

Answer any two of the following: (6)

Q.1(A) 1. State the law of conservation of energy and explain the conclusion of Joule's experiment with a neat diagram.

2. With the help of one diagram, explain the construction and working of an internal combustion engine.

3. State the causes, symptoms and treatment of kwashiorkor disorder.

[B] Answer the following (any five) (10)

1. Mention four characteristics of an ideal fuel.

2. State the importance of sodium and iron in our diet. Mention their sources also.

3. State the difference between work and power.

4. Mention differences between petrol and diesel.

5. What are the advantages of using a biogas plant?

6. Mention the uses of a solar cell.

[C] Answer the following in a sentence: (4)

1. What is the main use of coke?

2. State the constituents of the gaseous mixture separated during destructive distillation of coal.

3. State the constituents of anthracite.

4. What is the wavelength of visible light.

Q.2 [A] Answer any two of the following: (6)

1. What is a balanced diet? State the significance of it.

2. Write a short note on Beriberi.

3. What are pollutants? State the various harmful effects of chemical pollutants on human health.

II [B] Answer the following (any five) (10)

1. What is vernalisation? Explain.
2. What is addiction? State the harmful effects of tobacco.
3. What are weeds? How can they be removed.
4. Which two points should be taken into consideration for long time storage grains?
5. Explain: Drip Irrigation.
6. Give differences between vitamin C and vitamin D.

[C] Answer the following in a sentence: (4)

1. Define drying/dehydration.
2. What type of bacteria are present in the droppings of birds?
3. Mention two sexually transmitted diseases.
4. Which implement is used for levelling ploughed soil?

III A. Answer any two of the following: (6)

1. What is natural wealth? State the measures adopted to conserve natural wealth.
2. Explain carbon cycle with a neat diagram.
3. How is pure silicon obtained from its ore.

[B] Answer any five of the following: (10)

1. Explain biodegradation.
2. What is noise? State the main sources of noise.
3. Define ecosystem? State the components of an ecosystem.
4. State the role of animals in the balance of an ecosystem.
5. Define (1) Green house effect (2) Röntgen
6. Write the formula of bleaching powder and give its uses.

III C Answer in a sentence: (4)

1. State the full form of WWF.
2. How is fog produced?
3. What is the diameter of solute particles in a colloidal solution?
4. Which layer of earth's atmosphere has ozone gas?

IV (A) Answer any two of the following: (6)

1. With a neat diagram, describe the preparation of ethene gas in the laboratory.
2. What is a plastic? Explain its types giving examples.
3. Describe, with the help of a neat diagram, the electrolytic process of refining of copper.

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

1. How is quicklime obtained? Mention its uses.
2. Explain the structure of yellow phosphorus.
3. What happens when Aluminium metal is put in dilute sulphuric acid.
4. Name two ores of sulphur giving their molecular formulae.
5. What is isomerism? Draw the isomers of pentane.
6. How are carbon fibres obtained? Give two uses of it.

(C) Answer in a sentence. (4)

1. Name the monomer of neoprene.
2. Which chemical is added to detergent to keep it dry?
3. Which compound of silicon is very hard?
4. Name the metals that can be purified by liquefaction.

V [A] Answer any two of the following: (6)

1. Write a short note on black hole?
2. Explain saponification reaction?
3. Explain solid fuel rocket with a neat diagram.

