

Std: X

Science

M.M: 100

- Q1**
- A. Answer the following questions (any two) (6)**
- 1. Explain with the help of diagram the working of an internal combustion heat engine.**
 - 2. Describe the experiment of destructive distillation of coal.**
 - 3. Explain the importance of water in our body.**
- B. Answer the following in brief (any five) (10)**
- 1. State the advantages of biogas plant.**
 - 2. Write the method of obtaining gaseous fuel from coal.**
 - 3. Distinguish between renewable and nonrenewable sources of energy.**
 - 4. Give four characteristic symptoms of marasmus disorder.**
 - 5. Explain Complete and Incomplete combustion**
 - 6. Why is petroleum considered as the 'black liquid gold'?**
- C. Answer the following in one sentence: (4)**
- 1. What is the range of wavelength of UV waves?**
 - 2. Why the calorific value of wood is less than that of methane?**
 - 3. Which process is used to prepare ammonia on large scale?**
 - 4. What do you mean by 1 watt power?**
- Q2**
- A. Answer the following questions (any two) (6)**
- 1. Name any three minerals, their sources and state their functions.**
 - 2. State alterations which occur in stored food grains by abiotic factors.**
 - 3. What preventive measures should be taken to preserve public health?**
- B. Answer the following (any five) (10)**
- 1. State possible reasons for dehydration.**
 - 2. What are carcinogens? Name four Carcinogenic substances?**

3. State the cause of spoilage of fruits and vegetables.
4. What type of seeds should be selected for sowing?
5. Write two sources of each (a) Proteins (b) fats (c) Iodine (d) Vitamin A.
6. Explain briefly the method artificial insemination

C. Answer the following in one sentences (4)

1. Which disease is caused by deficiency of Iodine?
2. Which synthetic fertilizer increases alkalinity of the soil?
3. Define calorific value.
4. What are enzymes made up of?

Q3 A. Answer the following questions (any two) (6)

1. Describe nitrogen cycle.
2. State the difference between the true solution, colloidal solution and suspension.
3. Describe the electrolytic refining of copper metal.

B. Answer the following (any five) (10)

1. Explain the role plants in the balance of the ecosystem
2. What happens if the potable water contains more fluoride or iodine?
3. Write four uses of sodium carbonate
4. What is a sanctuary ?
5. What is greenhouse effect?
6. Explain the term 'Producers'.

C. Answer the following in one sentence: (4)

1. Which is the largest natural ecosystem?
2. What is the diameter of solute particles in a true solution?
3. Write the full form of WWF.
4. Define ecosystem.

Q4 A. Answer the following questions (any two) (6)

1. Explain with neat and labelled diagram the preparation of methane gas.
2. Explain how pure alumina is obtained from bauxite by Bayer's process.
3. State the physical and chemical properties of non-metallic elements.

B. Answer the following in brief (any five) (10)

1. Write a chemical reaction involved when aluminium metal is dropped in boiling water.
2. Name two ores each of sulphur and phosphorus (with formula).
3. Explain cracking process with illustrations.
4. What are hydrocarbons? Give two examples of each type.
5. Why silicon is considered a semi metal ?
6. Why aluminium is said to be an amphoteric metal? Give examples.

C. Answer the following in one sentence: (4)

1. Name the neutral oxide of carbon.
2. Of which metals are dolomite & malachite the ores?
3. What is molecular formula of Epsom salt?
4. Write the general formula of the Alkene series

Q5 A. Answer the following (any two) (6)

1. Write a note on allotropes of phosphorus.
2. Write a note on the rocket engine with liquid fuel. Draw a neat labelled diagram also.
3. What is a black hole? Explain how it is formed.

B. Answer the following (any five) (10)

1. Explain how a white dwarf star is formed out of a red giant star phase.
2. Why life is not possible on planets far from sun?
3. What are red shift and blue shift?
4. Write four uses of sodium chloride.
5. Give two differences between Rocket engine with solid fuel and Rocket engine with liquid fuel.
6. What is Supernova explosion?

C. Answer the following in one sentences (4)

1. Which state of star is called its middle age?
2. What is a meteorite?
3. What is the temperature on the surface of Venus?
4. What are the two main types of Galaxies

