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General Science (I) Charts, School Education

Product Image

The Cell Theory

Unicellular and Multicellular Organisms

As proposed by Schleiden (1804-1881) and Theodore Schwann (1810-1882) and modified by Rudolf Virchow (1858), The Cell Theory may be summed up as:

1. All living things are composed of one or more cells.
2. All cells arise from pre-existing cells.
3. All cells are basically alike in chemical composition and metabolic activities.
4. The function of an organism as a whole is the outcome of the activities and interactions of the constituent cells.

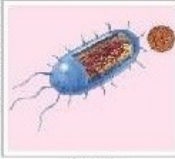
A cell represents the cellular level. In unicellular organisms (single-celled) it performs all the functions in a living organism whereas in multicellular organisms (many-celled), the cell constitutes the basic structural and functional unit of a living organism, like the bricks in a building.

Types of Cells

In general, two types of cells are recognised. These are as follows:

1. Prokaryotic


These are simple in structure. Their nucleus is simple. Even the DNA is simple and circular. All membrane-bound organelles are absent. The nuclear membrane, microtubules and cytoplasmic streaming are also absent.
Example: Bacteria cell



Bacteria Cell

2. Eukaryotic


These have a membrane bound nucleus, enclosed by jelly-like fluid mass called cytoplasm, which is further enclosed by cell membrane and cell wall (only in plants). Membrane bound organelles are present. The DNA is complex and linear.
Example: All plant and animal cells.



Plant Cell

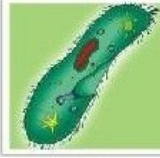
Unicellular Organisms

A unicellular organism is a unit structure of life, which is capable of leading an independent life. Each unicellular organism is capable of performing all the functions within the cell itself. Some of these unicellular organisms are given below.




Amoeba

Amoeba is a protozoa which locomotes by pseudopodia. It reproduces usually by binary fission.




Paramecium

Paramecium reproduces by binary or multiple fission and conjugation. Locomotion is by cilia.



Bacteria

Bacteria is present in soil, air and water and in living beings as parasite.




Plankton


Plankton is present in the upper layers of sea water. It is a source of food for large marine animals.

Multicellular Organisms


Those organisms which consist of aggregation of many cells and some of which become specialised to perform essential functions of life are called multicellular organisms. Levels of organisation in a multicellular organism are given below.



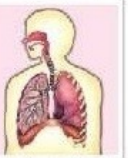
Cell



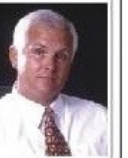
Tissues



Organ



Organ System



Organism

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Description

Standard Size: 58x90cms

Language: English

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A. Charts, Basic Agricultural Practices



B. Charts, Renewable Sources of Energy



C. Charts, Petroleum & Natural Gas

D. Charts, Nitrogen Cycle

Petroleum & Natural Gas

Petroleum was formed from organisms living in the sea. As the organisms died, their remains settled at the bottom of the sea and got covered with layers of sand and silt. Over a period of millions of years, high pressure and temperature changed the remains of all transformed these dead organisms into petroleum and natural gas. Due to the great commercial importance, petroleum is also called black gold.

Oil and gas are trapped in porous rocks. The oil and gas are trapped in porous rocks. The oil and gas are trapped in porous rocks. The oil and gas are trapped in porous rocks.

Petroleum refined through all well is a dark oily liquid with an unpleasant odour. It is a mixture of various constituents such as petroleum gas, petrol, diesel, kerosene, lubricating oil, etc.

Classification of petroleum are separated by fractional distillation of petroleum in a petro refinery.

Hydrogen gas is the most clean fuel of all fossil fuels. It is highly efficient. CNG is compressed natural gas used in automobiles and for cooking purposes.

Nitrogen Cycle

Nitrogen cycle is a process of nitrogen passing through the ecosystem.

Nitrogen is taken up by plants in the form of nitrate, which is converted into amino acids by plants. Nitrogen is taken by the animals including the human beings. The dead plants and animals and their excreta get nitrogen back to the soil.

General of Nitrogen cycle

Conversion of Nitrogen by Lightning and Animals

Conversion of Nitrogen to Soil

Lightning converts nitrogen in the air into nitrate ions. These nitrate ions are used by plants to make proteins. Animals eat plants and get these proteins. Animals excrete nitrogen back to the soil.

Animals excrete nitrogen back to the soil.

Animals excrete nitrogen back to the soil.

Animals excrete nitrogen back to the soil.

