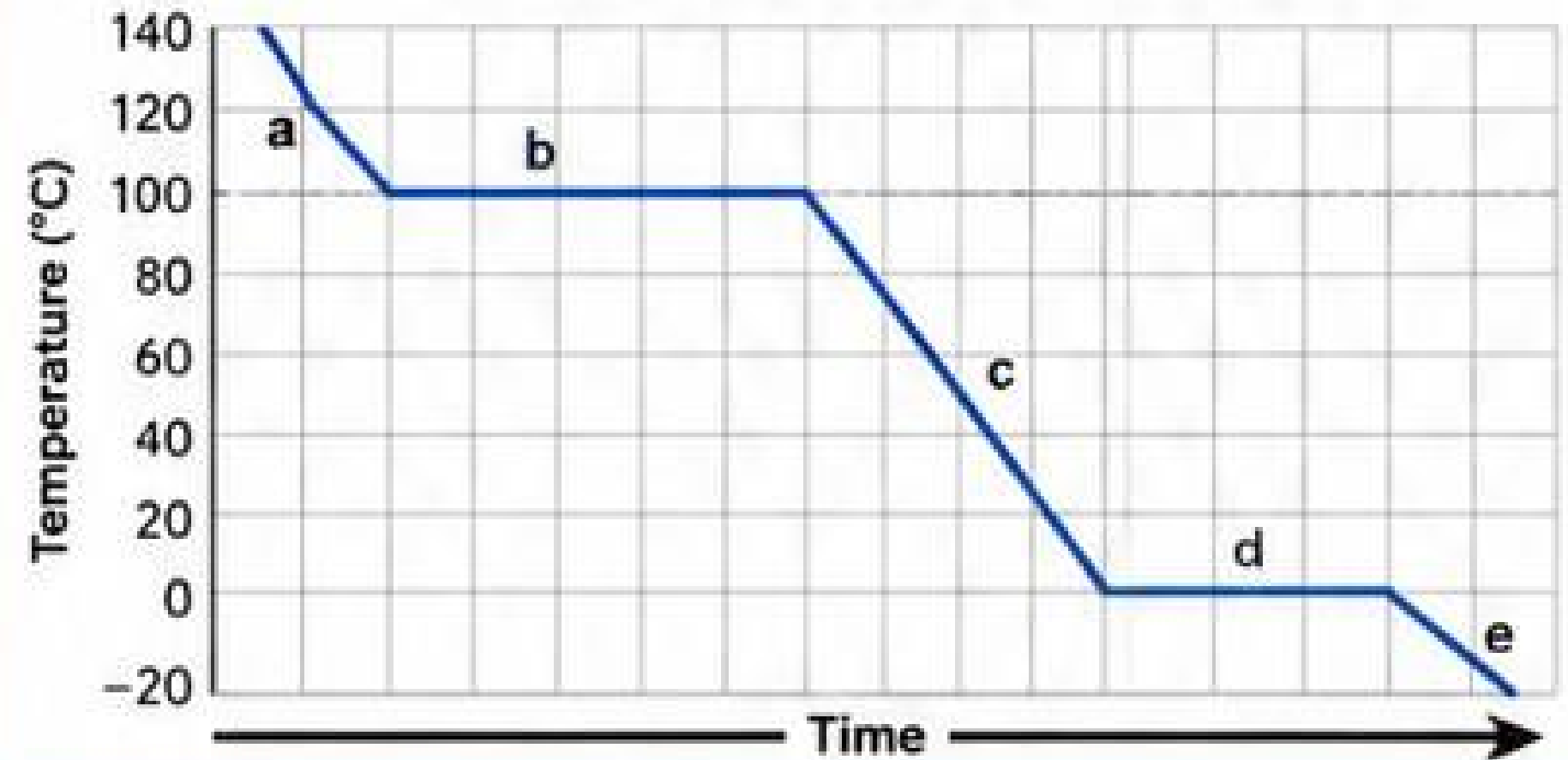
- ★ Temperature remains **constant** during phase changes (condensation and freezing).
- ★ During phase changes, Potential Energy (PE) **decreases** while Kinetic Energy (KE) stays constant.
- ★ During cooling stages, Kinetic Energy (KE) decreases and Potential Energy (PE) remains constant.

HEATING CURVE OF WATER



SEGMENT	TEMPERATURE	PHASE	WHAT IS HAPPENING?
a	-20°C to 0°C	Solid (Ice)	Ice warms up. Temperature increases.
b	0°C (constant)	Solid + Liquid	Melting occurs. Energy is used to overcome attractive forces. Temperature stays the same.
c	0°C to 100°C	Liquid (Water)	Liquid water warms up. Temperature increases.
d	100°C (constant)	Liquid + Gas	Boiling occurs. Energy is used to overcome attractive forces. Temperature stays the same.
e	Above 100°C	Gas (Water Vapor)	Steam warms up. Temperature increases.

COOLING CURVE OF WATER



SEGMENT	TEMPERATURE	PHASE	WHAT IS HAPPENING?
a	Above 100°C	Gas (Water Vapor)	Steam cools down. Temperature decreases.
b	100°C (constant)	Gas + Liquid	Condensation occurs. Steam turns to liquid. Temperature stays at 100°C.
c	100°C to 0°C	Liquid (Water)	Liquid water cools down. Temperature decreases.
d	0°C (constant)	Liquid + Solid	Freezing occurs. Water turns to ice. Temperature stays at 0°C.
e	Below 0°C	Solid (Ice)	Ice cools down. Temperature decreases.



5. Interpret heating and cooling curves and their phases.

• Cooling Curve

Gas Cooling → Temperature **decreases**.

Condensation → Gas changes to liquid, temperature stays **constant**.

Liquid Cooling → Temperature **decreases**.

Freezing → Liquid changes to solid, temperature stays **constant**.

Solid Cooling → Temperature **decreases**.

• Heating Curve

Solid Warming → Temperature **increases**.

Melting → Solid changes to liquid, temperature stays **constant**.

Liquid Warming → Temperature **increases**.

Boiling → Liquid changes to gas, temperature stays **constant**.

Gas Warming → Temperature **increases**.

(Heating Curve)

- Temperature stays **constant** during melting and boiling. **PE increases**, KE stays constant during phase changes.
- During **heating**, **KE increases**.

(Cooling Curve)

- Temperature stays **constant** during condensation and freezing. **PE decreases**, KE stays constant during phase changes.
- During **cooling**, **KE decreases**.

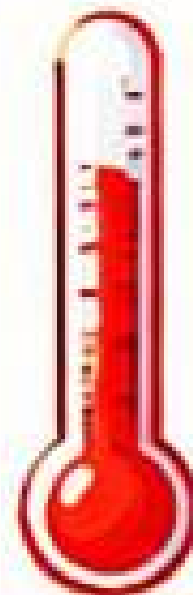
COMPARISON: EVAPORATION vs BOILING

Property	Evaporation	Boiling
 Where it occurs	At the surface of the liquid.	Throughout the liquid.
 Temperature	Can occur at nearly any temperature.	Occurs at a specific temperature (boiling point).
 Particles	Only surface particles escape.	Bubbles of gas form inside the liquid.
 Energy needed	Lower energy (no boiling point needed).	Higher energy (heat of vaporisation).
 Speed	Slower process.	Faster process.
 Example	Clothes drying, puddles disappearing.	Water boiling in a kettle.



BOILING POINT

The temperature at which the pressure of the vapor in the liquid is equal to the external pressure acting on the liquid.



HEAT OF VAPORISATION

The amount of energy required for a liquid at its boiling point to change completely into a gas **without any change in temperature.**

6. Predict whether an object will float or sink.

• **Density** Mass per unit volume.

• **Buoyant Force**

The upward force exerted by a fluid on an object.

- If Density of Object $<$ Density of Fluid $\rightarrow$ Float
- If Density of Object $>$ Density of Fluid $\rightarrow$ Sink
- If densities are equal $\rightarrow$ Object may stay suspended in the fluid.

Less dense than fluid $\rightarrow$ Float
More dense than fluid $\rightarrow$ Sink
Buoyant force pushes upward against gravity.

6
Floating and Sinking

Float

Density of object
 $<$ Density of fluid

Sink

Density of object
 $>$ Density of fluid

Objects float when buoyant force equals or exceeds weight.

Ships **float** because they are **less** dense than water.
Ships have **air** spaces inside them.

ARCHIMEDES' PRINCIPLE

The buoyant force on an object is equal to the **weight of the fluid displaced** by the object.

DENSITY AND BUOYANCY

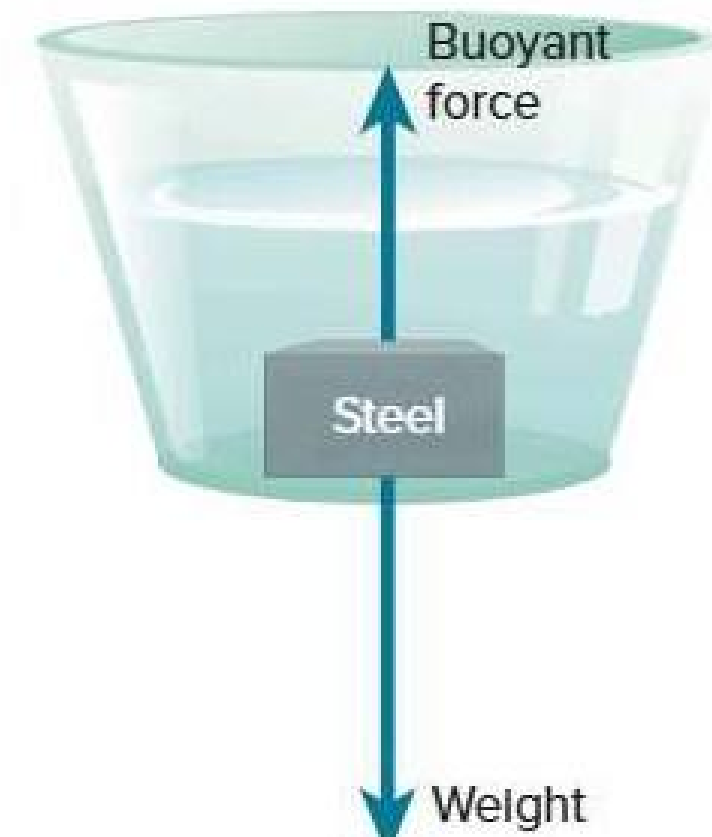
Density = mass per unit volume

Compare the density of the object with the density of the fluid.

