

FIRST TERM SCHEME OF WORK

WEEK	TOPIC	CONTENT
1.	Living Things I	-Habitat and examples -Organisms found in each habitat -Adaptation of living things in their habitat
2.	Relationship between Organisms in the same habitat	-Basic ecological concept - Biotic and abiotic factors - Population density
3.	Living Things II	-Human beings as intelligent animals - Uses of intelligence to human beings -Application of basic intelligence skills
4.	Changes in living things I	-Growth and developmental change -Developmental stages - Characteristics of each -Developmental stages
5.	Changes in living things II	- Classifying growth and developmental as temporary or permanent - Factors affecting growth and development -Differences between growth and Development
6.	Non-Living Things	- Elements - Compounds - Mixtures
7.	Chemicals I	- Meaning and examples - Classification based on use - Classification based on hazardous nature
8.	Chemicals II	- Hazard Pictograms - Devices used in handling chemicals - Storage of chemicals and safety measures when handling chemicals
9.	Revision	
10.	Examination	

HABITAT

Habitat is a natural place where plants and animals live or the natural dwelling place of living things.

There are three types of habitats, they are;

1. Aquatic habitat
2. Terrestrial habitat
3. Arboreal habitat

1. Aquatic habitat

This is a water environment where living things are found. Living things found in water are called aquatic organisms

Three types of aquatic habitat

1. Fresh water habitat
2. Salt water (marine) habitat
3. Estuary (brackish) habitat

Fresh water habitat: This is a water body with little or no salt concentration. Examples: rivers, streams, springs, lakes, ponds, wells, etc. crayfish and crabs are found here.

Salt water (Marine) habitat: This is a water body with very high salt concentration. Examples: sea and ocean. Octopus, whales and dolphins, sharks, coral, sponges, jelly fish are found here.

Estuary (brackish) habitat: This is the mixture of fresh and salt water habitat. It is found where fresh water from the rivers or streams meet and mixes with salt water from the sea or ocean. It is found at the river mouth where salt and fresh water meet. Examples are, lagoons and bays. Periwinkles and lobsters, mangrove trees are found here.

2. Terrestrial Habitat

This is a land environment where plants and animals or living things are found.

Types of Terrestrial Habitat

1. Grassland: This is land that is mainly dominated by grasses and wildflowers.
2. Desert: This is a land with little or no vegetation. Desert is very dry and often hot. The soil is often sandy.
3. Forest: This is a large area of land that is covered with trees of various heights. The plants here provide shade and protection to many different types of animals.
4. Swamp: This is a land that is permanently filled with water with different trees and plants.

2. Arboreal Habitat

This is the habitat which contains plants and animals live on air or spend most of their time on air.

Examples of Aquatic Organisms (animals)

- i. water lettuce

- ii. water lily
- iii. spirogyra
- iv. water hyacinth
- v. mosquito larva
- vi. toad
- vii. catfish
- viii. duck Whale
- ix. Dolphin
- x. Shark
- xi. Star fish.
- xii. Oyster
- xiii. Lobster

Examples aquatic plants

- 1. Sea weed
- 2. Sea grass
- 3. Red mangrove
- 4. White mangrove
- 5. water lily
- 6. water hyacinth

Examples of Terrestrial Organisms

Terrestrial Plants

- 1. Orange tree
- 2. Cashew tree
- 3. Hibiscus plant
- 4. Cassava plant
- 5. Onion plant
- 6. Ginger plant

Terrestrial Animals

- 1. Goat
- 2. Cow
- 3. Tiger
- 4. Lion
- 5. Man
- 6. Elephant

Examples of Arboreal Organisms

Arboreal Plants

- 1. Epiphytes
- 2. Mosses
- 3. Ferns

Arboreal Animals

- 1. Monkey

2. Gorilla
3. Birds
5. Tree frog

EVALUATION

1. What is habitat
2. Mention the three major types of habitats
3. List three types of aquatic habitats
4. Mention three types of terrestrial habitats
5. Mention two animals and two plants found in each of the three major types of habitats

ADAPTATION

Adaption is the possession of certain features by an organism which enables it to live and survive in its habitat. The features that an organism possesses that enables it to survive in its habitat are called Adaptive features.

Adaptive features of Aquatic Plants

1. Possession of stomata (tiny pores) on the surface of the leaves for breathing
2. Possession of flexible, long and hollow stems that enable them to float on water
3. Possession of air space on leaves and stems to help hold the plants up in water
4. They have thin layer of cuticle on their leaves and stems which are permeable for easy absorption of nutrients into the whole surface of the plants
5. Some plants have leaves that float atop the water to help expose them to sunlight for photosynthesis.
6. In some the upper surface of the leaves are waxy to repel water
7. They are flexible to withstand the pressure of moving water.

Adaptive Features of Aquatic Animals

1. Possession of streamlined body for easy movement in water.
2. fishes have gills for respiration.
3. possession of tails and fins for swimming.
4. Frogs have webbed toes for swimming.

5. Some have swim bladder for balancing

NOTE: Toads and frogs are described as amphibious because they live both in water and on land

Adaptive features of terrestrial plants

1. They have extensive root for anchor and absorption of nutrients.
2. They have thick bark to resist fire and harsh weather conditions.
3. They have stomata on their leaves for respiration.
4. Some desert plants, their leaves are modified into spine to reduce water loss.
5. Desert plants have extensive root system to penetrate deep into the soil to absorb water
6. Desert plants have waxy coating on stems and leaves to reduce water loss
7. Some desert plants called succulents, store water in their stems and leaves

Adaptive features of Terrestrial Animals

1. They have limbs for locomotion.
2. They have lungs for respiration.
3. They have hairs and feathers for temperature regulation.
4. Possession of sweat gland for excretion.
5. Possession of skeleton in vertebrates for support and protection
6. They (reptiles) have scales to reduce excess loss of water through their skin.