E. Charts, Levels of Organisation

F. Charts, DNA

Levels of Organisation

In the living world there are different levels of organisation. The highest level of organisation of the individual living beings is organisms. The biggest level of living organisations is biosphere (including all living beings in the world). Biosphere includes all the ecosystems which are large and small geographical regions.

1. ATOM LEVEL

2. MOLECULE LEVEL

3. CELL STRUCTURE LEVEL (FOR ANIMALS)

4. ORGAN LEVEL

5. ORGAN SYSTEM LEVEL

6. ORGANISM LEVEL

7. POPULATION LEVEL

8. COMMUNITY

9. ECOSYSTEM

10. BIOSPHERE

Different levels of organisation in the living world (atomic level to biosphere level)

DNA

Deoxyribonucleic acid (DNA) is the most important constituent of chromosomes. DNA carries all genetic information.

DNA is a long chain of nucleotides. DNA structure was first suggested by James Watson and Francis Crick in 1953.

1. DNA structure (sugar-phosphate chain)

2. DNA structure (sugar-phosphate chain)

3. Double helix DNA structure (sugar-phosphate chain)

Nucleotide DNA

Nucleotide is the structural unit of DNA. A nucleotide has a nitrogenous base, a phosphate group and a deoxyribose sugar.

Nitrogenous Base

Purines: Adenine, Guanine

Pyrimidines: Cytosine, Thymine

Two polynucleotide chains are in the form of a double helix. Each strand has a backbone of sugar and phosphate molecules joined with each other. Nitrogenous bases are attached to sugar molecules and successively attached to form a weak bond. A weak base of C-G, A-T, C-G, A-T. A-T-C-G-T. Complementary base pairing.

G. Charts, Cellular Respiration

H. Charts, Origin of Life

Medicinal Plants-1

1. ALOE VERA
ALOE BARBADENSIS
 Medicinal plant

2. ONION
ALLIUM CEPA
 Medicinal plant

3. TULSI
OCIMUM SACRUM
 Medicinal plant

4. LEMON
CITRUS LIMON
 Medicinal plant

5. GARLIC
ALLIUM SATIVUM
 Medicinal plant

6. TURMERIC
CURCUMA LONGA
 Medicinal plant

7. GINGER
ZINGIBER OFFICINALE
 Medicinal plant

8. PEPPERMINT
MENTHA SPICATA
 Medicinal plant

9. EUCALYPTUS
EUCALYPTUS GLOBULUS
 Medicinal plant

10. SAGE
Salvia officinalis
 Medicinal plant

11. FENNEL
Foeniculum vulgare
 Medicinal plant

12. ANISE
Pimpinella anisum
 Medicinal plant

13. CORIANDRUM
Coriandrum sativum
 Medicinal plant

14. CUMIN
Cuminum cyminum
 Medicinal plant

15. MUSTARD
Brassica sinensis
 Medicinal plant

Energy Needs

Energy is required to perform different tasks

Hydro Energy
 Energy from water is called hydro energy. It is a renewable energy source.

Chemical Energy
 Chemical energy is stored in the bonds between atoms and molecules.

Solar Energy
 Solar energy is the energy that comes from the sun.

Wind Energy
 Wind energy is the energy that comes from the wind.

Bio Energy
 Bio energy is the energy that comes from living organisms.

Geothermal Energy
 Geothermal energy is the energy that comes from the earth's interior.

Nuclear Energy
 Nuclear energy is the energy that comes from the nucleus of an atom.

Sound Energy
 Sound energy is the energy that comes from vibrating objects.

Light Energy
 Light energy is the energy that comes from light sources.

M.Charts, Bio - Gas

N. Charts, Animal Husbandry

BIO - GAS

Animal and plant wastes are easily degraded by anaerobic micro-organisms in the presence of water. In this process gases such as methane, carbon dioxide, hydrogen and hydrogen sulphide are produced. This mixture of gases is called biogas. Biogas can be burned in gas stoves to give heat. It can also be used for streetlight and for running engines. Two practical designs of biogas plants have been generally used - The Fixed-Dome Type and The Floating Gas Holder Type.

FIXED-DOME TYPE BIO-GAS PLANT

FLOATING GAS HOLDER TYPE BIO-GAS PLANT

USES OF BIO-GAS

- Streetlight
- Cooking
- Manure

Animal Husbandry

Systematic rearing, caring and improvement of domestic animals is called Animal Husbandry.