Condition	Prediction
Density of object < density of fluid	The object will FLOAT .
Density of object > density of fluid	The object will SINK .

An object will:

- **FLOAT** if buoyant force is equal to or greater than its weight.
- **SINK** if buoyant force is less than its weight.



LESSON 2 · PROPERTIES OF FLUIDS

Will It Float or Sink?



Floats

- Object density is less than fluid density
- Buoyant force is equal to or greater than object's weight
- Displaces fluid equal to its own weight
- Example: wood block, steel ship hull filled with air



Sinks

- Object density is greater than fluid density
- Buoyant force is less than object's weight
- Gravitational force pulls it down
- Example: steel block, rocks, dense metals

WHY DOES A STEEL SHIP FLOAT?

Steel ship hull
with air inside

The hull is mostly
air, which has
very low density.

Buoyant
force

Weight



Archimedes' Principle

The buoyant force on an object equals the weight of the fluid it displaces. Floating stops when displaced fluid weight is equal to object's weight.

Pascal's Principle

Pressure applied to a fluid is transmitted equally throughout the fluid in all directions — the basis for hydraulic systems.

7. Calculate pressure in pascals (Pa).

$$P = \frac{F}{A}$$

Where:

- **P = Pressure (Pa)**
- **F = Force (N)**
- **A = Area (m²)**

EXAMPLE Problem 1

CALCULATE FORCE Atmospheric pressure at sea level is about 101 kPa. With how much total force does Earth's atmosphere push on an average human being at sea level? Assume that the surface area of an average human is 1.80 m².

List the Unknown: force: F

List the Knowns: pressure: $P = 101 \text{ kPa} = 101,000 \text{ Pa}$

area: $A = 1.80 \text{ m}^2$

Set Up the Problem: $P = \frac{F}{A}$

Solve the Problem: $101,000 \text{ Pa} = \frac{F}{1.80 \text{ m}^2}$

$$F = 101,000 \text{ Pa} \times 1.80 \text{ m}^2$$

$$= 182,000 \text{ Pa} \cdot \text{m}^2 = 182,000 \frac{\text{N}}{\text{m}^2} \cdot \cancel{\text{m}^2} = 182,000 \text{ N}$$

EXAMPLE Problem 2

CALCULATE FORCES A hydraulic lift is used to lift a heavy machine that is pushing down on a 2.8-m^2 platform with a force of 3700 N . What force must be exerted on a 0.072-m^2 piston to lift the heavy machine?

List the Unknowns: force on piston: F_{in}

List the Knowns: force on platform: $F_{\text{out}} = 3700\text{ N}$

area of platform: $A_{\text{out}} = 2.8\text{ m}^2$

area of piston: $A_{\text{in}} = 0.072\text{ m}^2$

Set Up the Problem: $\frac{F_{\text{in}}}{A_{\text{in}}} = \frac{F_{\text{out}}}{A_{\text{out}}}$

Solve the Problem: $F_{\text{in}} = \left(\frac{F_{\text{out}}}{A_{\text{out}}} \right) A_{\text{in}} = \left(\frac{3700\text{ N}}{2.8\text{ m}^2} \right) 0.072\text{ m}^2 = 95\text{ N}$

8. Identify applications of Archimedes', Pascal's, and Bernoulli's principles.

8

Archimedes', Pascal's and Bernoulli's Principles

Archimedes'

Buoyant force on objects in fluids.



Pascal's

Pressure applied to a fluid is transmitted equally.



Bernoulli's

Fast-moving fluids have lower pressure.



Applications: Ships • Hydraulic lifts • Airplanes • Submarines



8. Identify applications of Archimedes', Pascal's, and Bernoulli's principles.

- **Archimedes' Principle**

Objects in water experience an upward force called buoyancy.
Helps explain floating and sinking.

Applications: Ships, boats, submarines, life jackets.

- **Pascal's Principle**

Pressure applied to a fluid is transmitted equally in all directions.

Applications: Hydraulic lifts, car brakes, hydraulic jacks.

- **Bernoulli's Principle**

Fast-moving fluids have lower pressure.

Applications: Airplanes, helicopters, spray bottles.



9. Describe Bernoulli's principle.

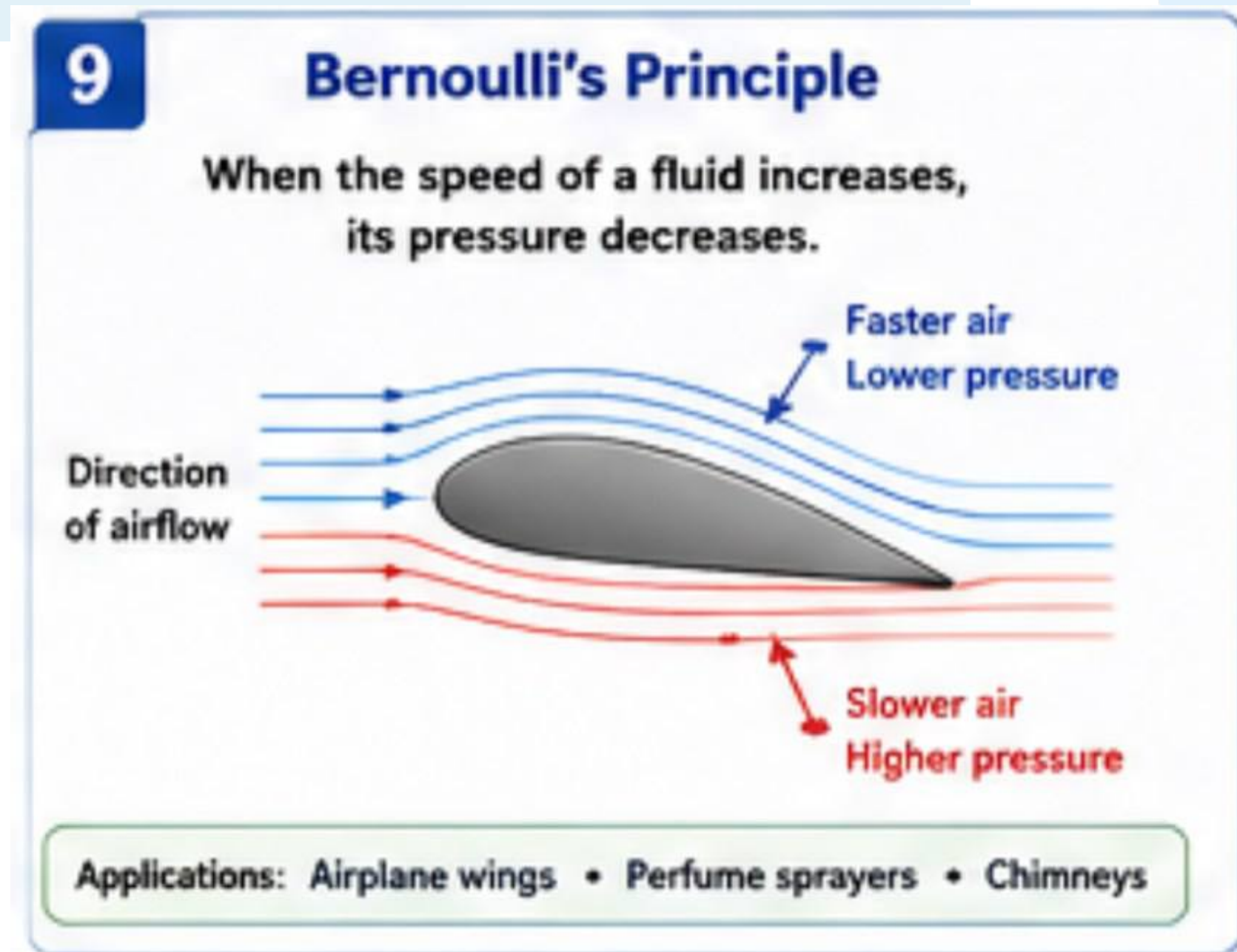
- **Bernoulli's Principle**

Fast-moving fluids have lower pressure than slow-moving fluids.

Airplanes fly because air moves faster over the wings.

Spray bottles work because moving air creates lower pressure.

Strong wind can lift lightweight objects.



Faster fluid → Lower pressure.

Slower fluid → Higher pressure.

Bernoulli's principle helps explain how airplanes fly.



10. Differentiate, using examples, between extensive and intensive properties

- **Extensive Properties**

- Depend on the amount of matter
- Change when the amount changes



- **Intensive Properties**

- Independent on the amount of matter
- Stay the same even if the amount changes

- **Examples of extensive:**

- Mass
- Volume
- Length
- Weight

- **Examples of intensive:**

- Density
- Temperature
- Color
- Pressure

10 **Extensive vs. Intensive Properties**

Extensive (Depends on amount)	Intensive (Independent of amount)
• Mass • Volume • Length • Total Energy  More matter More mass	• Density • Boiling Point • Melting Point • Color  Same density

Intensive properties help identify substances.