Adaptive feature of Arboreal Plants

1. They have many green leaves for photosynthesis.
2. They have aerial root for support.
3. They have aerial roots which help them to absorb nutrients, moisture
4. Some have thin leaves to reduce the rate of transpiration

Adaptive features of Arboreal Animals

1. They have wings for flight.
2. They have lungs for respiration.
3. They have clawed feet for perching on trees
4. They have beak for obtaining food.
5. They have streamlined body and light bones for flight.

ASSESSMENT/NOTE

In a tabular form classify these aquatic organisms into fresh water, marine, estuary organisms

Spirogyra
 Toad
 Flamingo
 Cord
 Sea weed
 White mangrove
 Whale
 Mosquito larva
 water lily

Fresh Water Habitat	Marine Habitat	Estuary habitat
Spirogyra	Sea weed	White mangrove
Water lily	Whale	Flamingo
Toad	Coral	
Mosquito Larva		

ECOLOGICAL CONCEPTS

Ecology: This is the study of the interaction between living organisms and their environment. A scientist who studied ecology is called an Ecologist.

Some Basic Ecological Concepts

1. Environment: This is the sum total of all the living and non-living components that affect an organism in its habitat. The environment is composed of two primary categories of factors that shape the ecosystem, living and non-living components.
2. Community: This is the sum total of all the organisms of different species that live together in a place and can interact with each other.
3. Ecosystem: This is a large community of living organisms interacting with each other and with non living environment. It is an area where living organisms interact with one another and with the non living component of their environment.
4. Biotic factors: These are living factors in a habitat which affect the organism in the habitat. Examples of biotic factors are goat, orange, cow, lion, grass, man, fungi, grasshopper, chicken, etc.

Three groups of Biotic Factors

1. Producers [autotrophs]
2. Consumers [heterotrophs]
3. Decomposers

Producers

Producers are the living organisms that use organic sources to produce their own food through photosynthesis. All green plants are producers.

Consumers

Consumers are those living organisms that depend directly or indirectly on plant for food.

Three Types of Consumers

1. Primary Consumers: These are organisms that depend directly on plants for food. Examples are goat, cow, rabbit, giraffe, grasshopper, insects, termites, etc. They are also called herbivores.

2. Secondary Consumers: These are organisms that depend directly on primary consumers for food. They are made up of carnivores and omnivores. Examples are pig, rat, chicken, lion, fox, wolf, hawk, snake, etc.

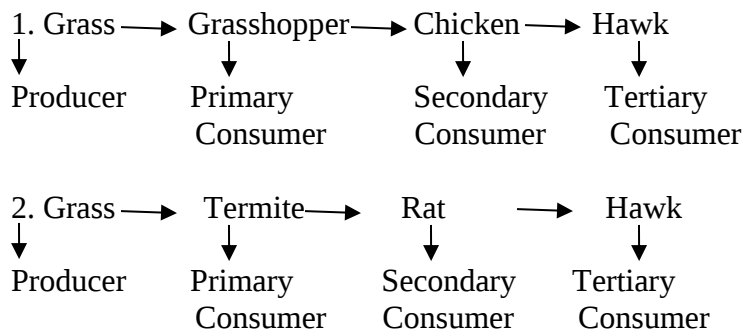
3. Tertiary Consumers: These are organisms that depend on secondary consumers for food. Examples are lion, man, tiger, leopard, crocodile, python, stork, polar, bear, etc.

Decomposers

Decomposers are organisms that feed on dead and decomposing, or decaying organisms. They break them down into nutrients which are taken or absorbed by plants through their roots to manufacture their food. Example: fungi, etc.

Food Chain

Food chain is a linear illustration of how energy is transferred from one organism to another in an ecosystem. It is the transfer of energy through a series of organisms eating and being eaten. Examples;



Abiotic Factors

These are non-living components of a habitat.

Examples of Abiotic factors that affect all living things

1. Temperature
2. Rainfall or water
3. Wind
4. sunlight

5. Air

Examples of Abiotic factors that affect only Aquatic Organisms

1. Salinity – The amount of salt in water.
2. Turbidity – How clear the water is.
3. Current and Waves of water

Examples of Abiotic factors that affect only Terrestrial Organisms

1. Humidity – The amount of moisture in the atmosphere.
2. Land
3. Soil type

Population

Population is the sum total of organisms of the same species (kind) living together in a given place and can interact with each other. Examples, the population of students in a school, the population of monkeys in a forest, the population of orange trees in an orchard, etc.

Population Density

This is the measure of the number of organisms of the same specie within a defined area.

Formula for calculating population density

$$\text{Population Density} = \frac{\text{Population size}}{\text{Area}}$$

Example

1. Find the population density of 200 trees living in an area that is 100cm².

$$\text{Population Density} = \frac{\text{Population size}}{\text{Area}}$$

$$= \frac{200}{100\text{cm}^2}$$

$$= 2\text{trees/cm}^2$$

An Ecological relationship is the relationship between organisms in an ecosystem. All organisms in an ecosystem are connected.

There are five ecological relationships in which two are oppositional and three are symbiotic.

The oppositional relationships are;

- i. predation and ii. competition.

The symbiotic relationships are;

- i. mutualism ii. Commensalism iii. amensalism and iv. parasitism.