Important Steps Involved in Animal Husbandry

- Breeding**
- Feeding**
- Weeding**
- Health**

Feed for Cattle

Feed for Cattle	Feed for Poultry	Feed for Sheep and Goat
Plants, coarse and low-moisture straw, cutch, hay, fodder, etc.	It includes grains, animal by-products, fish and farm wastes containing essential nutrients like bags, wheat and maize. Some more nutritive food containing green grass, chlorella, green, etc.	When reared for wool, they are fed on green weeds, herbs and farm wastes containing essential nutrients like bags, wheat and maize. Some more nutritive food containing green grass, chlorella, green, etc.

With Water Requirement Summary

Animal	Water	Feed	Cost	Yield	Height
Cattle	1.5L	100g	1000	1000	1000

Other Sections: Poultry, Apiculture, Fisheries, Sericulture.

O. Charts, Fossil Fuels

P. Charts, Nuclear Energy

Fossil Fuels

The term 'Fossil' refers to parts of dead plants and animals that have been preserved in nature for thousands of years. These fossils which are used to obtain energy in any form are called fossil fuels. For eg: coal, petroleum, etc.

TYPES OF FUELS

Solid Fuels

Wood, coal and coke are important solid fuels. Coal is a result of carbonization of wood and other vegetation buried for a long time under the earth's surface. Coke is a solid fuel. Coke is obtained by heating coal in absence of air.



Liquid Fuels

Petroleum is the most important liquid fuel. It is a mixture of thousands of liquid and solid. Benzene and alcohol are other important liquid fuels. Automobiles use liquid fuel.



Gaseous Fuels

Natural gas, the gas that is formed naturally along with petroleum deposits, is the most common type of gaseous fuel. Water gas and coke gas are other examples of gaseous fuels. LPG is used in cooking gas cylinders.



Characteristics of a Good Fuel

- A good fuel should not have any waste product on burning.
- It should have a high calorific value.
- It should burn with very pollution.
- It should be easy to store, transport and handle.
- It should have a convenient ignition temperature.
- It should have a low ignition temperature.

Fuel	Calorific Value (kJ/kg)
Coal	33
Wood	17
Coke	34
Hydrogen	142
Alcohol	30
Gasoline	44
Oil	44
Propane	50
Butane	49
Coal gas	17
Water gas	14
Biogas	40
Hydrogen	142

Calorific Value

It is the heat energy liberated when 1 kg of fuel is burnt completely under ideal conditions. High calorific value implies that the fuel releases more energy per unit of mass burnt. Gaseous fuels have the highest calorific value and solid fuels generally have the lowest.


Uses of Coal Products

Coke: It is the residue left behind after destructive distillation of coal and used as a reducing agent in metallurgical process.
Coal gas: It is a mixture of hydrogen, methane, carbon monoxide and other gases. It is used as fuel for domestic cooking and lighting.
Coal tar: It is a mixture of several carbon compounds. These compounds yield many important organic compounds, such as benzene, toluene, naphthalene, etc. It is used for making pesticides.
Ammoniacal liquor: When dissolved in water, they give ammoniacal liquor which is used to make ammoniacal fertilizers.

Nuclear Energy

Nuclear Energy Power Plant


In a nuclear reactor energy released is utilized to heat water and make steam. The steam is used to rotate turbines to generate electricity.



Sources of Nuclear Energy

Fission

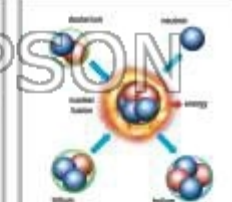
Breaking up of a heavy nucleus like that of uranium into lighter elements and neutrons is called fission. Uncontrolled fission is a chain reaction.

$${}^{235}_{92}\text{U} + {}^1_0\text{n} \rightarrow {}^{141}_{54}\text{Ba} + {}^{92}_{38}\text{Kr} + 3{}^1_0\text{n} + \text{Energy}$$


Uncontrolled Chain Reaction

Fusion


The nucleus of hydrogen isotopes atoms join to form the nucleus of the helium atom. In this reaction tremendous amount of energy is released.

$${}^2_1\text{H} + {}^3_1\text{H} \rightarrow {}^4_2\text{He} + {}^1_0\text{n} + \text{Energy}$$


Controlled Chain Reaction

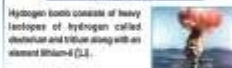
Atomic Bomb

The highly destructive nuclear bomb is based on nuclear fission. Reaction of uranium-235 and plutonium-239 forms the atomic bomb.