STD X

Sub : Science

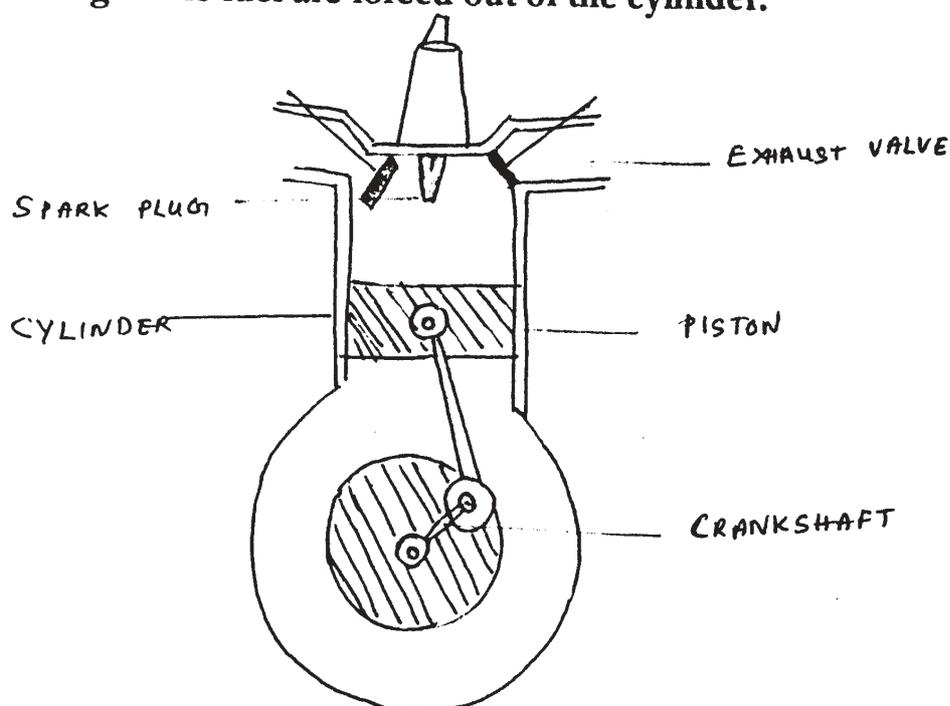
Solution :-

I A

1. Working of internal combustion engine :

The whole working cycle is divided into five stages:

- 1) Intake : The mixture of properly mixed air and fuel is entered into the cylinder.
- 2) Compression : The mixture is compressed by the piston.
- 3) Ignition : The mixture is ignited by a device like spark plug.
- 4) Expansion : The gases produced at high temperature and high pressure as a result of burning of the fuel, propel the piston towards outside of the cylinder.
- 5) Exhaust : The exhaust valve opens and gases produced during the burning of the fuel are forced out of the cylinder.



INTAKE POSITION . INTERNAL COMBUSTION ENGINE

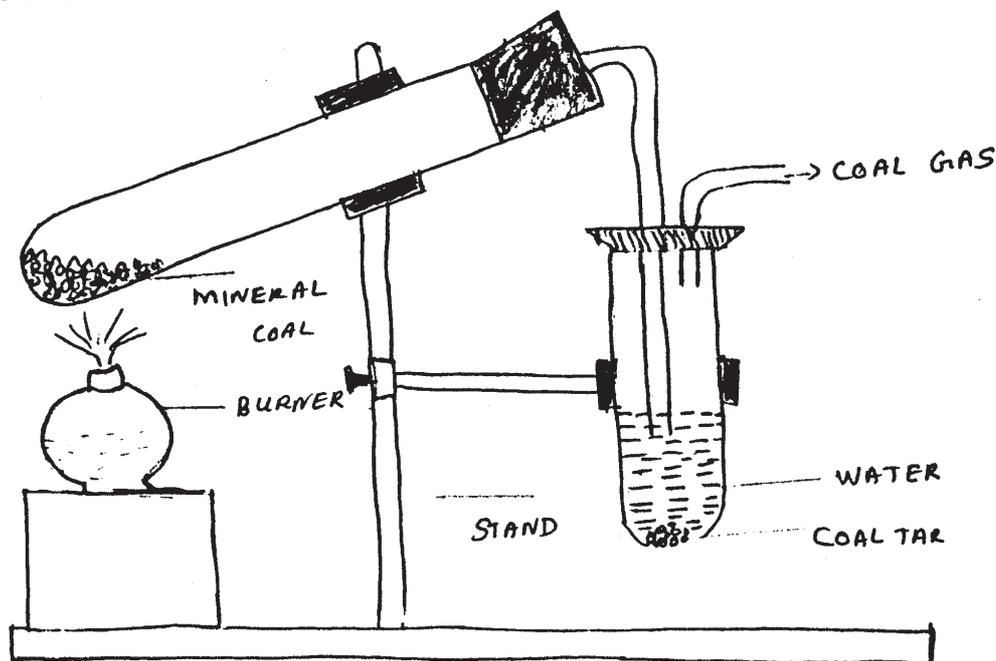
Repeating this process again and again the wheel linked with the piston by a crank shaft rotates and mechanical work is obtained.

2. Destructive distillation of coal :-

Aim : To examine the components obtained after destructive distillation of coal.

Apparatus : Hard glass test tube, test tube; bent glass tube, burners, stand, cork, delivery tube, mineral coal, water litmus paper.