Oppositional relationships

- a. Predation: Predation is a relationship between two organisms in which one which is a carnivore kills and the other. For example, a snake eating a mouse. The snake is the predator while mouse is the prey. A snake may become a meal for the hawk. Also when organisms such as herbivores (goat, sheep, cows) feed on plants it is a predation relationship.
 - i. Herbivores (goats, sheep, cow) prey on plants
 - ii. Carnivores (animals that feed on flesh) feed or prey on herbivores, some carnivores can feed or prey on other carnivores.
 - iii. Omnivores feed on both plants and animals
 - iv. Scavengers (e.g. vulture) feed on dead organisms
 - v. Decomposers feed on dead organisms to cause their decay.
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- b. Competition: Competition is when organisms compete for the same resources.

Symbiotic relationships

- a. Mutualism is a relationship in which organisms benefit from each other. This is a positive, positive relationship.
An example of this would be the bee and flower. Bee gets nectar and honey from flower. The bee contributes back to the flower by spreading the pollen so that the flowers can reproduce.
Another example would be when the ox pecker lands on an impalas back and eats the ticks that are a parasite to the impala. The ox pecker is benefited because it gets a meal from the tick and the impala gets benefited because the tick is no longer on it.
- b. Commensalism
Commensalism is a relationship in which one organism benefits from another organism that is not affected negatively. This is a positive, neutral relationship.
For example, a small fish called the Pilot Fish follows underneath a shark and when the shark eats something the pilot fish eats the scrap pieces of the shark original kill
Another example is of a bird nest in a tree. The bird is benefitting because the tree is giving the bird shelter and the tree is not getting anything in return.
- c. Parasitism is a relationship in which one organism (the parasite) benefits while the other (the host) is harmed. This is a positive, negative relationship.
The parasite usually lives on or inside the other organism.
For example, mosquito is a parasite, feeding on a human blood while transferring plasmodium which causes Malaria.
Similarly, head lice are an example of parasitism because they feed on blood from the human head.

EVALUATION

1. What are the two factors that affect living organisms in their habitats?
2. Features that enable organisms to survive in a particular habitat are called-----
3. Define i. biotic factors ii. Abiotic factors
4. Mention two adaptations of aquatic plants to their habitats
5. Outline two adaptations of terrestrial animals to their habitats
6. State and explain the abiotic factors of a habitat
7. Give two examples of the biotic factors of a habitat
8. What is population density?
9. Define ecosystem
10. What is community
11. The organism that feed directly on plants are-----
12. A linear relationship through which food energy is transferred from one organism to another is called-----
13. Define, i. predation ii. commensalism

Human Beings as Intelligent Animal

There are two classes of animals, they are;

1. Vertebrates
2. Invertebrates

Invertebrates

Invertebrates are those animals without a backbone, Examples: ants, cockroach, millipede, worm, jelly fish, octopus, etc.

Vertebrates

Vertebrates are animals with backbone. Examples: dog, man, cow, gorilla, goat, etc.

There are five types of Vertebrates

1. Mammals
2. Fish
3. Amphibians e.g. frogs, toads
4. Reptiles e.g. snakes, lizards etc.
5. Birds

Mammals

Mammals are animals that can give birth to their young ones alive and breastfeed them with milk from their mammary gland.

There are three types of Mammals

1. Monotreme Mammals: They are mammals that lay eggs. Examples platypus, anteater, etc.
2. Marsupial Mammals: They are mammals that give birth to their young ones prematurely. Examples: Kangaroo, Koala, Wallabies, etc.
3. Placental Mammals: They are mammals that give birth to their young ones fully matured. Examples: rat, cow, dog, primates such as man, monkey, gorilla, ape, etc.

Characteristics of Mammals

1. They are warm blooded organisms
2. Their females feed their young ones with milk from their mammary gland.
3. They have heterodont dentition (the kind of dentition that is made up of different kinds of teeth).
4. They have diaphragm.
5. Their bodies are covered with hairs/furs.

Uniqueness of Man

Primates

A primate is any mammal whose eyes are in front of their heads and can grasp things with their hands.

Characteristics of Primates

1. They can stand and walk in an upright position.
2. They have nails not claws.
3. They can grasp things with their hands.
4. They have their eyes in front of their heads.
5. They have opposable thumbs which they use with their forefingers to pick up things, etc.

Examples of Primates

1. Man
2. Lemur
3. Monkey
4. Gorilla
5. Chimpanzee
6. Orangutan
7. Ape

Characteristics that distinguish human beings from other Primates

1. They have skill in problem solving.
2. They have large and highly complicated brain which make them the most intelligent animals.
3. They possess the largest skull which contains their brain.
4. They exhibit bi-pedal movement (Movement on two legs)
5. They have “S” curved backbone which enables them to stand upright for a long time without difficulty.

EVALUATION

1. In what way is man different from animals?
2. Give four examples of mammals
3. List four examples of primates
4. Man is a primate. NO OR YES
5. Give three characteristics of primates
6. ----- enables man to stand upright for a long time
7. What are the three types of mammals?
8. Mention two characteristics of mammals
9. What are the two classes of animals?
10. What are the five classes of vertebrates

GROWTH AND DEVELOPMENTAL CHANGES

Growth

Growth is the increase in size of a living organism. . It is brought about by food intake and cell division. For proper growth to take place, one must always eat balanced diet. Growth starts from birth and continues until one reaches maturity.

Growth can be measured by measuring the increase in mass, length, height, width. Growth in living things is both observable and measurable.

Examples of Growth Changes

1. Increase in height
2. Increase in weight
3. Increase in size,

Development

Development is the changes that occur during growth. Development can also be defined as series of orderly changes by which a living thing comes to maturity or an organism becomes

fully matured (i.e. the organism becomes ready to reproduce). leading to maturity of certain organs of the body and individual behavior.

Developmental changes progress from simple to complex changes and these changes can only be observed by the appearance of certain parts of the body, certain organs of the body and the individual's behavior development cannot be measured.