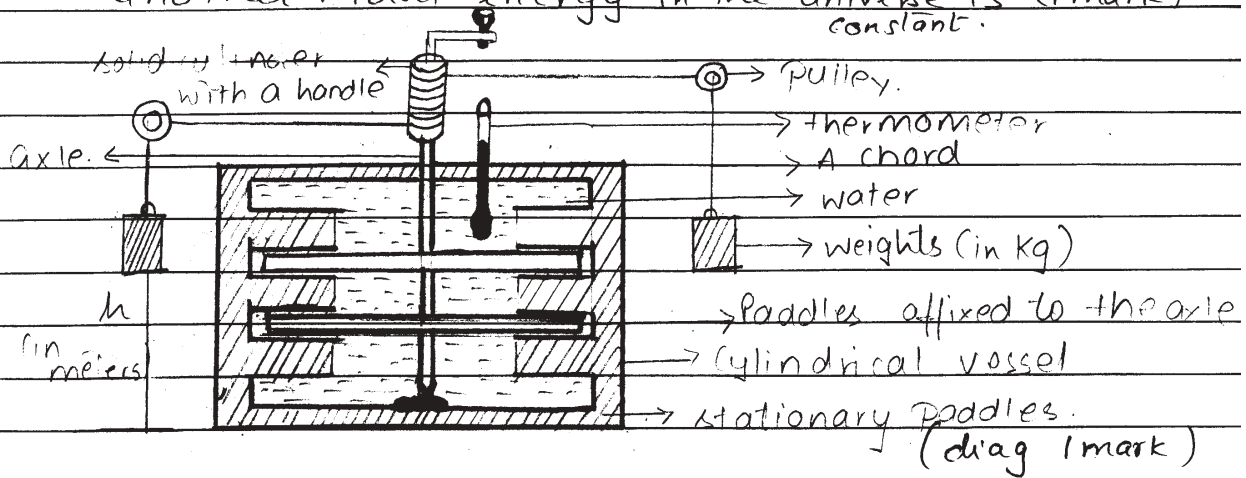
[B] Answer any five of the following: (10)

1. Write a short note on asteroids.
2. Why is life not possible on moon?
3. How is plaster of Paris obtained? Give its uses.
4. State the characteristics of Jupiter.
5. Explain light year.
6. Define: (a) Comet (b) Pulsar.

[C] Answer in a sentence: (4)

1. What is the density of matter in a neutron star?
2. Which method is used to determine the age of the earth?
3. What is the inner temperature of a protostar and for how many years does it contract?
4. Which planet has a very high concentration of carbon dioxide gas?

1 [A] 1. Energy can neither be created nor destroyed but it can be transformed from one form to another. Total energy in the universe is (1 mark) constant.



Conclusion of Joule's experiment:

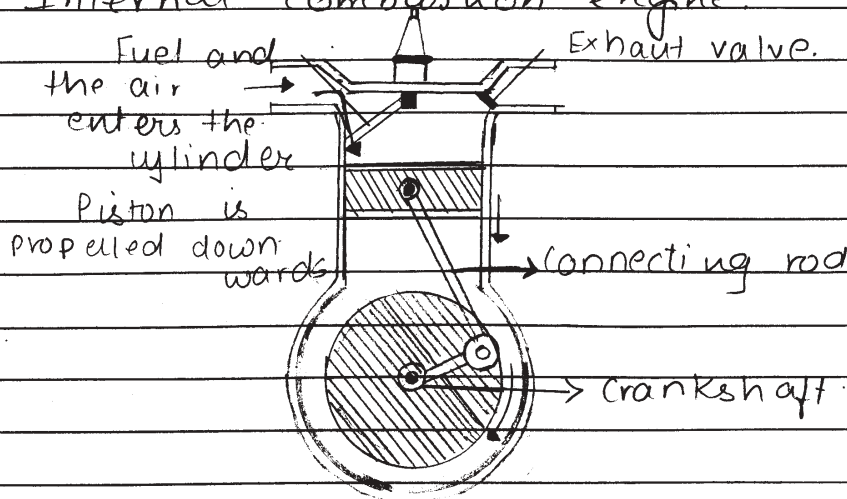
→ Joule transformed mechanical energy into heat energy by a series of experiments.

→ He concluded that to increase the temp. of 1kg of water by 1°C , the work required to be done was 4186 Joules.

→ \therefore 1000 calories heat energy = 4186 Joules.
 \therefore 1 calorie = 4.186 Joules of mechanical work.