11. Define a chemical property of matter while listing some examples

- **chemical property**
- A chemical property describes how a substance **changes** into a **new** substance.

• Examples

- Flammability (burning) :
- Rusting (iron reacts with air and water)
- Reactivity with acids
- Tarnishing (silver changing color)
- Ability to decompose

• Remember:

- **Chemical property = ability to change into a new substance**

11 Chemical Properties of Matter

Chemical properties describe a substance's ability to form new substances.

Examples:

- Flammability
- Reactivity
- Rusting
- Corrosiveness



Observed only during a chemical change.

Chemical properties are seen when a chemical reaction happens.

The original substance changes into something new.
These changes are often hard to reverse..

Table 2 Properties of Copper

Physical Properties	Chemical Properties
• reddish brown, shiny • easily shaped into sheets (malleable) and drawn into wires (ductile) • a good conductor of heat and electricity • density = 8.96 g/cm^3 • melting point = 1085°C • boiling point = 2562°C	• forms green copper carbonate compound when in contact with moist air • reacts with nitric acid and sulfuric acid, forming new substances • one type of compound forms a deep-blue solution when in contact with ammonia



Condensation



Solidification

Figure 9 Condensation can occur when a gas is in contact with a cool surface, causing droplets to form. Solidification occurs when a liquid cools. Water dripping from the roof forms icicles as it cools.

13. Define a chemical change while listing some examples

- **Chemical Changes**

- A chemical change is a change where a new substance is formed.

- **Examples:**

- Burning wood
- Rusting iron
- Cooking an egg
- Baking a cake
- Milk going sour

12

Chemical Changes

A chemical change results in the formation of a new substance.

Examples:



Burning wood



Rusting iron



Cooking an egg

Usually difficult to reverse.

Chemical changes cannot be easily reversed.

The substance changes its properties and becomes something new.



14. List evidences (indicators) of a chemical change

13

Indicators (Evidences) of Chemical Change

Color Change



Gas Produced



Temperature Change



Light Produced



Precipitate Formation



Formation of a new substance indicates a chemical change.



EVIDENCE OF A CHEMICAL REACTION

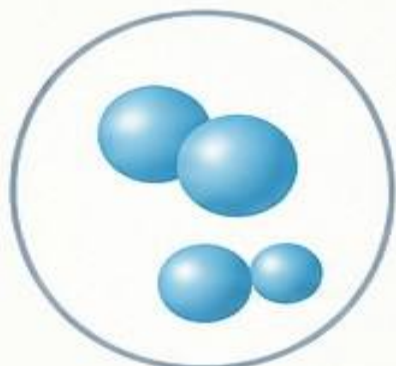


1. RUST FORMATION



IRON

+



OXYGEN

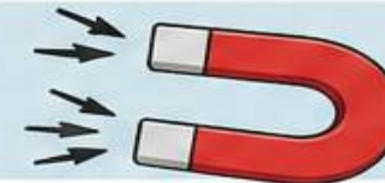


RUST

Take another look at **Figure 10**. As shown, rust is a brownish-orange powdery substance. It looks very different from the elements iron and oxygen that compose it. Rust is not attracted to a magnet, whereas iron is. The observation that the product (rust) has different properties than the reactants (iron and oxygen) is evidence that a chemical reaction has taken place. A chemical reaction always produces a change in properties.



Rust is not attracted to a magnet, whereas iron is.



2. SPOILED FOOD



FRESH FOOD



ROTTING FOOD



MOLDY BREAD

Spoiled food, such as rotten fruit and bread, is another example of chemical reactions. The properties of spoiled food differ from the properties of fresh food. How the food tastes, how it smells, and its digestibility might all change as food rots. Examples of food that have undergone chemical reactions are shown in **Figure 11**.



Smell
changes



Taste
changes



Digestibility
changes



When a chemical reaction occurs, new substances are formed with different properties from the original substances. This change in properties is the key evidence that a chemical reaction has taken place.



15.State Law of conservation of mass

- **Law of Conservation of Mass**

- Mass **cannot** be **created** or **destroyed** in a chemical reaction; it only **changes** form.

- The total mass of **reactants** = total mass of **products**.

- **A closed system** is **needed** to observe it properly.

- **Remember:**

- **Total mass before reaction = Total mass after reaction**

14

Law of Conservation of Mass

Mass is neither created nor destroyed in a chemical reaction.



Total Mass
Before Reaction

=

Total Mass
After Reaction

(In a closed system)

- **Example**

- If 10 g of reactants react, the products will also have a total mass of 10 g.

EXAMPLE Problem 1

CONSERVATION OF MASS In an experiment, 10.00 g of red mercury(II) oxide powder is placed in an open flask and heated until it is converted to liquid mercury and oxygen gas. The liquid mercury has a mass of 9.26 g. What is the mass of oxygen formed in the reaction?

1 ANALYZE THE PROBLEM

You are given the mass of a reactant and the mass of one of the products in a chemical reaction. According to the law of conservation of mass, the total mass of the products must equal the total mass of the reactants.

Known

$$m_{\text{mercury(II) oxide}} = 10.00 \text{ g}$$

$$m_{\text{mercury}} = 9.26 \text{ g}$$

Unknown

$$m_{\text{oxygen}} = ? \text{ g}$$

2 SOLVE FOR THE UNKNOWN

$$\text{Mass}_{\text{reactants}} = \text{Mass}_{\text{products}}$$

$$m_{\text{mercury(II) oxide}} = m_{\text{mercury}} + m_{\text{oxygen}}$$

$$m_{\text{oxygen}} = m_{\text{mercury(II) oxide}} - m_{\text{mercury}}$$

$$m_{\text{oxygen}} = 10.00 \text{ g} - 9.26 \text{ g}$$

$$m_{\text{oxygen}} = 0.74 \text{ g}$$

State the law of conservation of mass.

Solve for m_{oxygen}

Substitute $m_{\text{mercury(II) oxide}} = 10.00 \text{ g}$ and $m_{\text{mercury}} = 9.26 \text{ g}$.

Mixtures

Homogeneous Mixture
(Uniform composition)



Example: Salt water

Heterogeneous Mixture
(Non-uniform composition)



Example: Salad

Homogeneous mixtures look the same throughout.

16. Classify, using a particulate diagram and examples, a mixture into homogenous and heterogeneous

- **Mixtures: Homogeneous vs Heterogeneous**

- **Homogeneous Mixture**

- **Same** throughout
- **One** visible phase
- Particles are **evenly** mixed

- **Heterogeneous Mixture**

- **Not** the **same** throughout
- **More** than **one** visible part
- **Uneven** distribution of particles

- **Examples:
Homogeneous**

- Salt + water
- Sugar + water
 - Air
- Vinegar

- **Examples:
Heterogeneous**

- Oil + water
- Sand + water
 - Salad
- Rocks in soil

- **Homogeneous mixtures** are also called **solutions**
- **Heterogeneous** mixtures can often be **separated** by filtering or settling
- Both mixtures do **NOT** form **new** substances

★ 17. Classify, using a particulate diagram and examples, a pure substance into element and compound

• Pure Substances: in Elements and Compounds

★ • **Element**

- A pure substance made of only **one type** of atom
- **Cannot be broken** down into simpler substances

• **Compound**

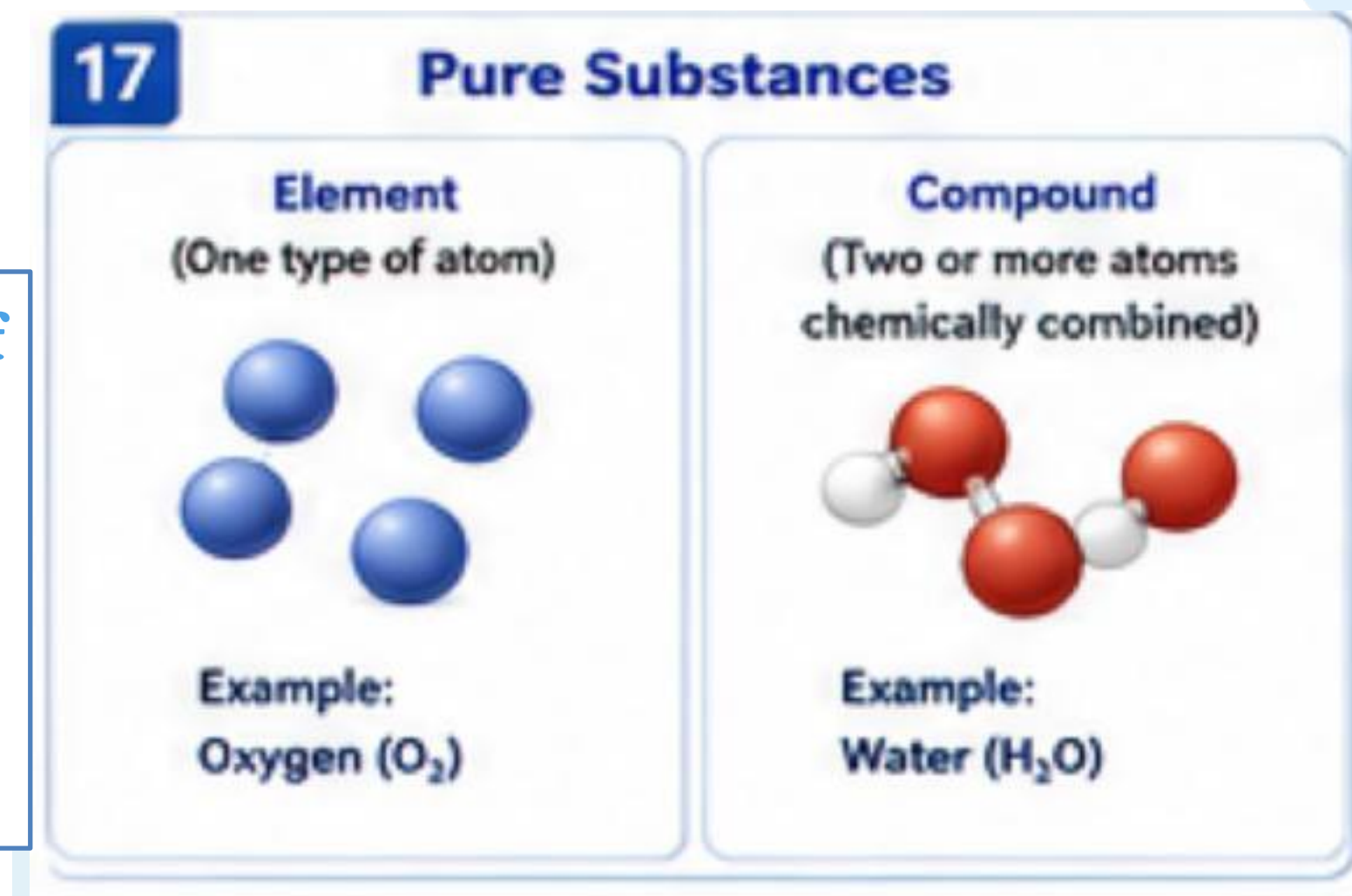
- A pure substance made of **two or more** different atoms chemically bonded
- **Can be broken** down by chemical reactions