Developmental Stages

There are four developmental stages in man.

1. Infancy
2. Childhood
3. Adolescence/puberty
4. Adulthood

Infancy

This is from age zero to two years (0 – 2 years). It commences from birth and every organ of the body is initially small. The baby has the ability to sit, walk, run, and grow milk teeth.

Childhood (early and late):

It is from the age of two to eleven (2 – 11 years}. This stage precedes the puberty stage. This is the stage when they learn to run, jump and motor skills.

Adolescence:

This is the stage in between childhood and adulthood. It is from eleven to eighteen years (11-18 years) and this is when a lot of changes occur in the body. The adolescent experiences rapid and continuous growth and development. At the early stage of puberty, between the ages of 10 – 14 years, girls grow faster than boys, while from 15 – 20 years old the boys grow faster than the girls.

They develop the secondary sexual characteristics (puberty), want to be independent, secretive, believe more in peer groups.

Adulthood and old age

This stage starts from the age of eighteen and above (18 years and above). It is a stage of maturity as the individual is capable of being independent. An adult is capable enough to establish his or her own family through marriage.

A lot of features begin to appear to indicate old age. Examples: grey hair, reduction in the ability to reproduce, shrinking of the skin, appearance of wrinkles etc.

Characteristics/Features of Growth and Development of infants

They have:

1. Presence of hairs on the head.
2. Milk teeth dominate
3. Bones are soft, hence the child's inability to lift heavy loads.
4. The child is guided in most activities he/she engages in.
5. They learn to trust
6. They imitate people
7. They get attached to their caregivers especially their mothers

8. Learn to walk

Characteristics/Features of Growth and Development of Childhood

They have:

1. ability to speak
2. ability run, jump
3. learn to write
4. begin to lose some milk teeth

Characteristics of features of Growth and Development at Adolescence

Girls

1. Increasing body size, height and weight.
2. Presence of full set of permanent teeth.
3. development of enlarged hips
4. Development of breast
5. Ovulation and menstruation

Boys

1. Deepening or cracking of voice
2. Broadening of shoulders
3. Production of sperm
4. Growing of moustache

Characteristics/Features of Growth and Development at Adulthood/ old age

1. No increase in height but there may be increase in weight.
2. Decline in body functions like reproductive ability, sight, movement etc.
3. Ageing as indicated by the presence of gray hair.
4. Ability to produce young ones.
5. Advanced reasoning.
6. Strong body structures.

Temporal and Permanent Changes in Growth and Development

Growth and developmental changes can either be temporary or permanent. Permanent changes remain for life and are not reversible while temporary changes are can be reversible.

Temporal Changes

Temporal changes are those changes that do not last forever. They are reversible.
Examples of temporal changes are:

1. Growing of milk teeth
2. Increase in body weight
3. Appearance of pimples in adolescents
4. protruding stomach after eating

Permanent Changes

Permanent changes are those changes that remain for life. They are not reversible.
Examples of permanent changes in growth and development are:

1. Growing grey hair at adulthood.
2. Sperm production
3. Growth of pubic hairs
4. Appearance of breast
5. Enlargement of chest
6. Broad chest
7. Growing of moustache
8. Skill acquisition at childhood
9. Increase in height
10. Ability to stand and walk
11. permanent teeth

There are some factors that affect growth and development, they are;

Factors that Affect Growth and Development

1. Food/nutrition
2. Heredity
3. Growth hormones
4. Exercise
5. Disease
6. Rest
7. Love and care

DIFFERENCES BETWEEN GROWTH AND DEVELOPMENT

<u>Growth</u>	<u>Development</u>
1. Growth can be measured and observed.	Development cannot be measured but only be observed.
2. It stops at maturity.	It continues till death.
3. Growth brings about an increase in size.	Development brings about maturation of organs.
4. It occurs at the early stage of life.	It occurs at all times.

CLASS WORK

1. A stage in life in which individuals grow into adult is termed-----
2. ----- is an irreversible increase in size in an organism
3. Mention four factors that affect growth and development
4. State two differences between growth and development
5. List any two characteristic or features of growth and development in boys and girls
6. Give four examples of permanent changes in growth and development of human beings
7. Mention two examples of temporary growth
8. Outline two features of developmental changes in adulthood

Elements, Components and Mixtures

Elements

An element is a substance that made up of one kind of atom which cannot be broken down into simpler units by chemical reaction. An atom is the smallest unit of a matter. Elements are represented with symbols.

The first twenty (20) elements in the periodic table are;

Atomic No	Name of Element	Symbol
1.	Hydrogen	H
2.	Helium	He
3.	Lithium	Li
4.	Beryllium	Be
5.	Boron	B
6.	Carbon	C
7.	Nitrogen	N
8.	Oxygen	O
9.	Fluorine	F
10.	Neon	Ne
11.	Sodium	Na
12.	Magnesium	Mg
13.	Aluminum	Al
14.	Silicon	Si

15.	Phosphorous	P
16.	Sulphur	S
17.	Chlorine	Cl
18.	Argon	Ar
19.	Potassium	K
20.	Calcium	Ca

Properties of Elements

1. An element consists of only one kind of atom.
2. An element cannot be broken down into a simpler type of matter by either physical or chemical means
3. an element is made up of tiny particles called atoms.
4. The atom of an element contains protons, neutrons and electrons in its nucleus.
5. An element can be a metal or a non-metal, etc.