Method : Take some mineral coal in a hard glass test tube. Arrange the apparatus as shown in the figure. Heat the coal with the help of burner in absence of air.



Observation : The gas which come out from the end of the tube is coal gas. It burns with blue flame.

- The thick liquid that remains at the end of the tube containing water is known as coal tar.
- The gas dissolved in the water is called Ammonia gas. This can be checked with the help of litmus papers.
- The hard and porous substance left in the hard glass tube is coke.

Conclusion : We obtain coke, coal tar , coal gas and ammonia by the destructive distillation of coal.

3. Importance of water in our body : _____

- Water is the basic requirement for all the living beings.
- In human body, the water content in cell is 70-90 %.
- The 60% of our body weight is due to water .
- 10% loss of water in our body leads to dehydration.
- 20% water loss may result in one's death.
- Water is the necessary medium for the transportation of various nutrients, gases, minerals etc.

- The thermoregulation of the body is due to the high specific heat of water.
- Water helps to keep our body healthy and fit. In the absence of water no bodily function can take place.

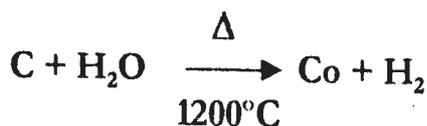
I B.

1. Advantages of biogas Plant :

- Construction of the plant is easy.
- Garbage, Agricultural wastes, human excreta etc. are used to produce gas. So the garbage and other wastes can be got rid off.
- It does not create pollution.
- It is odour less gas and does not produce smoke.
- The byproduct can be used as manure.

2. Method of obtaining gaseous fuel from coal:

- German Scientist Fischer and Tropsch have developed a method of obtaining gaseous fuel from coal.
- Steam is allowed to pass over the layers of Coke at 1200°C. Thus water gas is obtained.



- After removing impurities from water gas more hydrogen is mixed and this mixture is made to pass over cobalt molybdenum catalyst at 200° C under one atmosphere pressure

- Carbon monoxide gets reduced to yield methane.



Thus, we get water gas and methane .

3. Renewable Sources

1. These sources are in exhaustible
2. They do not create pollution
3. These sources are not very costly.
4. Eg: Solar energy, tidal energy.
5. They are available in ample quantity

Non-Renewable Sources

1. These sources will get exhausted after some time.
2. They create a lot of pollution
3. These sources are costly.
4. Eg: Coal, mineral oil, natural gas.
5. They are available in limited quantity

4. Characteristic symptoms of Marasmus :-

- Water content of the body is reduced.
- Skin become loose and wrinkled as in senile persons.
- Child looks like a bag of bones.
- Exhibits craving for food and keep crying for the same through the day.

5. Complete combustion :

- Combustion taking place in the presence of adequate amount of oxygen.
- It produces good amount of heat
- Colour of the flame will be blue.
- Flame of a stove is an example.

Incomplete combustion :

- Combustion taking place when the supply of oxygen is not adequate.
- It produces less heat.
- Colour of the flame will be yellow.
- Light given by a kerosene lamp is an example.

6. Petroleum – black liquid gold

- Petroleum is dark black coloured liquid.
- Fractional distillation of petroleum yields many precious products .
- Many valuable things can be made out these products.
- Thus as petroleum yields such valuable products it is considered as gold.

I C.

1. The range of wavelength of UV-rays is 100 \AA° ---- 4000 \AA° .
2. the ratio of hydrogen to carbon is more in methane thus having high calorific value.
3. Habers process is used to make ammonia in large scale.
4. If 1 joule of work is done in 1 second. Then power is 1 watt.

II A

1. Mineral

Iodine

Sources

Fish, seafood, iodised table salt

Function

Synthesis of thyroid hormone

Calcium

Milk & Milk products, pulses,
Leafy vegetables, cereals, gingli
Seeds, soyabeans, Bengal gram
Black gram

Structure of bone
Coagulation of blood
Conduction of nerve pulses

Sulphur

Onions, dry fruits

As a component of sulphur containing Aminoacids

2. Alterations occur in stored food grains by abiotic factors.

Moisture, Temperature, metallic containers are abiotic factors:

MOISTURE:

Higher moisture level increases the overall grain dimensions.

- Moisture accelerates the rate of enzymatic activities.
- Moisture facilitates increase in populations of micro organisms.
- Respiratory activities of bacteria leads to rise in temperature which is known as dry combustion.
- Due to the high temperature growth of fungi increases result in the increase of temperature and water content of grains which is known as wet combustion.

Temperature :-

- Insect pest thrive at a temperature range 30 - 32°C.
- Micro organisms thrive very well at 30 - 40°C.

Metallic containers :-

- According to material, chemical reaction may take place resulting in the formation of toxic effects.
- Sour or citrus fruits stored in copper containers results in the production of poisonous compounds.
- Lead container also produce toxic compounds.