★ • **Examples: element**

- **Oxygen (O_2)**
 - Iron (Fe)
 - Gold (Au)

• **Examples: compound**

- **Water (H_2O)**
- **Carbon dioxide (CO_2)**
- **Salt (NaCl)**



- Both are **pure substances**
- **Elements** are the **simplest** form of matter
- **Compounds** always have a **fixed** ratio of atoms

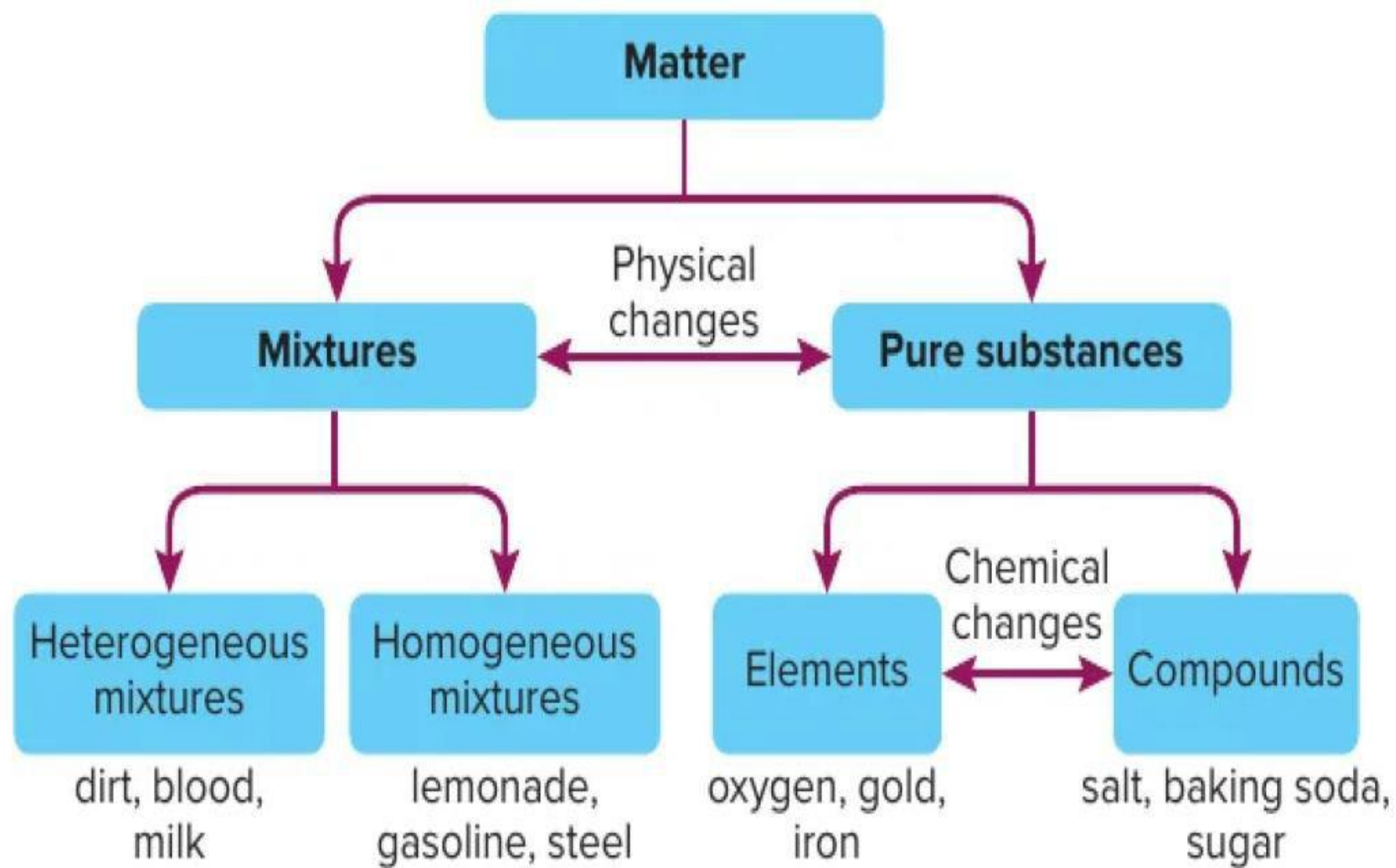


Figure 20 Matter can be classified into different categories that have defined properties.

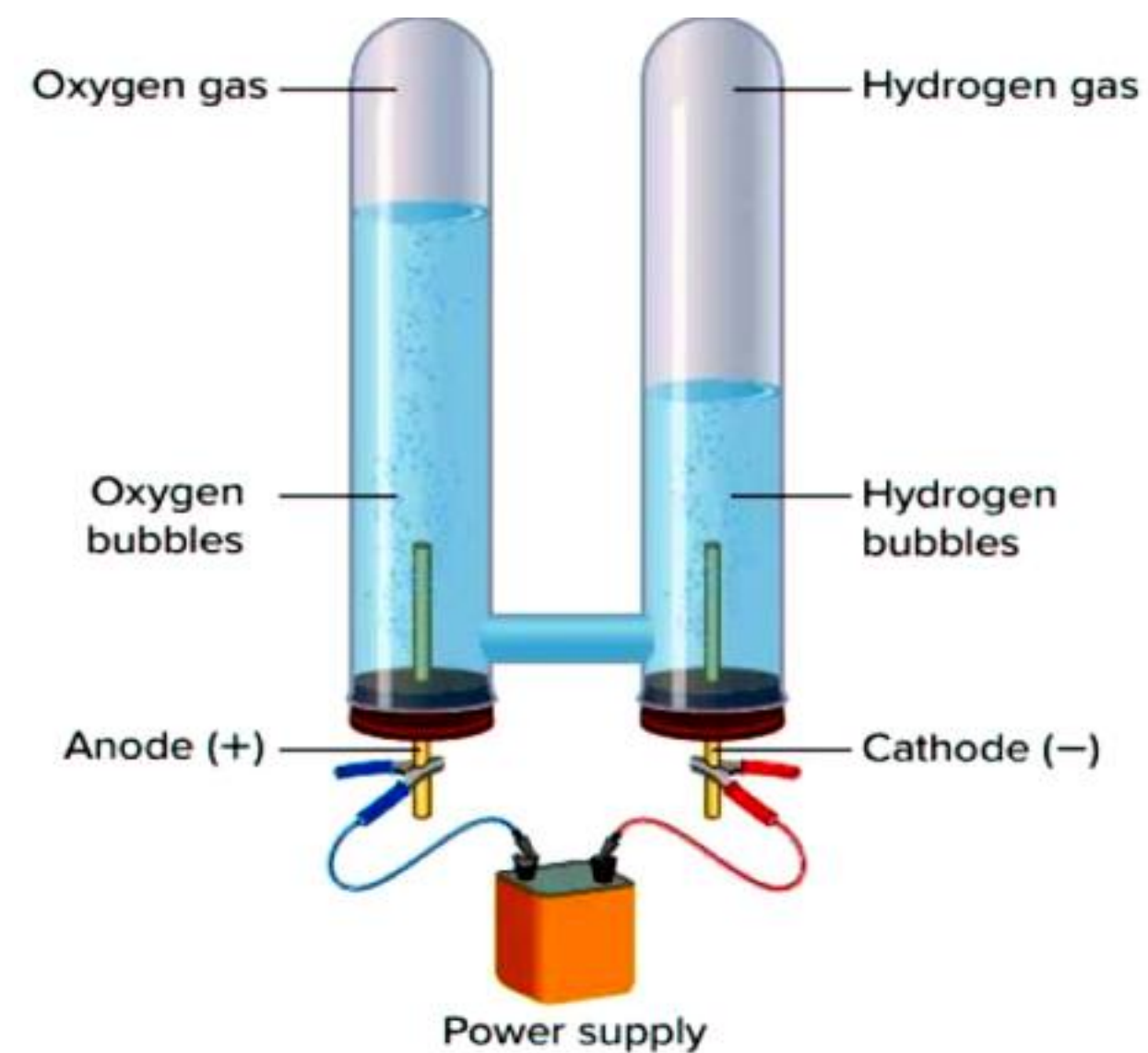


Figure 15 An electric current breaks down water into its components, oxygen and hydrogen.