Elements are divided into two (2) groups. They are; **Metals and Non metals.**

METALS	NONMETALS
1. Calcium (Ca)	Hydrogen (H)
2. Sodium (Na)	Nitrogen (N)
3. Magnesium (Mg)	Oxygen (O)
4. Aluminium (Al)	Fluorine (F)
5. Zinc (Zn)	Bromine (Br)
6. Copper (Cu)	Chlorine (Cl)
7. Nickel (Ni)	Iodine (I)
8. Tin (Sn)	Sulphur (S)
9. Iron (Fe)	Phosphorus (P)
10. Silver (Ag)	Carbon (C)
11. Gold (Au)	Silicon (Si)
12. Platinum (Pt)	
13. Mercury (Hg)	
14. Lead (Pb)	

Uses of some Elements

1. Oxygen is used to support life and burning.
2. Gold and silver are used to make jewelries.
3. Aluminum is used for making cooking utensils.
4. Chlorine is used for making disinfectants. It is also used as a bleaching agent.
5. Copper is used for making electric wires.

6. Iron is used for making steel, etc.

Compounds

A compound is a substance that consists of two or more elements chemically combined in a fixed proportion. A compound can be represented with a formula.

Examples of compounds

1. Sodium chloride (table salt or cooking salt) $\Rightarrow$ NaCl

2. Sodium hydroxide (Caustic soda) $\Rightarrow$ NaOH

3. Sugar $\Rightarrow$ C₆H₁₂O₆

4. Water $\Rightarrow$ H₂O

5. Carbon (iv) Oxide $\Rightarrow$ CO₂

Properties of Compounds

1. A compound is a combination of two or more elements.
2. Components of compounds are chemically combined together.
3. The elements that make up a compound cannot be separated by a physical method
4. The chemical and physical properties of compounds are quite different from that of the individual elements that make up a compound, etc.
5. Their components can be separated by a chemical method.

Uses of Compounds

1. Sodium hydroxide is used for making soaps.
2. Sodium chloride is used for cooking and preserving food.
3. Sand is used for constructing buildings.
4. Hydrogen peroxide (H₂O₂) is used for treating wounds.
5. Limestone (CaCO₃) is used for making cement.
6. Sugar is used for sweetening food.
7. Water is used for domestic cleaning, cooking, etc.
8. Plants use carbon (iv) oxide for manufacturing their food through photosynthesis.

Mixtures

A mixture is a substance made up of two or more substances physically combined together.

Examples of mixtures

1. Soil
2. Air
3. Blood
4. Crude oil, etc

Properties of a Mixture

1. A mixture consists of two or more substances physically combined.
2. A mixture can be separated by a physical method or process.
3. Each component of a mixture retains its original properties.

Uses of Mixtures

1. Crude oil is used for making different kinds of fuel like kerosene, petrol, diesel, etc.
2. Carbon (iv) oxide found in air is used by plants to manufacture their food.
3. Oxygen found in air is used for supporting life and burning.
5. Blood helps the body to circulate materials like digested food and oxygen around the body.
6. Soil is used for cultivating crops.

Methods of Separating Mixtures

Methods of separation are **physical techniques** used to separate components of a mixture based on differences in properties such as size, density, solubility, or boiling point. They do not involve chemical reactions and do not change the chemical identity of substances. The methods are;

1. Handpicking
2. Sieving
3. Winnowing
4. Sedimentation and decantation
5. Filtration
6. Evaporation
7. Fractional distillation
8. Simple distillation
9. Magnetization or magnetic separation
10. Sublimation
11. Chromatography

1. **Handpicking:** this is the method of manually separating large impurities from grains or pulses.
2. **Sieving:** Sieving involves using a mesh to separate substances by size, like in removing
3. **Winnowing:** A process of using air currents to separate lighter husk from heavier grain.
4. **Sedimentation & Decantation:** These methods involve allowing heavier solids to settle, then pouring off the liquid.
5. **Filtration:** filtration is the process of passing a mixture through filter paper to separate insoluble solids from liquids (e.g., sand and water).
6. **Evaporation:** Evaporation involves heating a solution to remove the solvent, leaving the solid behind (salt from seawater, sugar from sugar solution).
7. **Simple distillation:** this is the method of separating liquids by their boiling points, such as extracting pure water from salt water, separating water from alcohol.
8. **Magnetic separation:** separating magnetic substances (e.g., iron) from non-magnetic materials.
9. **Sublimation:** Sublimation method involves separating a sublimable solid from non-sublimable solid, example, separating solids (camphor) that directly turn to gas upon heating.
10. **Chromatography:** used to separate colours of dyes and pigments based on the speed at which each components moves, the more soluble component moves faster to a higher position.
11. **Fractional distillation:** this is used to separate miscible liquids having closer boiling points, used to refine crude oil in a fractionating column (separating it into its fractions like petrol, kerosene, diesel)

ASSESSMENT

1. **Define i. decantation ii. Fractional distillation**
2. **State two properties of i. elements ii. Compounds iii. Mixtures**
3. **Mention four methods used in separating mixtures**
4. **Give two examples of, i. mixtures ii. Compounds iii. Elements**
5. **List two uses of, i. mixtures ii. Compounds iii. Elements**
6. **Mention four examples of, i. metals ii. Non metals**
7. **What are the two classes of elements**
8. **Mention two substances that are separated with distillation method**
9. **State a substance separated into its constituents using fractional distillation**
10. **Name a substance that is separated into its constituents with chromatography**

CHEMICALS

A chemical is a compound used in or produced by a chemical process. It is either an element or a compound. A chemical process leads to the formulation of new substances and this change is not easily reversible (it is a permanent change). Chemicals can be in liquid, solid or gaseous form.

SOURCES OF CHEMICALS

1. Natural sources: they are chemicals obtained from plants and animals, examples: salt from sea water, sugar from sugar cane, oils from plants.
2. Synthetic sources: these are chemicals made artificially in the laboratories or factories, examples: fertilizers, insecticides, hypo, jik ect.