3. Preserving public health :

- Mass education about health awareness .
- Health awareness can be propagated by films, pamphlets and posters and slogans.
- Due precautionary measures to be taken by person who looks after the patient.
- Proper information about the occurrence of pathogens and their vectors to be given to the public.
- Persons suffering from infectious diseases should be isolated.
- Medical and health officers have to come out with official declarations to warn the public .
- Mass immunization and development of protective vaccines.
- Restriction to be kept on movements of diseased persons from place to place.

- Prompt attention and proper medical treatment to be given to the patients.

II B**1. Reasons for dehydration.**

- Excessive loss of water through perspiration
- Vomiting
- Diseases like diarrhoea, dysentery.
- Less intake of water.

2. The agents or the substances that induce cancerous growth are known as carcinogens.

Eg. DDT, BHC, Arsenic, asbestos.

3. Causes of spoilage of fruits and vegetables:

- Lack of proper and speedy transportation.
- High water content of fruits and vegetables
- Over ripening
- When rotten ones kept with fresh stock
- Lack of consciousness about preservation.
- Lack of proper storage place.

4. Seeds selected for sowing should be:

- Of high quality
- Quick developing
- Of high capacity
- Disease resistant
- Drought resistant

5. Sources :

- Proteins – Milk, Egg
- Fats – Ghee, Butter
- Iodine – Fish, sea foods
- Vitamin A – carrots, liver

6. Artificial Insemination :

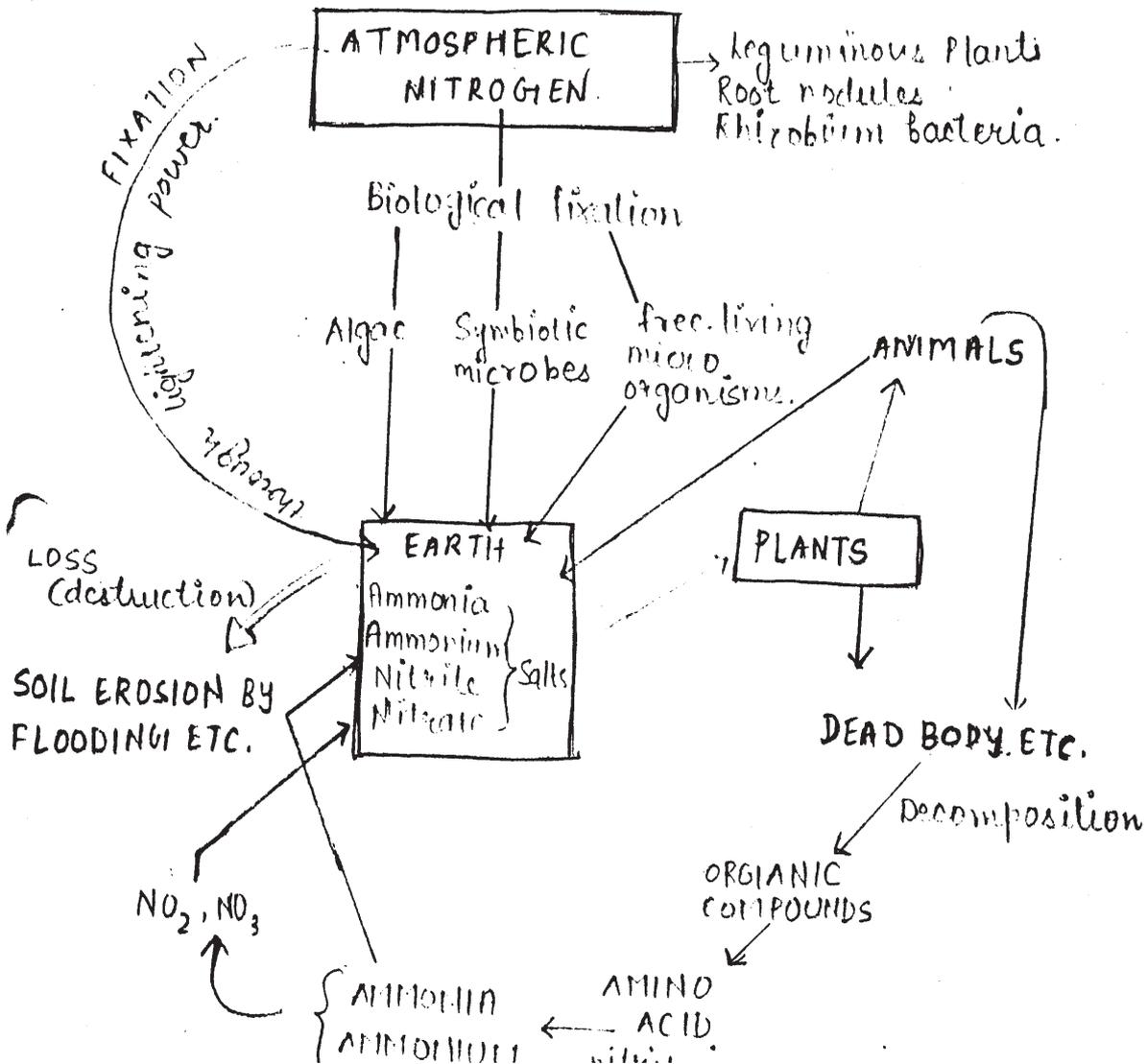
- The male animals are excited artificially and the semen is collected.