\therefore Mechanical equivalent of heat is $4.186 \frac{\text{joules}}{\text{cal}}$
 (conclusion 1 mark)

2. Internal combustion engine:



Intake of fuel and air (diagram 1 mark)

construction:

- There is a movable piston in the cylinder.
- Piston is linked with a crankshaft which is connected with a wheel.
- There are two valves and a spark plug at one end of the cylinder. (1 mark)

working : 5 steps

- Intake : mixture of air and fuel enters the cylinder
- Compression : mixture is compressed by piston.
- Ignition : mixture is ignited by spark plug.
- Expansion : Due to burning of fuel gases are produced at high temperature and pressure which propel the piston outwards
- Exhaust : piston moves up, gases are compressed valve opens and gases are forced out.

Due to this the wheel linked with piston rotates and mechanical work is obtained. (1 mark)

(3) Kwashiorkor disorder:

Cause: protein, energy malnutrition. ($\frac{1}{2}$ mark)

Symptoms:

- child is plumpy but is underweight.
- swelling of skin, hair is sparse and reddish
- excessive fat deposits on liver.
- secretions of enzymes reduced.
- walls of stomach and intestine become thinner than normal.
- diarrhoea, anaemic and on prolonged duration kidneys are damaged.
- amino acids lost through urine.

($\frac{1}{2}$ mark)

Treatment :

- children should be fed wheat, groundnut, bengal gram, soybean, jaggery, animal-protein like egg, fish etc. (1 mark)

I.B.1. Characteristics of ideal fuel:

- high calorific value;
 - burn quickly and completely.
 - fire point as per the utility.
 - Cheap, easily transportable;
 - non-volatile matter very less, possible to store
 - pollution as little as possible.
- (each pt $\frac{1}{2}$ mark).

2. Sodium Iron.

Imp. conduction of impulses, acid-base balancing. (1/2) formation of haemoglobin. (1/2)

Sources leafy vegetables, black gram. (1/2) bajara, cereals, eggs leafy vegetables. (1/2)

3. Work

- Displacement of a body in the direction of force applied.

Unit - ~~New~~ Joule

$$\rightarrow W = F \times d$$

Power:

Time rate of doing work.

Unit: watt

$$P = \frac{W}{t}$$

(each pt 1 mark).

4. Petrol

- Obtained in the boiling range of $30^\circ\text{C} - 120^\circ\text{C}$

→ hydrocarbon have 5-10 carbon atoms.

→ calorific value 47kJ/gm .

→ used as a fuel in cars, scooters etc.

Diesel.

$260^\circ\text{C} - 340^\circ\text{C}$

14-20 carbon atom.

45kJ/gm .

in heavy vehicles trucks, buses etc.

(each diff 1 mark)

5 Advantages of a biogas plant.

- garbage in rural areas is got rid off.
- biogas is harmless, free from unpleasant odour
- does not produce smoke on burning
- saves wood, relief from smoke, no pollution
- organic manure is got as byproduct.
- Cfl₄ being main constituent give good heat.
- can be used for lighting and cooking.

(each pt 1/2 mark)

4 pts - 2 marks.

6. Uses of solar cell.

- to run water pump sets.
- radio, calculators, watches etc.
- in remote villages ^{solar cell} can convert solar to electrical and store in storage batteries which can be used when needed.

(1/2 mark each pt)
4 points.

IC.11) Coke is used as a reducing agent.

2) Coal gas - its constituents are methane, hydrogen, carbon monoxide and gaseous hydrocarbons.

3) anthracite : 96% carbon, 1% volatile matter, 3% moisture.

4) wavelength of visible light is
4000 Å - 8000 Å

(each answer 1 mark)

II A1. Diet containing proper proportions of all nutrients with adequate quantities of calories is called a balanced diet. (1 mark)

Significance:

- normal efficiency of the body is maintained.
- healthy state of body
- keeps the body active.
- helps to resist diseases.
- does not become weak or abnormally fat.

(2 marks)
4 pts.

2. Beri beri : Cause: deficiency of thiamine vit. B₁, consuming polished rice, maida, alcoholic drinks (1 mark)

Symptoms: loss of appetite, vomiting, constipation, weakness of muscles, possibility of Parkinson's disease or heart failure.

(1 mark)

Remedy:

Food rich in Vit B₁, like whole grains, cereals, legumes, leafy vegetables.