Determine What is the ratio between the amount of hydrogen and the amount of oxygen released during electrolysis?



Potassium



Iodine



Potassium Iodide

Figure 16 When potassium and iodine react, they form potassium iodide, a compound with different properties.



18. Identify the energy resources used in daily life.

• Energy Resources Used in Daily Life

• Non-renewable energy resources

1. Oil (petrol, diesel) – cars, buses, generators

★ 2. Natural gas – cooking, heating

3. Coal – electricity generation in power plants

• Renewable energy resources

1. Solar energy – sunlight used for electricity and heating

2. Wind energy – wind turbines produce electricity

3. Hydropower – flowing water in dams generates electricity

4. Biomass – wood, plant waste used for fuel



★ Study Notes ★

- **Renewable** resources can be **replaced naturally**.
- **Non-renewable** resources are **limited** and will **run out**.

RENEWABLE & NON-RENEWABLE ENERGY EXAMPLES



RENEWABLE ENERGY



RENEWABLE ENERGY:
SUSTAINABLE & ECO-FRIENDLY SOURCES

SOURCES



SOLAR
Sunlight converted to electricity



WIND
Wind power from moving air



HYDRO
Flowing water generated power



GEOTHERMAL
Heat from within the Earth



BIOMASS



BIOMASS

Organic matter for fuel

KEY BENEFITS



Clean Power



Low Emissions



Inexhaustible



NON-RENEWABLE ENERGY



NON-RENEWABLE ENERGY:
FINITE & POLLUTING SOURCES

SOURCES

COAL

Fossil fuel burned for electricity



OIL & GAS

Extracted for fuels & energy



NUCLEAR

Uranium fuel generates intense heat



KEY IMPACTS



High Pollution

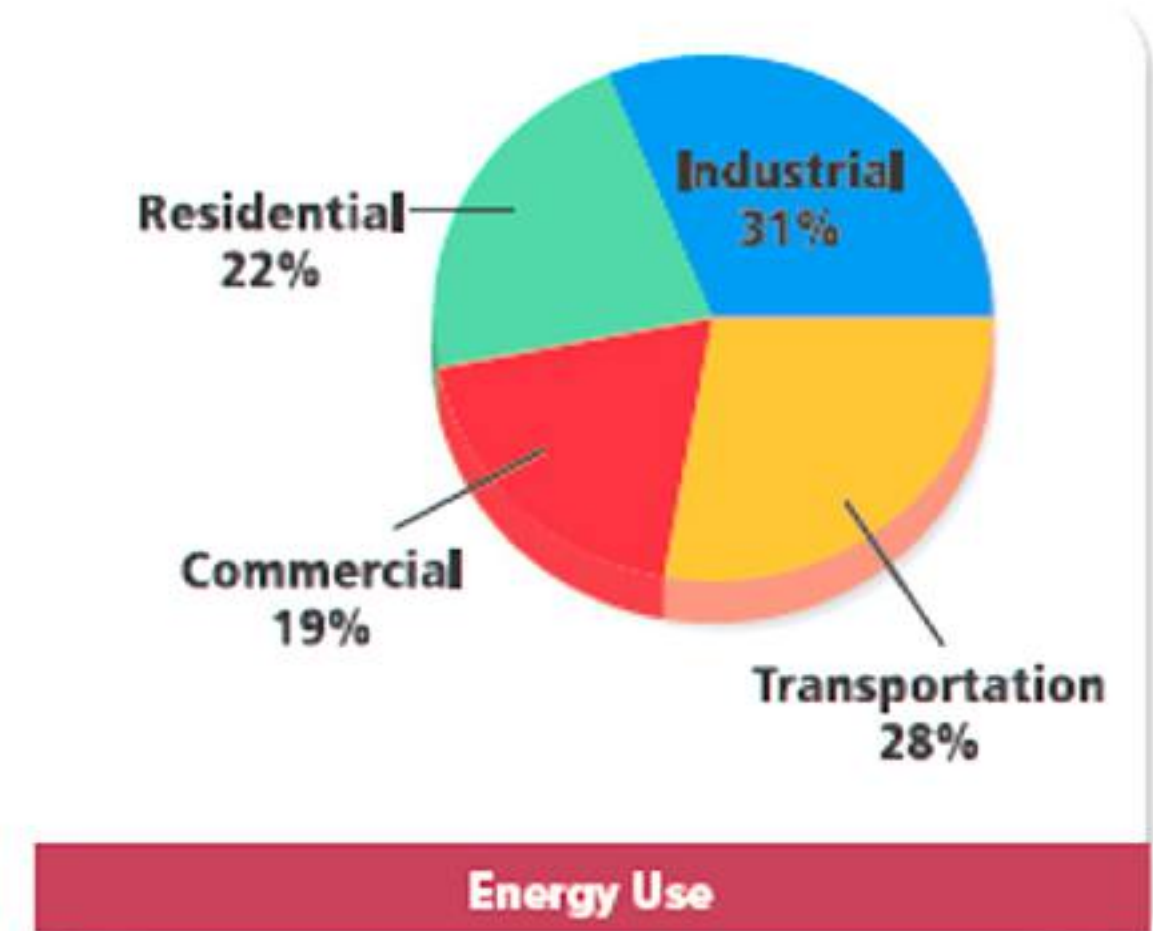
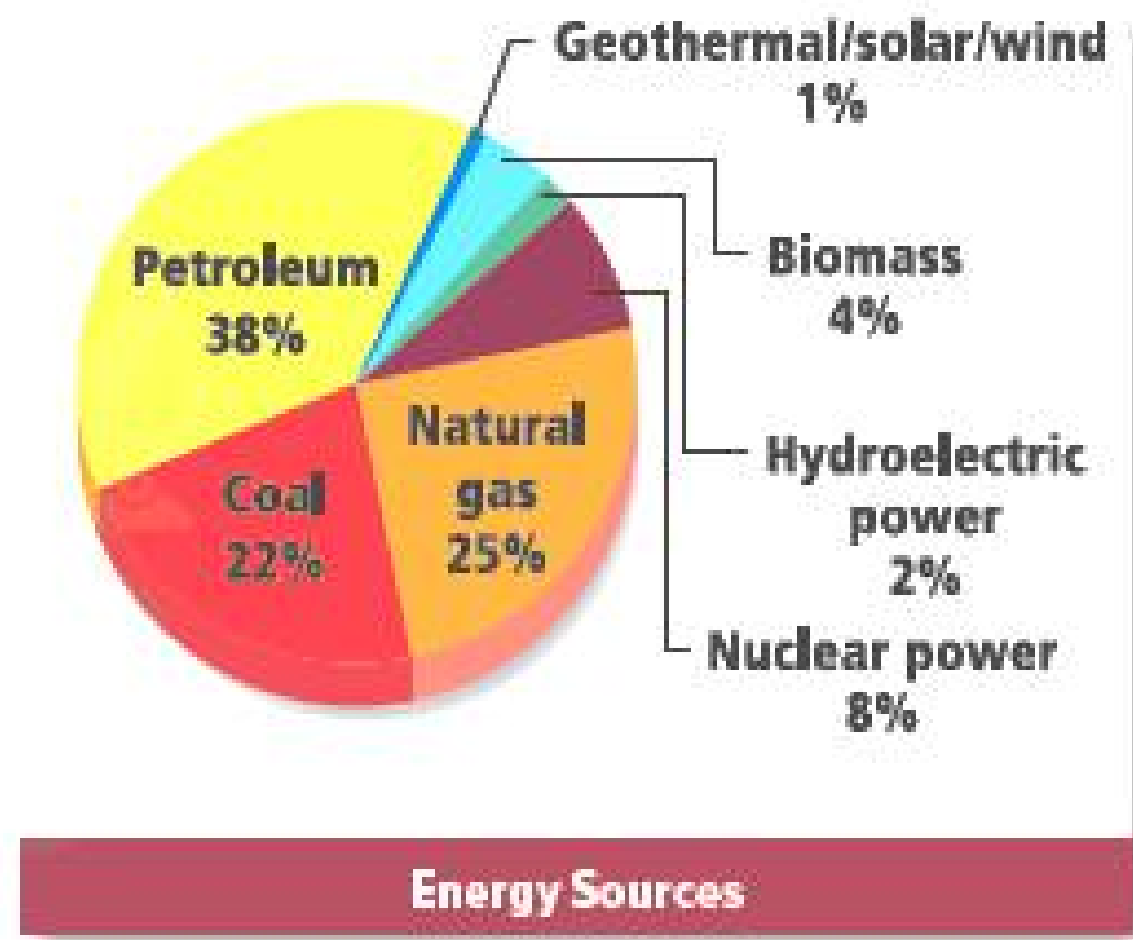


CO2 Emissions



Limited Supply

• Renewable Resources	• Non- Renewable Resources
• Solar – wind – hydroelectric - biomass	• Petroleum – Natural gas – Coal
• They can renew rapidly	• They can't renew rapidly
• They are replaced by natural processes faster than humans can use them.	• we use faster than they can be replaced or replenished





19. Describe the process of fossil fuel formation.

- **Fossil Fuel Formation**

- Fossil fuels form from the remains of dead plants and animals.
- These remains get buried under layers of soil and sand.
- Over millions of years, heat and pressure change them into fossil fuels.



• Process Steps

- Plants and animals **die**.
- They are **buried** under sediments.
- **Heat** and **pressure** increase over time.
- They slowly turn into coal, oil, or natural gas.