- The collected semen is injected in the vagina of female animal using a syringe.
- This method is used to produce desirable hybrid variety of animals.
- The semen samples can be liquid nitrogen and can be transported to different places.
- Many sperm banks are established for this purpose. Bidaj animal farm near Ahmedabad is an example.

II C.

1. Goitre is caused by the deficiency of iodine.
2. Sodium nitrate increases alkalinity of soil.
3. Heat produced by burning 1gm of fuel is known as its calorific value.
4. Enzymes are made up of proteins.

III A. figure:



- The amount of nitrogen in atmosphere is about 78%.
- Bacteria residing in the root nodules of the leguminous plants fixes atmospheric nitrogen into soil.
- Blue green algae Nostoc and anabaena converts free nitrogen into its salts.
- Dead and decaying plants and animals as well as excretory products of animals are converted by micro organisms into simple compounds.
- The denitrifying bacteria converts these organic compounds into inorganic salts like ammonia, nitrites, nitrates etc.
- Plants utilize this from the soils, when animals consume plants they also get necessary nitrogen for protein synthesis.
- The nitrogen cycle keep going on in this manner.

2. True Solution

Solute particles are
Of size 10^{-10} cm

Particles cannot be
Seen under micro-
scope.

Eg: Salt & sugar sol.

Colloidal solution

Solute particle size is
from $10^{-5} - 10^{-7}$ cm.

The particles are in
emulsion form

Milk, gum, collagen

Suspension

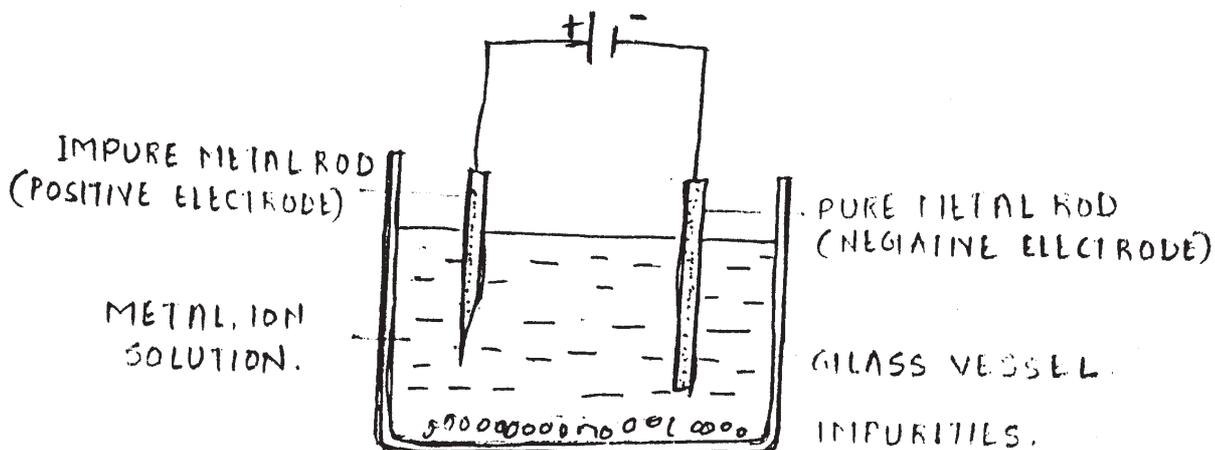
Solute particles size is 2×10^{-5} cm

can be seen under microscope

Muddy water.

3.

figure :



- Thin strip of pure copper is taken as negative electrode
- Rod of impure copper is taken as positive electrode.

- Metallic salt solution ,ie copper sulphate solution is taken as electrolyte.
- On passing electric current pure copper will get collected at the negative electrode.

III B.

1. Role of plants in balance of ecosystem :

- Decreases CO₂ level
- Prevents soil erosion
- Provides sufficient energy.
- Provide food to consumers.
- Protects natural resources.
- Bring the rain

2. If the potable water contains more than 0.8 pm then it will cause flurosis. If the potable water contains more iodine, it will lead to unnecessary stimulation of all bodily activities and create disturbances in the functioning of thyroid gland. It may lead to goiter.

3. Uses of sodium Carbonate :

- Making glass, water glass
- Preparation of Caustic soda.
- Making hard water soft.
- Used as washing soda.