(1 mark)

3. Agents which cause pollution are called pollutants: eg CO, SO₂, pesticides. (1/2 mark)

Harmful effects:

- lung disorders are caused by sulphur dioxide, nitrogen dioxide, CO.
- Chemical pollutants can cause cancer or heart problems.
- methyl mercuric chloride → harms chromosomes
- excess fluorine → fluorosis
- workers of coal mines suffer from pneumoconiosis.
- workers of quarries → silicosis
- workers of asbestos factories → asbestosis.

(5 pts 1/2 mark each)

II B.1. Vernalisation:

- soaked seeds are kept in refrigerator at a low temperature.
- soaked seeds are chemically treated.
- vernalised seed germinate quickly, develop fast, maturity time is reduced.
- seeds are disease resistance. ($\frac{1}{2}$ mark each pt)

2. Addiction:

Bad habit of taking substances which prove harmful to health in the short or long run.

Tobacco ($\frac{1}{2}$ mark)

- harmful substance - nicotine which is highly poisonous, poisonous.
- it stimulates nerves, increases blood pressure
- sustained use leads to weakness of nerves, indigestion, muddled vision, development of cancer. ($1\frac{1}{2}$ mark)

3. Weeds

- unwanted plants that grow with the crop plants and compete for sunlight, air, water and nutrients are called weeds. (1 mark)
- They can be removed manually using a sickle or using weedicides like 2-4 D etc. (1 mark)

4. Long term storage:

- 1) grains of crop should be fully matured
- 2) water content of the grains should not exceed the specified limit (each pt 1 mark)

5. Vit. C

- water soluble
- needed for gums & teeth
- cannot be synthesized in the body.
- citrus fruits. (each pt 1 mark)

Vit D.

- fat soluble
- strong bones.
- can be synthesized below the skin.
- milk, egg, butter etc

II C.1. The process of reducing water content from food items to the maximum possible extent without loss of nutrients or flavour.

2. Salmonella bacteria are present in the bird droppings.

3. Two sexually transmitted diseases are AIDS, Gonorrhoea, Syphilis.

4. Harrow is used for levelling the field.

III A.1. The wealth produced naturally without man's effort and yet useful to man is called natural wealth. (1 mark)

Conservation:

→ utilisation of natural wealth through well planned management practices.

→ should be replenished by different ways.

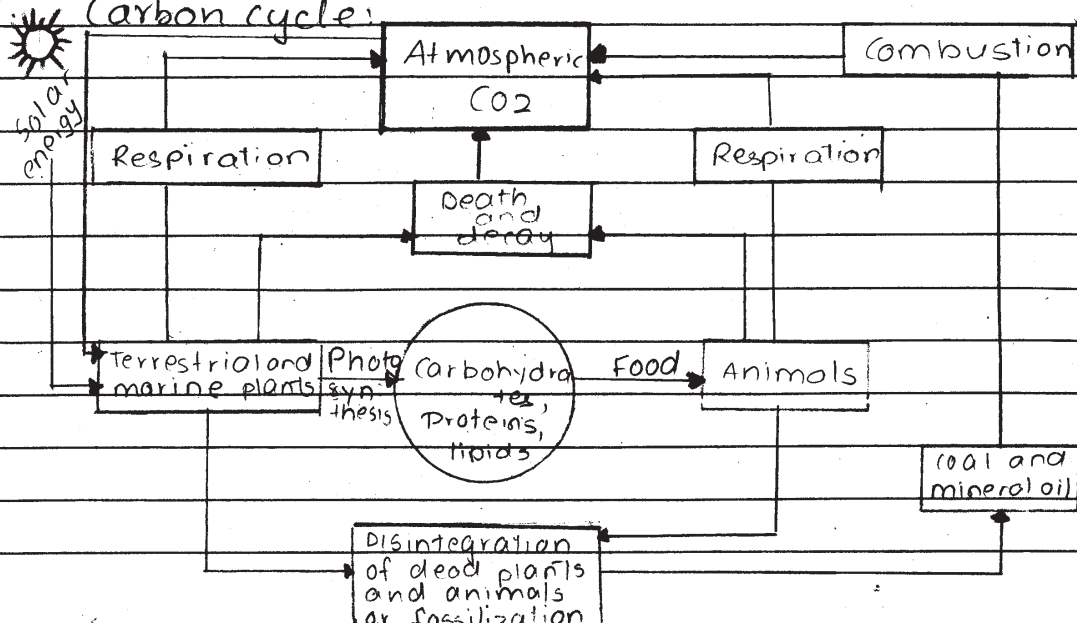
→ like 'Project Tiger' programme, other wildlife should also be protected.