Examples of Liquid Chemicals

1. water
2. Tetraoxosulphate (iv) acid
3. Ammonia
4. Ethanol
- 5 Hydrochloricacid
6. Body cream
7. Kerosene
8. Petrol
9. Hypo or Jik
10. Diesel oil
11. Paint, etc.

Examples of Solid Chemicals

1. Sodium chloride (table salt)
2. Soap
3. Detergent
4. Limestone
5. Sugar
6. Starch
7. Camphor
8. Iodine crystals, etc

Examples of Gaseous Chemicals

1. perfume
2. Body spray
3. Methane gas
4. Hydrogen
- 5.Oxygen
6. Carbon (ix) oxide
7. Insecticides

Classes of chemicals

Chemicals are classified based on;

1. Their uses
2. Hazardous nature

Classification of Chemicals based on Use

1. Pharmaceuticals/Cosmetics: They are those chemicals used in making drugs and cosmetics. Examples: glycerol, calcium hydroxide (limestone), alcohol, etc.

2. Agrochemicals: These are the chemicals used in agriculture to improve the quantities and qualities of crops and animals. Examples: fertilizers, Pesticides, herbicides, rodenticides, etc.

3. Industrial Chemicals: These are chemicals used as raw materials for producing various products in the industry, e.g Chlorine, Nitrogen, Tetraoxosulphate (IV) acids

4. Laboratory Chemicals: These are chemicals used for different scientific works in the laboratory. Examples: hydrochloric acid, sodium hydroxide, silver nitrate, methyl orange, etc.

5. Nuclear Chemicals: These are chemicals used to manufacture nuclear weapons. Examples Uranium-235, Plutonium-239etc.

Classification of chemicals based on Hazardous Nature

There are three classes of chemicals based on hazardous nature.

1. Highly Hazard and Toxic Chemicals: These are those chemicals that can cause explosion, death, can destroy living tissues like the eye, skin, etc. Examples: concentrated acid and base acid.

2. Moderately Hazardous and Toxic Chemicals These are chemicals are also toxic but less dangerous than the highly hazardous chemicals. They can cause irritation, reddening or blistering of the skin if not handled with care. Examples: diluted acid and base (hydrogen peroxide, sodium hypochloride (bleach, like, jik and hypo), etc.

3. Non-Hazardous and Non-toxic chemicals: These are those chemicals that will not cause any harm or adverse effect during use. Examples: Sodium chloride, water, glucose, oxygen, vinegar (acetic acid) etc.

SAFETY MEASURES WHEN HANDLING CHEMICALS

1. Always read labels and instructions carefully
2. Use protective equipments like gloves, goggles, masks, laboratory coat
3. Store chemicals in labelled, secure containers
4. Wash your hands after handling chemicals

5. Keep chemicals away from children and pets.
6. Do not eat food or drink where chemicals are used.
7. Do not smell chemicals to identify them it might cause respiratory problems
8. For the ladies, ensure that your hair is properly packed and tied to the back
9. Avoid any form of playing when handling chemicals.

NOTE

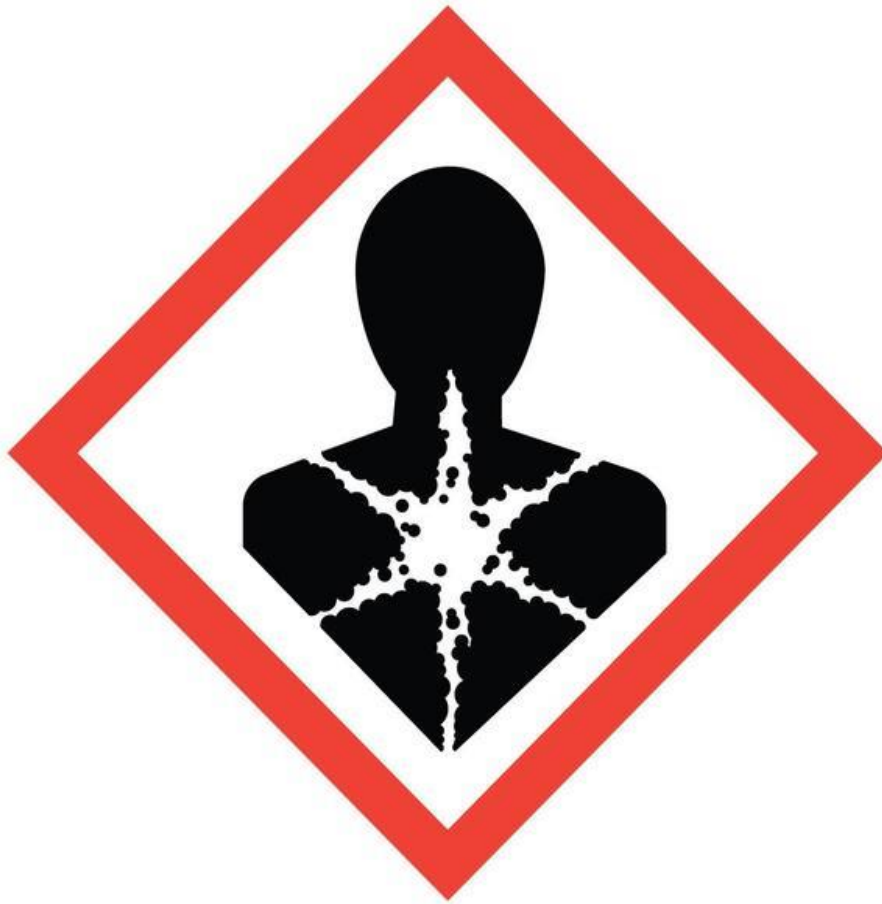
Hazard symbols (or pictograms) are universally recognizable images designed to warn you about dangerous chemicals and materials. Most systems, such as the [Globally Harmonized System \(GHS\)](#) and GB CLP regulations, use nine core diamond-shaped symbols. [\[1, 2, 3\]](#)