4. Sanctuary :

- Place where animals live in their natural surroundings.
- It is a protected part of a forest.
- Hunting of animals is restricted here.
- Population of animals can be increased.
- Animals get enough food and shelter.

5. Green house effect :

- Methane , Ozone, CO₂ etc in the atmosphere absorbs heat.
- They absorb the reflected sun rays which results in global warming.
- This may lead to melting of ice in polar region and may cause rise in the sea level.
- *This effect is known as green house effect .*

6. Producers :

- Organisms that prepare their own food.
- Eg. Green plants
- They provide food for consumers.

- They manufacture carbohydrate by the process of photosynthesis.

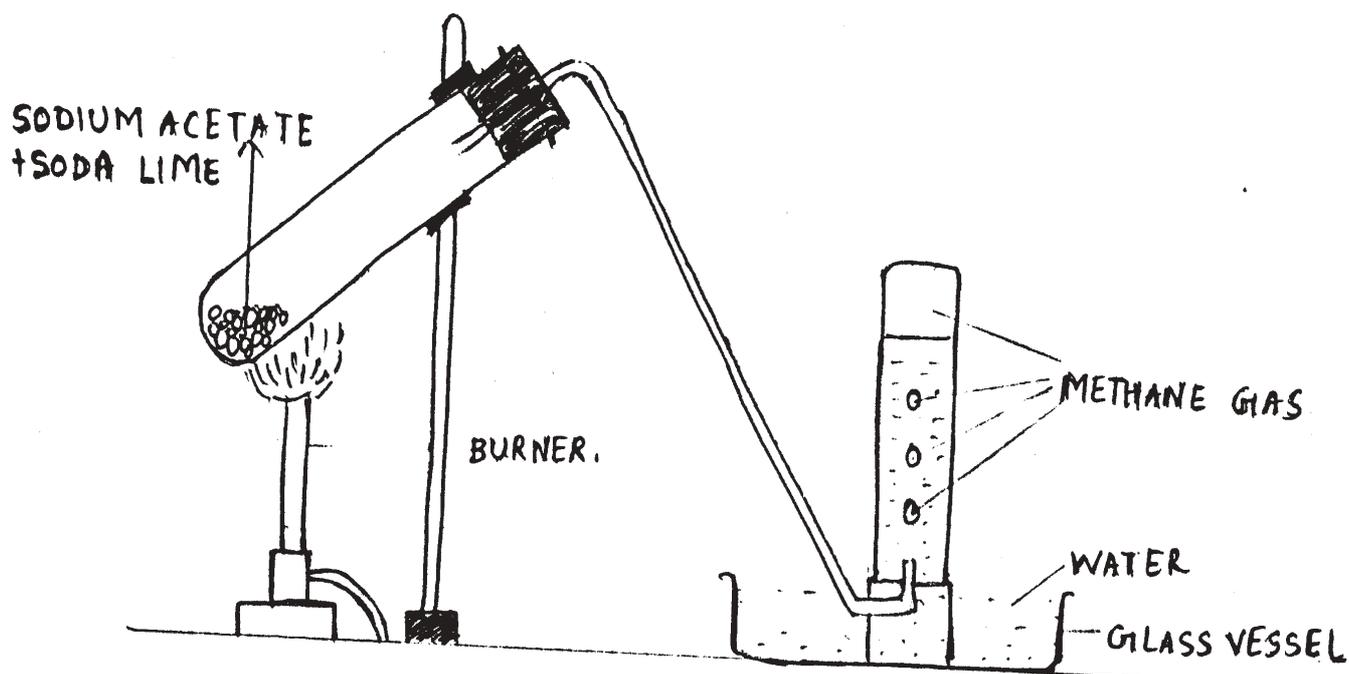
III C.

1. The marine ecosystem is the largest ecosystem.
2. The diameter of solute in true solution is 10^{-8} cm.
3. The full form of WWF is World Wide Fund for nature.
4. The undivided, inter related, interdependent unit of environment which includes both biotic and abiotic components is called an ecosystem.

IV A.

1. Preparation of Methane gas.

Figure :



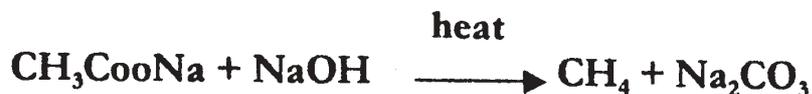
Aim: To prepare methane gas in laboratory.

Apparatus : Sodium acetate, soda lime, water, bee hive shelf, delivery tube, test tube.

Procedure :

- Take 2 gms of sodium acetate and 2gms of soda lime.

- Heat the mixture on a burner after arranging the apparatus as shown in figure.
- Methane gas is produced and can be collected by the downward displacement of water.



Observation :

- Methane is a colourless, odourless, insoluble gas.