• Types of Fossil Fuels Formed



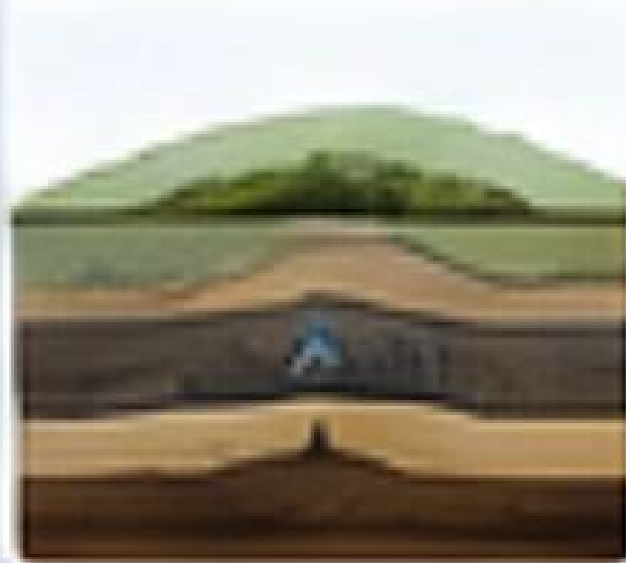
- **Coal** → from **ancient plants**
- **Oil** (petroleum) → from **tiny sea organisms**
- **Natural gas** → formed with **oil under high**

Fossil Fuel Formation

1. Dead organisms accumulate in swamps or oceans.



2. They are buried under layers of sediment.



3. Heat and pressure act over millions of years.



4. Fossil fuels (coal, oil, natural gas) are formed.



Fossil fuels require millions of years to form.

Takes millions of years to form.

Formed underground.

Fossil fuels are non-renewable
(cannot be replaced quickly).

Fossil Fuel	➤ Petroleum	➤ Natural Gas	➤ Coal
Definition	Is a liquid formed from a decay of ancient organisms , such as plankton and algae.	Is a gas formed when ancient organisms decayed on the seafloor .	Is a solid fossil fuel formed from swampy plant buried beneath sediments .
Composed of	Mixture of Hydrocarbons (carbon and hydrogen)	Mixture of Hydrocarbons Methane, propane and butane	- Mixture of hydrocarbons - It's contained impurities such as sulfur dioxide and nitrogen oxides.
Uses	plastics, synthetic fabrics, cosmetics, medicines, lubricants, wax products, asphalt.	Cooking – Heating-manufacturing ✓ Note: - produces more energy. - burns clean. - contains fewer impurities	Produce electricity ✓ Note: - contains more impurities Harm environment. - The most abundant fossil fuel.

20. Identify renewable and non-renewable resources, explaining the reason for the need to maintain the sustainability of these resources such as water, coal, natural gas, wind, sun, oil, etc.

- **Renewable Resources**

- Resources that can be replaced naturally and used again.

- **Non-renewable Resources**

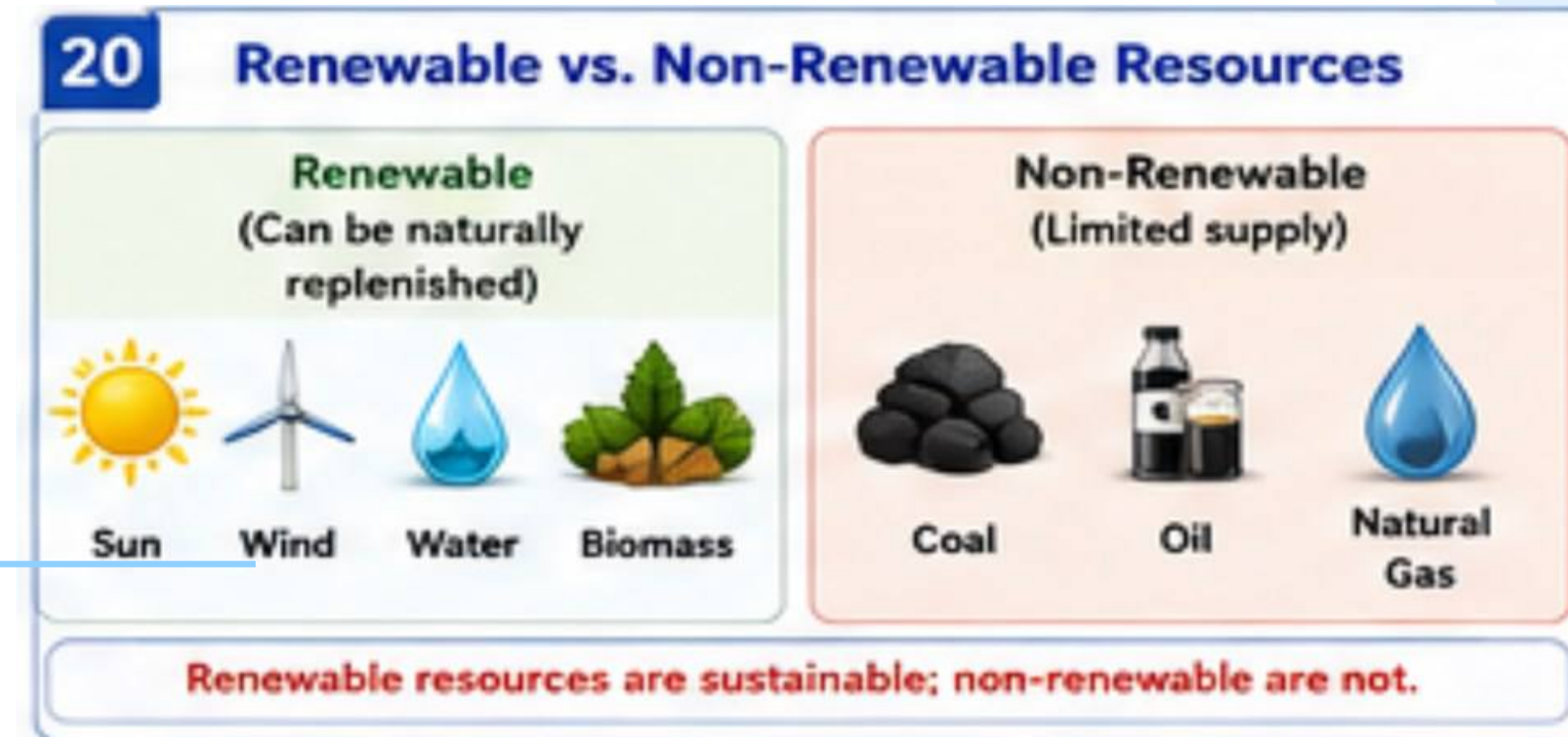
- Resources that cannot be replaced quickly once used.

- **Why they are renewable:**

- They are naturally replenished and will not run out easily.

- **Why they are non-renewable:**

- They take millions of years to form and can run out.



Why we must use resources sustainably

- To avoid running out of important resources
- To protect the environment
- To reduce pollution and damage
- To make sure future generations can also use them

RENEWABLE ENERGY EXAMPLES



RENEWABLE ENERGY:
REPLENISHABLE, SUSTAINABLE, & CLEAN



1



SOLAR ENERGY

POWER FROM THE SUN



- Photovoltaic (PV) cells convert light into electricity
- Concentrated Solar Power (CSP) for large scale

2



WIND ENERGY

POWER FROM THE WIND



- Kinetic energy captured by turbines
- Onshore & Offshore wind farms

3



HYDROPOWER (HYDRO)

POWER FROM WATER FLOW



- Gravity pulls water through turbines
- Dams and Run-of-River systems

4



GEOTHERMAL ENERGY

POWER FROM EARTH'S HEAT



- Uses steady heat from the Earth's core
- Direct use heating and electricity generation

5



BIOMASS ENERGY

POWER FROM ORGANIC MATTER



- Renewable fuel from plants and organic waste
- Biofuels (ethanol, biodiesel) and Biogas

6



OCEAN ENERGY

POWER FROM THE OCEAN



Tidal rise & fall /
Wave action

Significant untapped
potential

KEY BENEFITS OF RENEWABLE ENERGY



Eco-Friendly /
Low Emissions



Inexhaustible
Resources



Energy Security /
Stabilizes Costs



Creates Jobs /
Supports Economy



MAKING THE SWITCH FOR A SUSTAINABLE FUTURE

21. List the different renewable energy resources.
23. List the different renewable energy resources.

- **Renewable Energy Resources**

- **Solar energy (Sun):**

- Energy from sunlight is used to generate electricity and heat using solar panels.

- **Wind energy:**

- Moving air turns wind turbines to produce electricity.

- **Hydropower (water):**

- Flowing or falling water in dams turns turbines to generate electricity.

- **Geothermal energy:**

- Heat from inside the Earth is used to produce steam and generate electricity.

- **Biomass energy:**

- Energy made from plants and animal waste by burning or processing them.

★ Key Terms ★

Solar energy

Wind energy

Hydropower

Geothermal energy

Biomass energy



★ Study Notes ★

Renewable energy comes from nature and does not run out.

It is clean energy.

Solar = Sun

Wind = Air

Hydropower = Water

Geothermal = Earth heat

Biomass = Plants and waste



RENEWABLE ENERGY



SUSTAINABLE TODAY, POWERING TOMORROW

Renewable energy comes from natural sources that are constantly replenished.

These resources provide clean, sustainable solutions for our future.

TYPES OF RENEWABLE ENERGY RESOURCES

ENERGY CONVERSIONS

(From Source to Usable Energy)

SOLAR



Energy from the sun
in the form of
RADIANT ENERGY.



Radiant
Energy



Solar Panel
(Photovoltaic)



Electrical
Energy

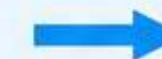
WIND



Energy from moving
air in the form of
MECHANICAL ENERGY.