The 9 Core Hazard Symbols & Their Meanings

Symbol	Name	What it means / Examples
Exploding Bomb	Explosive	Unstable substances that can explode from heat, shock, or friction. <i>(Examples: Fireworks, TNT)</i>
Flame	Flammable	Substances that catch fire easily when exposed to heat, sparks, or friction. <i>(Examples: Petrol, acetone)</i>
Flame over Circle	Oxidizing	Products that release oxygen, which can cause or intensify fires. <i>(Examples: Hydrogen peroxide, chlorine)</i>
Gas Cylinder	Gas under Pressure	Contains compressed gas that may explode when heated or cause cryogenic burns. <i>(Examples: Propane cylinders, oxygen tanks)</i>
Corrosion	Corrosive	Chemicals that can burn skin, damage eyes, or erode metals. <i>(Examples: Sulfuric acid, drain cleaners)</i>
Skull & Crossbones	Acute Toxicity	Toxic materials that can cause serious injury or death, even in small amounts. <i>(Examples: Pesticides, methanol)</i>
Exclamation Mark	Harmful / Irritant	Substances that can cause skin/eye irritation, allergic reactions, or drowsiness. <i>(Examples: Paint thinners, household detergents)</i>

HAZARDOUS PICTOGRAMS





CARCINOGENIC



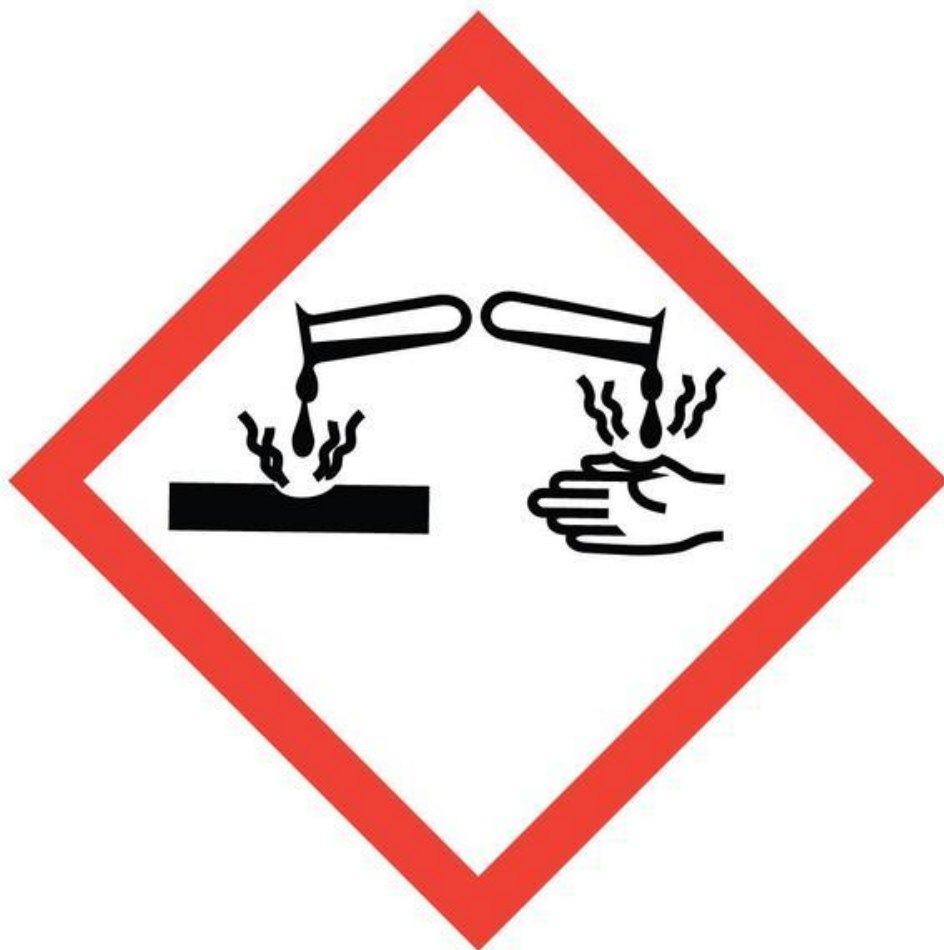
FLAMMABLE



HARMFUL IRRITANT

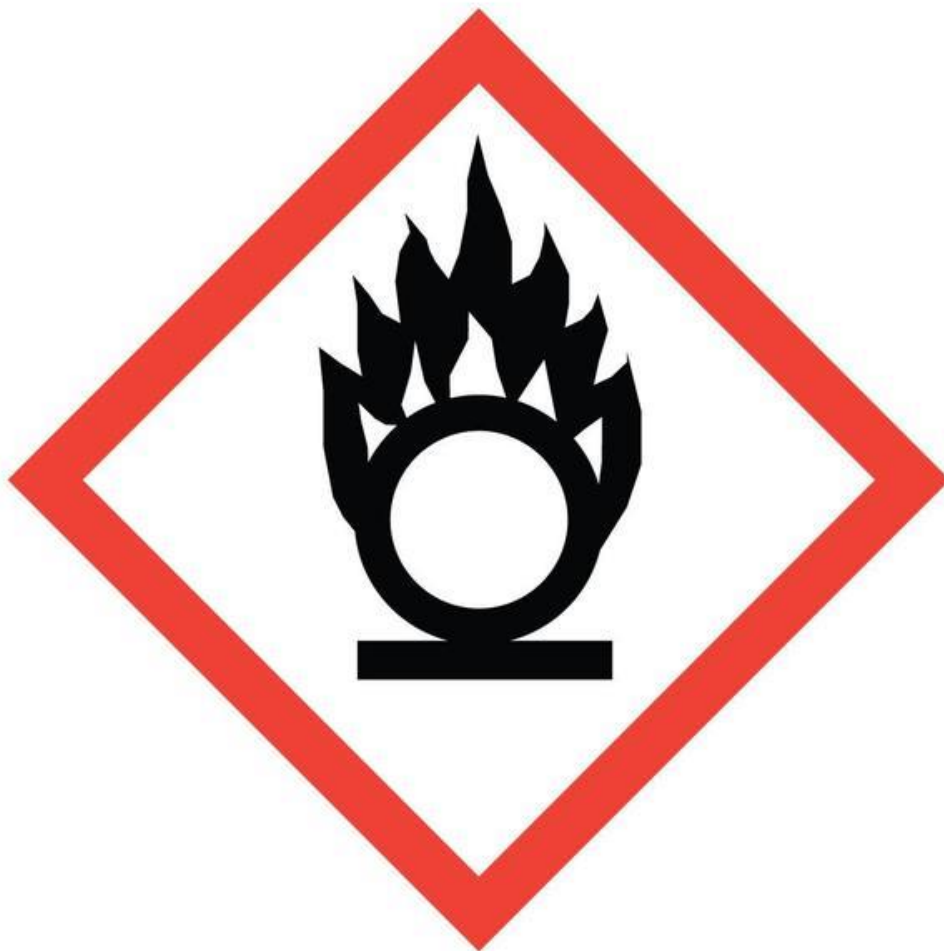


COMPRESSED GAS





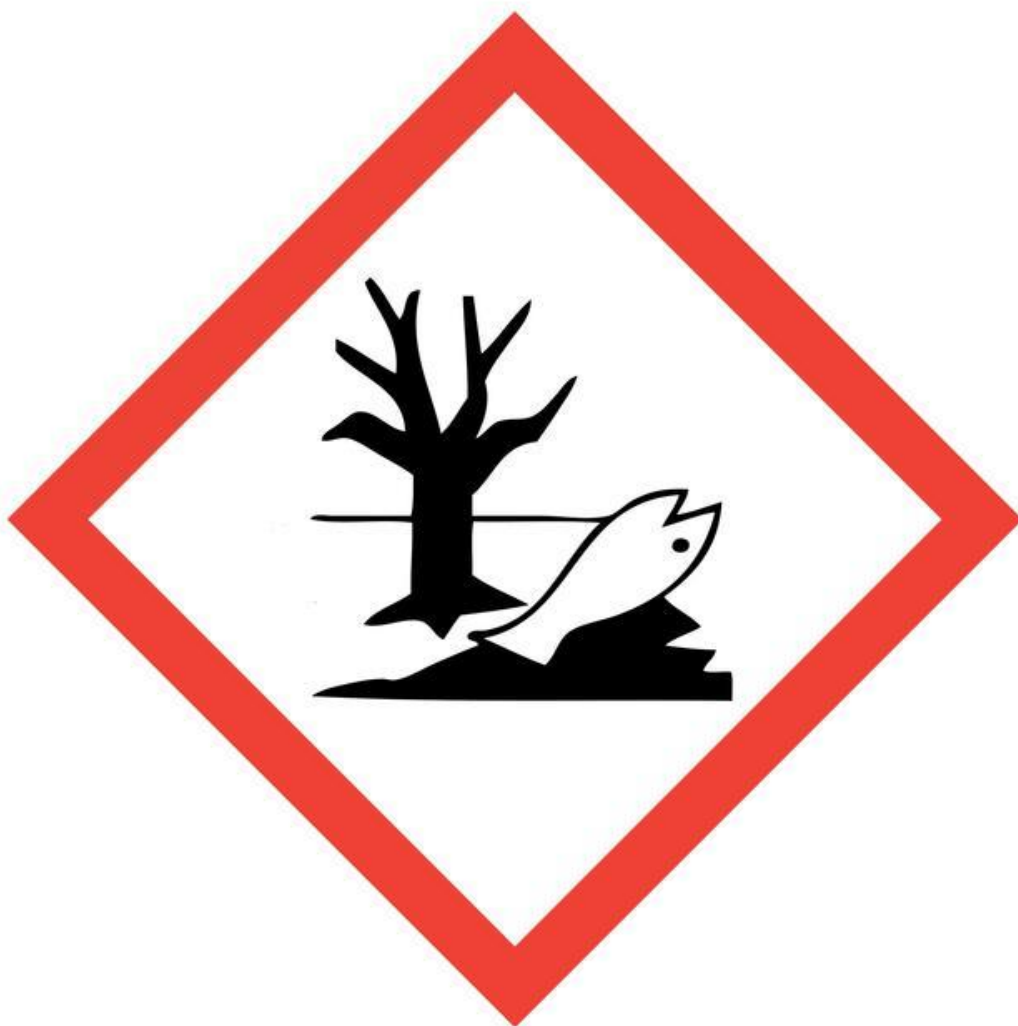
EXPLODING BOMB OR EXPLOSIVE



OXIDIZING



ACUTE TOXICITY



ENVIRONMENTAL HAZARDS

ASSESSMENT

1. Give two examples of liquid chemical
2. List two examples of solid chemical
3. What are two classifications of chemicals
4. Give three examples of chemicals classified based on their uses
5. Mention four safety measures when handling chemicals
6. Outline two examples of, i. highly hazardous chemical ii. Moderately hazardous chemicals