2. Bayers Process :

- ❖ Bauxite ($\text{Al}_2\text{O}_3 \cdot 2\text{H}_2\text{O}$) is first roasted and ferrous oxide is converted into ferric oxide.
- ❖ Then it is dried and powdered.
- ❖ Strong solution of caustic soda is added.
- ❖ Heated to 160°C in a closed vessel for 6 to 8 hours at 5 to 6 atmospheric pressure. Sodium aluminate is formed.
- ❖ $\text{Al}_2\text{O}_3 + 2\text{NaOH} \longrightarrow 2\text{NaAlO}_2 + \text{H}_2\text{O}$.
- ❖ Insoluble impurities are filtered out .
- ❖ Sodium aluminate solution is hydrolysed and white gelatinous precipitate of Aluminium hydroxide is formed.
- ❖ $\text{NaAlO}_2 + 2\text{H}_2\text{O} \longrightarrow \text{Al}(\text{OH})_3 \downarrow + \text{NaOH}$.
- ❖ This precipitate is repeatedly washed , with water and dried and heated to 1100°C to obtain 99.5% alumina.



3. Physical properties of non-metallic elements :

- Non conduction of heat and electricity.
- Neither malleable nor ductile.
- Luster less
- Dose not produce ringing sound.
- Can not be polished
- Hard brittle.

Chemical properties of non-metallic elements :

- Form oxides with oxygen

- Hydrogen gas will not be liberated on reaction with acids.
- Forms chlorides with chlorine.
- Form hydrides with hydrogen.

IV B

1. When aluminium metal react with boiling water aluminium hydroxide and hydrogen gas are formed



2. Sulphur ores:

Zinc blend – ZnS

Iron pyrite – FeS₂

Phosphorus :

Phosphorite – Ca₃(PO₄)₂

Florepitite – 3Ca₃(PO₄)₂ · CaF₂.

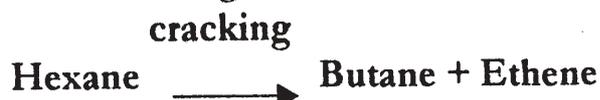
3. Cracking:

Forming small molecules by breaking an organic long molecule.

- Two types
- Heating in the absence of catalyst is thermal cracking.
- Cracking in the presence of a catalyst cracking.

Illustration :-

Thermal cracking :



Catalyst cracking :-

Preparation of ethane in laboratory by cracking of kerosene in presence of porcelain process.

4. Hydrocarbons:

The compounds containing hydrogen and carbon are known as hydrocarbons.

Two types :

- Saturated Hydrocarbons:

Exists only single covalent bonds

Eg. Methane , Ethane (Alkanes)

- Unsaturated hydrocarbons :

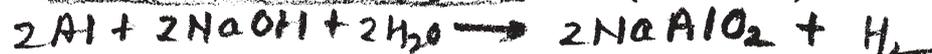
Exists double or triple bonds.

Eg. Ethene , propyne (Alkenes & Alkynes).

5. Silicon as semimetal

- It has luster
- It can be polished
- Some free electrons are available for the conduction of electricity & heat.

6. Aluminium reacts with both acids and bases.



IV C

1. Neutral oxide of carbon is carbon monoxide.
2. dolomite – Calcium
Malachite – Copper
3. Epsom salt – $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$.
4. General formulae of alkenes series is C_nH_{2n}

V A.

1. Allotropes of phosphorus.

There are three allotropes of phosphorus:

- 1) Yellow phosphorus
- 2) Red phosphorus
- 3) Black phosphorus

Yellow phosphorus :

- More active
- Three dimensional arrangement
- One atom is connected to other three atoms
- The arrangement is called P_4