Mechanical
Energy



Turbine



Electrical
Energy

HYDRO



Energy from water
at height that starts
with **GRAVITATIONAL
POTENTIAL ENERGY.**



Gravitational
Potential
Energy



Turbine
& Generator



Electrical
Energy

BIOMASS



Energy from organic
matter stored in
**CHEMICAL POTENTIAL
ENERGY.**



Chemical
Potential
Energy



Combustion
/ Conversion



Thermal
or Electrical
Energy

GEO THERMAL



Heat from inside
the Earth in the form
of **THERMAL ENERGY.**



Thermal
Energy



Turbine
& Generator



Electrical
Energy

TIDAL



Energy from the rise
and fall of tides in the
form of **MECHANICAL
ENERGY.**



Mechanical
Energy

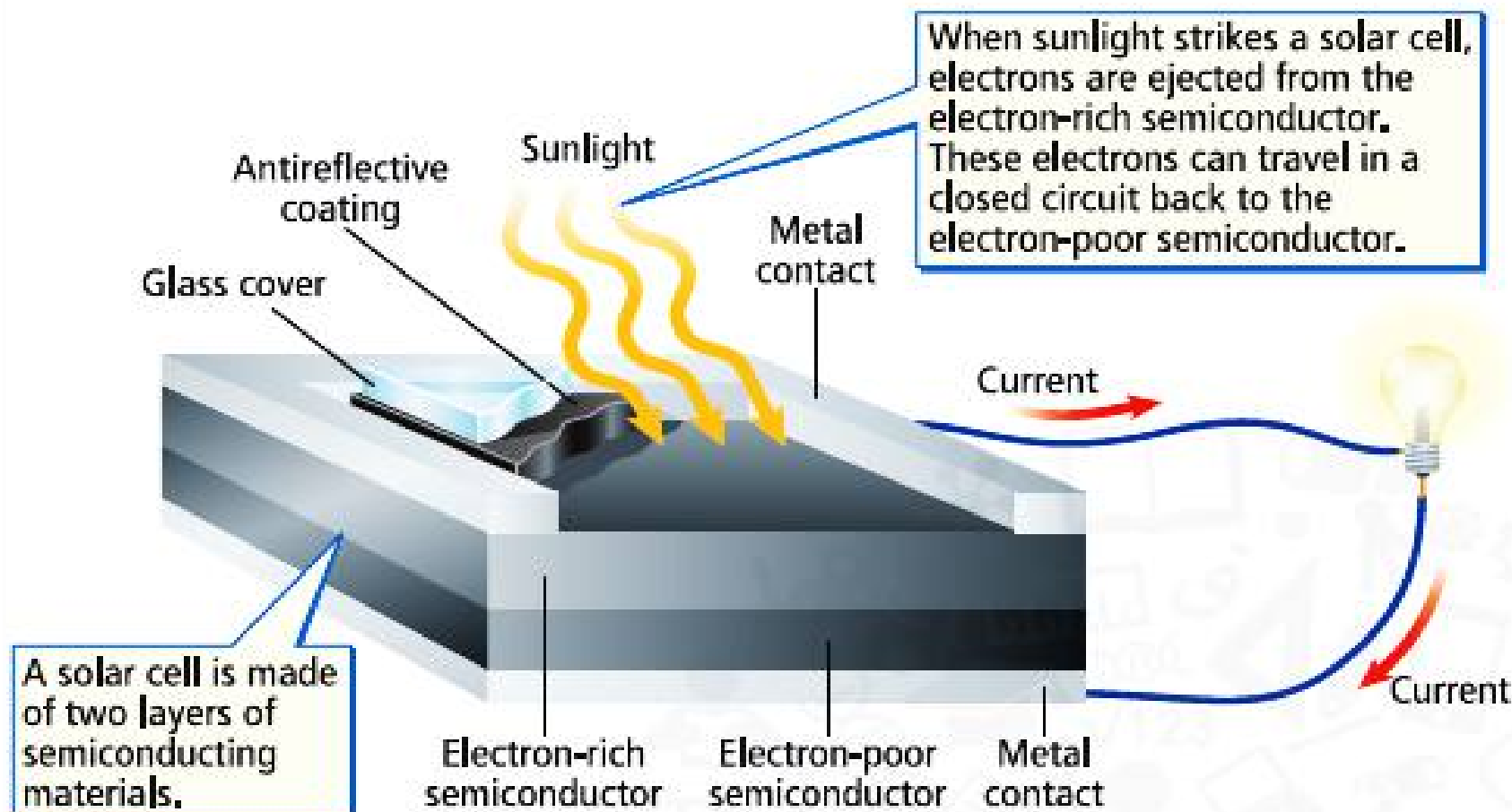


Tidal Turbine
& Generator



Electrical
Energy

■ **Figure 17** Photovoltaic cells convert radiant energy into electrical energy. Some vehicles have optional photovoltaic panels made of solar cells that are used to cool the car without the use of the engine.



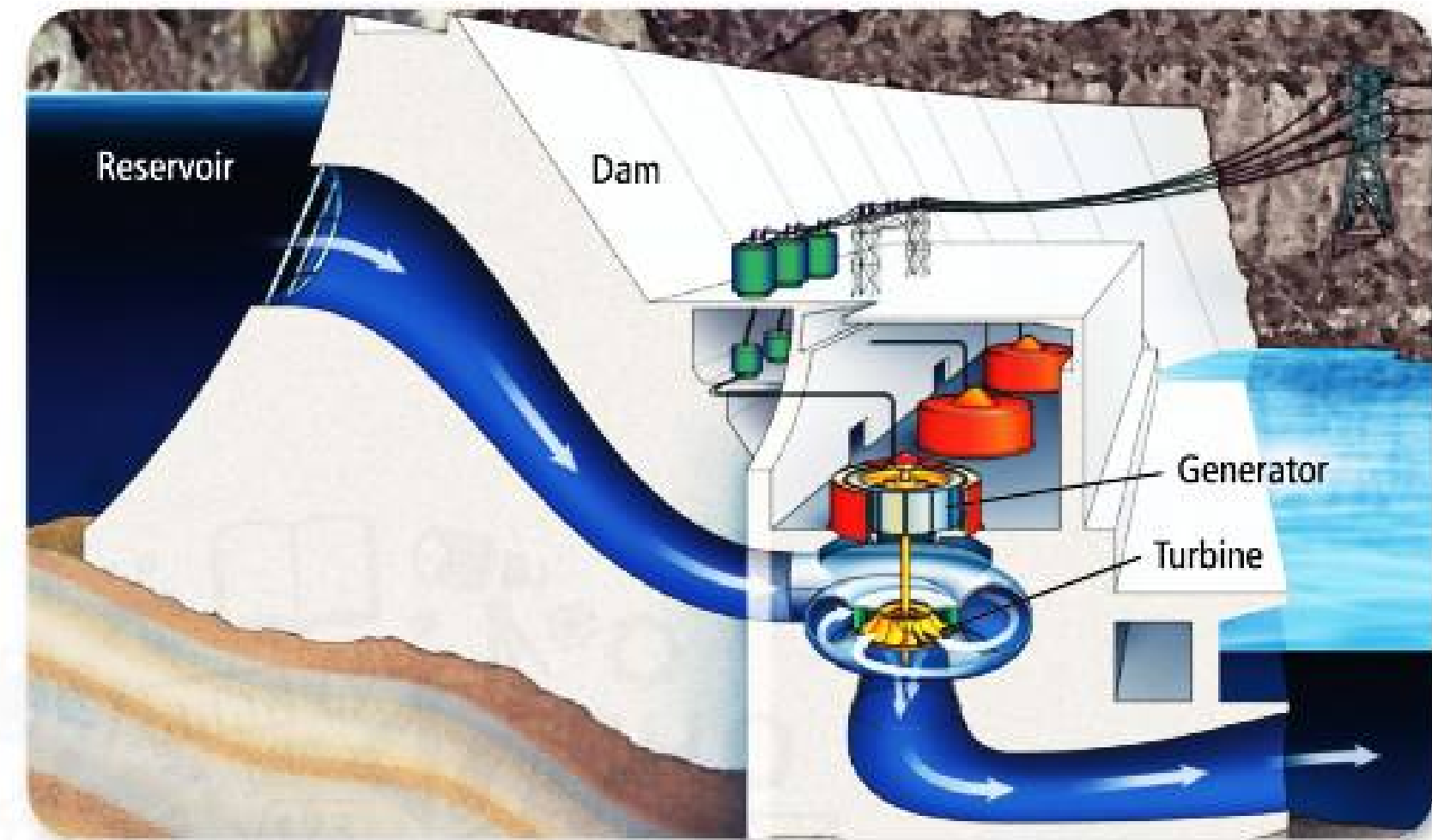
■ **Figure 18** Radiant energy from sunlight strikes the surface of a solar cell, exciting electrons and causing them to flow through an electric circuit.

Identify two devices that use solar cells for power.