Hydrogen Bomb

Hydrogen bomb consists of heavy isotopes of hydrogen called deuterium and tritium along with an element lithium-6 (Li).



Uses of Nuclear Energy

- Nuclear energy is used to produce electricity.
- Nuclear energy is used in Radiotherapy.
- Nuclear energy is used to make nuclear weapons.

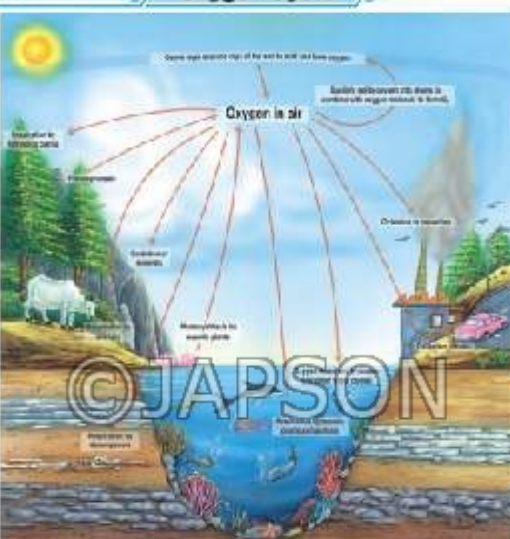
Effects of Nuclear Radiation

- Genetic Damages:** Exposure to radiation causes effect generations.
- Health Hazards:** Radiation increases chances of cancer.
- Radioactive Contamination:** Radiation badly affects natural resources like water, soil, air etc.


Q. Charts, Oxygen Cycle


R. Charts, Medicinal Plants-2


Oxygen Cycle





Uses of Oxygen


 Combustion


 Respiration


 Diving

 Space suits

 Steel industries

 Lab for studies

 Paper industries

 Household industries

Medicinal Plants-2

01. RED FRUIT 02. LEMON 03. CITRUS FRUIT 04. CITRUS FRUIT	05. BLACK PEPPER 06. ALLIUM 07. GARLIC 08. GARLIC	09. PEPPERMINT 10. MINT 11. MINT 12. MINT
13. GINGER 14. GINGER 15. GINGER 16. GINGER	17. TURMERIC 18. TURMERIC 19. TURMERIC 20. TURMERIC	21. CORIANDER 22. CORIANDER 23. CORIANDER 24. CORIANDER
25. CUCUMBER 26. CUCUMBER 27. CUCUMBER 28. CUCUMBER	29. ONION 30. ONION 31. ONION 32. ONION	33. GARLIC 34. GARLIC 35. GARLIC 36. GARLIC
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S. Charts, The Cell Theory

The Cell Theory

Unicellular and Multicellular Organisms

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1. All living things are composed of one or more cells.
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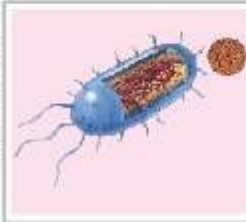
Types of Cells

In general, two types of cells are recognised. These are as follows:

1. Prokaryotic

These are simple in structure. Their nucleus is simple. Even the DNA is simple and circular. All membrane-bound organelles are absent. The nuclear membrane, microtubules and cytoplasmic streaming are also absent.

Example: Bacteria cell



Bacteria Cell

2. Eukaryotic

These have a membrane bound nucleus enclosed by jelly-like fluid mass called cytoplasm, which is further enclosed by cell membrane and cell wall (only in plants). Membrane bound organelles are present. The DNA is complex and linear.

Example: All plant and animal cells.



Plant Cell

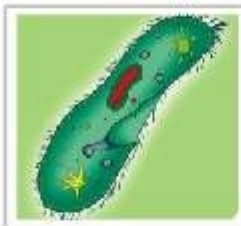
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Amoeba

Amoeba is a protozoa which locomotes by pseudopodia. It reproduces usually by binary fission.



Paramecium

Paramecium reproduces by binary or multiple fission and conjugation. Locomotion is by cilia.



Bacteria

Bacteria is present in soil, air and water and in living beings as parasite.



Plankton

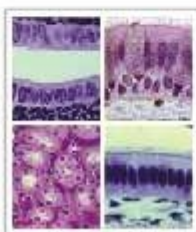
Plankton is present in the upper layers of sea water. It is a source of food for large marine animals.

Multicellular Organisms

Those organisms which consist of aggregation of many cells and some of which become specialised to perform essential functions of life are called multicellular organisms. Levels of organisation in a multicellular organism are given below:



Cell



Tissues



Organ



Organ System



Organism

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