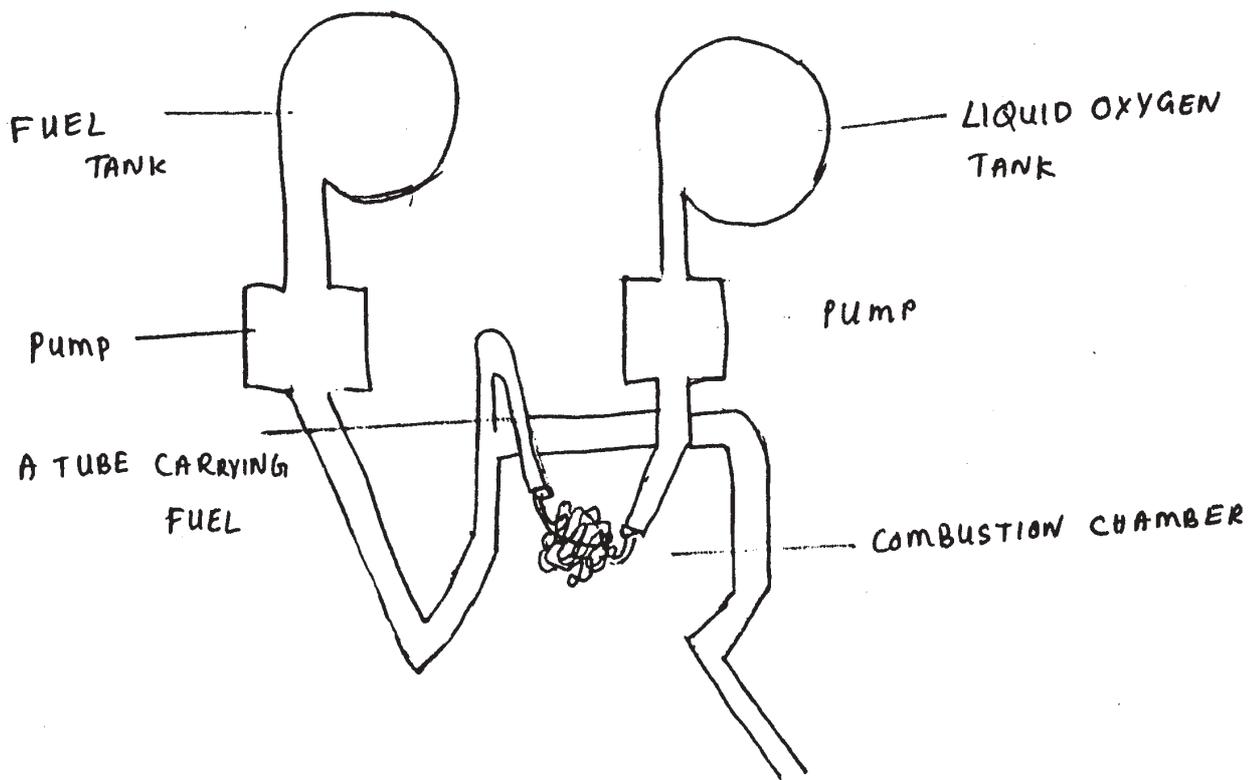
Red phosphorus :

- Less reactive
- Structure is complicated
- Configuration is not defined clearly.

Black phosphorus :

- Least reactive
- Net like arrangement of hexagons
- Metallic character.
- Possess luster
- Conducts electricity to some extent

2. Rocket engine with liquid fuel :



- This rocket works on Newton's 3rd law of motion
- Rocket engine uses liquid fuel.
- There are two tanks, one containing liquid fuel and another containing liquid that supports combustion.
- Combustion of these two takes place in the combustion chamber.
- The gases produced get released from lower open end of rocket.
- These gases thrust the rocket to move in upward direction.
- The rocket when comes back to earth burns due to high friction offered by atmosphere.

3. Black Hole :

A point like object in space through which even radiation can not pass and has infinite density is known as a black hole.

Formation :

- The contraction of a very massive neutron star goes on continuously.
- It experience the infinite contraction and results into a point like object.
- Density becomes so high, because of its gravitational electromagnetic waves cannot get escaped.

- If a star is found to be revolving with no other star at the center, then there is a possibility that there is a black hole at the center.

V B.

1.

- A star with a mass similar to that of our sun would lose its expanding shell after red giant phase.
- The core left behind would gradually condense into an extremely dense ball of matter.
- Helium at the center start converting into heavier elements like carbon.
- Then this small ball glow.
- This phase is known as white dwarf star.

2. Life is not possible on planets far from sun because :

- They are very cold.
- Atmosphere contains poisonous gases.

3. Red Shift :

When a star moves away from earth its frequency decreases and the corresponding spherical line shifts to red.

Blue Shift :

When a star moves towards earth its frequency increases and the corresponding spectral line shift to blue.

4. Uses of Sodium Chloride

- Preparation of washing soda
- Preparation of baking soda
- Preparation of caustic soda
- Preparation of hydrochloric acid.

5. Rocket with solid fuel

- 1) Uses fuel in solid form
- 2) Can be used in missiles
- 3) Can be preserved for long time
- 4) Transportation is easy

Rocket with liquid fuel

- Uses fuel in liquid form
Cannot be used in missiles.
Cannot be preserved for long time
Transportation is difficult.

5. Supernova Explosion :

- After the red giant phase, if the mass of the star is more than our sun, then the contraction continues in the core.

- High temperature is built up in the core.
- The energy liberated causes the outer envelop to explode with a brilliant flash.
- The amount of energy released in one second is same as that radiates by the sun in 100 yrs.
- It would light up the sky for many days.
- The gases liberated during supernova explosion provides raw material for the formation of new stars.

V C.

1. Equilibrium state is known as middle age of a star.
2. The part of meteors which reaches the earth's surface are known as meteorites .
3. The temperature on surface of Venus is 430° C.
4. The two main types of galaxies are
 1. Spiral galaxy
 2. Elliptical galaxy