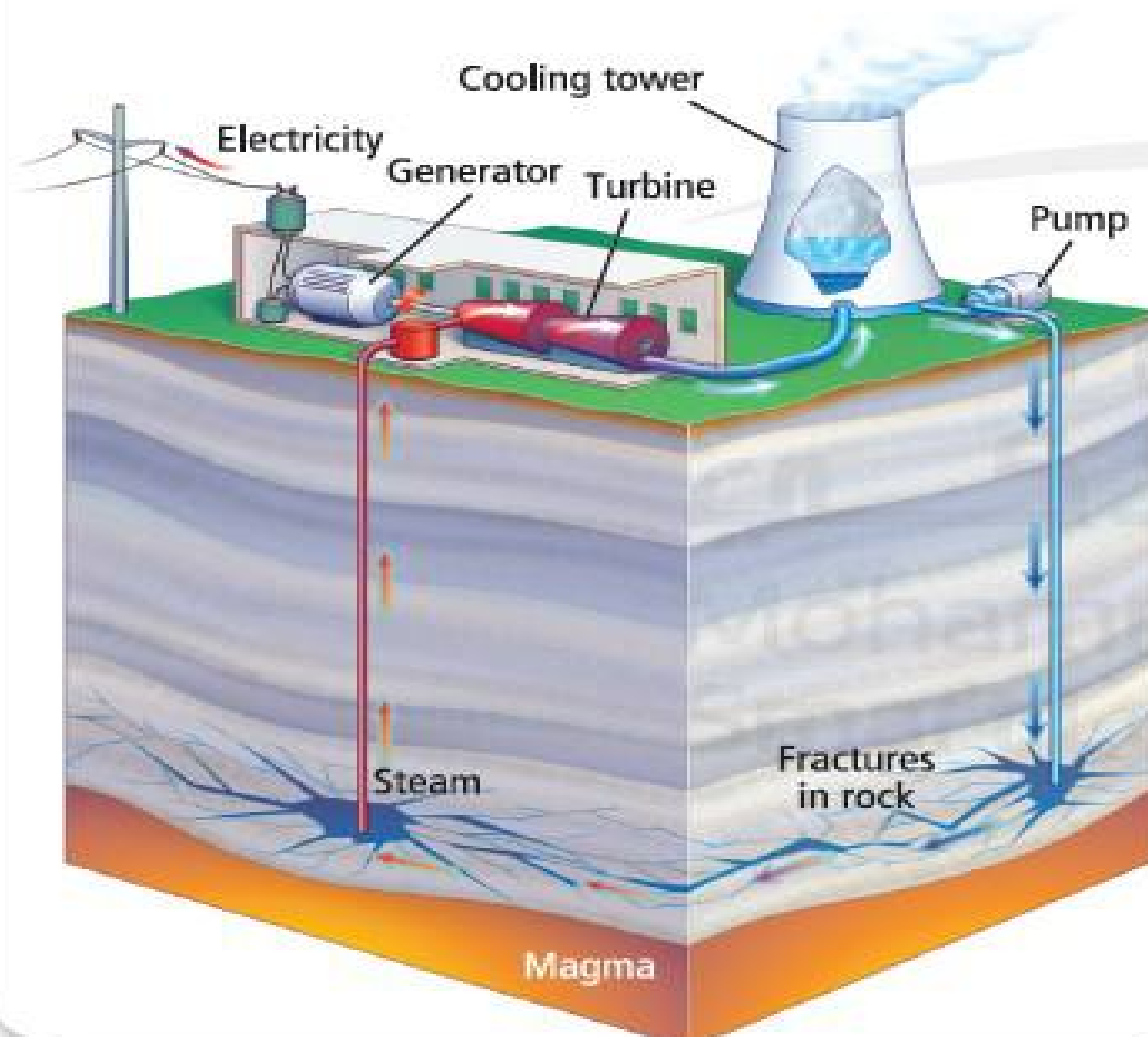
■ **Figure 19** The gravitational potential energy of water behind the dam is converted to electrical energy in a hydroelectric power plant.

Explain the energy conversions that occur as a hydroelectric dam produces electrical energy.

■ **Figure 20** A fish ladder is like a series of steps that allows fish to swim past a dam.



■ **Figure 23** Geothermal power plants convert geothermal energy to electrical energy. Water is changed to steam by the hot rock. The steam is pumped to the surface where it drives a turbine attached to an electric generator.



■ **Figure 22** Wind energy is converted to electrical energy as the spinning propeller turns a generator.





22. Describe the methods used to convert different types of renewable energy resources into electrical energy.

- **Converting Renewable Energy to Electricity**

- **Solar energy (Sun):**



- **Radiant → electrical energy**

- **Wind energy:**

- **mechanical → turbine spins → electricity**

- **Hydropower (water):**

- **Gravitational potential - mechanical → turbine spins → electricity**

- **Geothermal energy:**

- **thermal → steam → turbine → electricity**

- **Biomass energy:**

- **Chemical potential → heat → steam → electricity**



- **Wind, water, and steam from underground turn turbines and generator to make electricity.**

- This energy is **clean** and **does not pollute** much.

22

Converting Renewable Energy to Electricity

Resource	Conversion Method
 Solar	Solar panels convert sunlight to electricity.
 Wind	Wind turbines spin generators to produce electricity.
 Water (Hydro)	Moving water turns turbines connected to generators.
 Geothermal	Steam from the Earth spins turbines.

Generators convert mechanical energy into electrical energy.





24. Describe how the human population affects the Earth's carrying capacity.

- **Human Population and Earth's Carrying Capacity**

- **Definition:**

- **carrying capacity** is **the maximum number** of people the Earth can support with its available resources.

★ Key Terms ★

Carrying Capacity

Population

Resources

Sustainability

Pollution

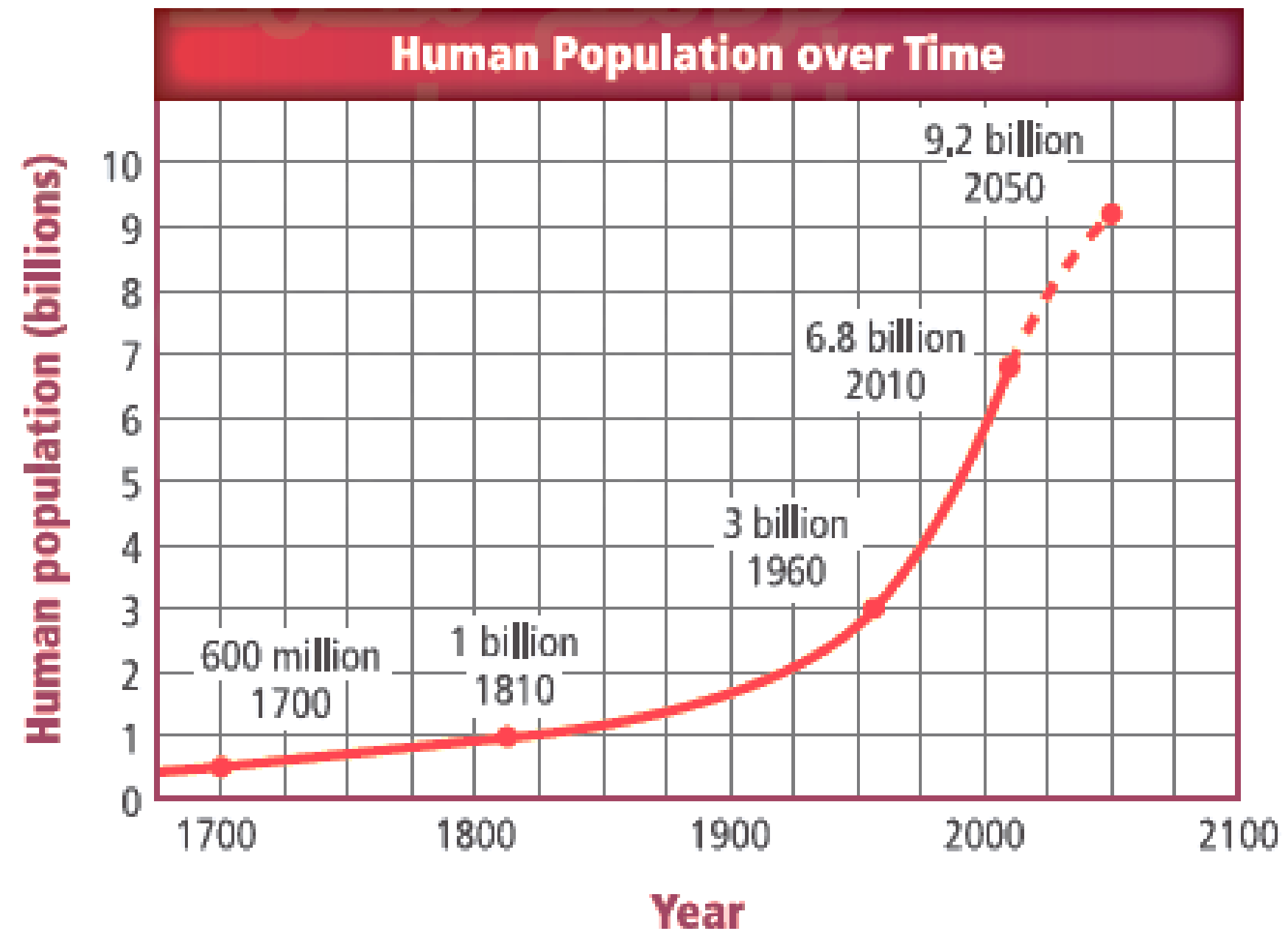
- **How population affects it:**

- **More people** need **more food, water, energy, and land.**
 - A growing population uses resources **faster.** ★
 - Too many people **can increase pollution** and waste.
 - This can put pressure on Earth's resources.



■ **Figure 25** Human population growth rates remained fairly steady until the middle of the nineteenth century. The growth rate then began to increase rapidly.

Estimate What will the human population be in the year 2025?



★ 25. Describes actions that can be taken to help protect and conserve Earth's natural resources.

- **Protecting and Conserving Earth's Natural Resources**

- **Actions We Can Take**

- **Reduce** waste.
- **Reuse** materials.
- **Recycle** paper, plastic, and metal.
- **Save water.**
- **Save electricity.**
- **Use renewable energy** when possible.
- **Plant trees.**
- **Avoid pollution.**



- Natural resources are limited and should be used wisely.
- Conserving resources helps protect the environment.
- Small actions by many people can make a big difference.
- Use resources wisely to protect Earth for the future.