→ forest area should be increased by adopting silviculture and implementation of 'Van Mahotsavs'

→ National parks and wild life sanctuaries should be developed.

→ legal controls over misuse. (4pts 1/2 mark each)

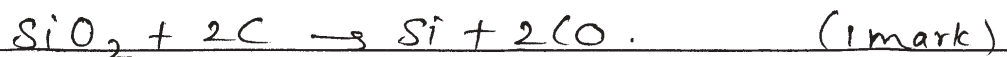
2. Carbon cycle:



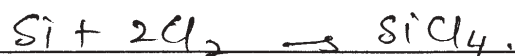
- Air has 0.03% CO_2 but sea water contains about 50% more CO_2 .
- CO_2 is added due to respiratory activity of plants, animals.
- due to industrial development, population, combustion of various fuels in transportation increases CO_2 . (1 mark)
- during day time green plants use CO_2 by the process of photosynthesis and liberate O_2 .
- Some amount of CO_2 is absorbed by ocean, which is partly used by marine plants for photosynthesis, and partly precipitates as carbonates.
- In this way cyclic movement of CO_2 goes on between the components of an ecosystem in a cyclic manner. (1 mark)

3. Silicon:

- silicon is obtained by reduction of silicon dioxide with carbon.

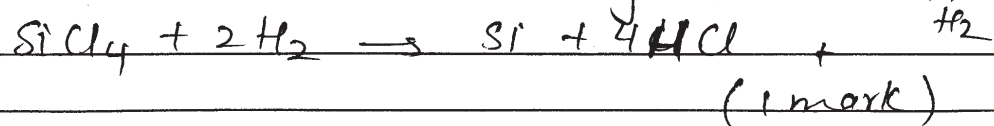


- This silicon is impure. Hence to purify it is converted to SiCl_4 by reaction with chlorine.



Silicon tetrachloride being liquid can be evaporated. It can be purified by distillation. (1 mark)

Pure silicon is obtained by reduction with H_2



1. Biodegradation: The process in which any form of a substance or component can be altered by natural factors like decomposers and transformers is called biodegradation. eg. formation of compost manure (1 mark)
disintegration of animal dung, urine, dead bodies etc. (1 mark)

2. Noise.

An unwanted sound of very high intensity created due to interferences in the atmosphere is called noise. (1 mark)

Sources of noise:- loud radios, stereo musical system, television, auto-transport, industrial machines etc (1 mark)

3. Ecosystem:

An undivided unit of the entire environment and the organisms living there in is called an ecosystem. (1 mark)

Components

Abiotic: Temp, sunlight, gases, water, land, minerals, humidity etc.

Biotic: Producers (green plants), Consumers (herbivores, carnivores, omnivores)

Decomposers - Transformers.

(Parasites, saprophytes). (1 mark)

4. Role of animals.

→ utilise O_2 and release CO_2

- provide food - Carni to other animals

- decomposers - transformers change organic substances into inorganic forms.

→ help in seed dispersal.

→ pollination. ($\frac{1}{2}$ mark each pt)

5. Green house effect: The increase in the temp due to heat absorbing gases like CO_2 , CH_4 and O_3 is known as green house effect. (1 mark)

Rontgen: The amount of radioactivity which produces 1.6×10^{12} ion pairs in 1 gm of air at 1 atmospheric pressure is called Rontgen (1 mark)

6 Bleaching powder: CaOCl_2 (1 mark)
 Uses - bleaching agent in laundry, paper and textile mill, as insecticide, making chloroform. (1 mark)

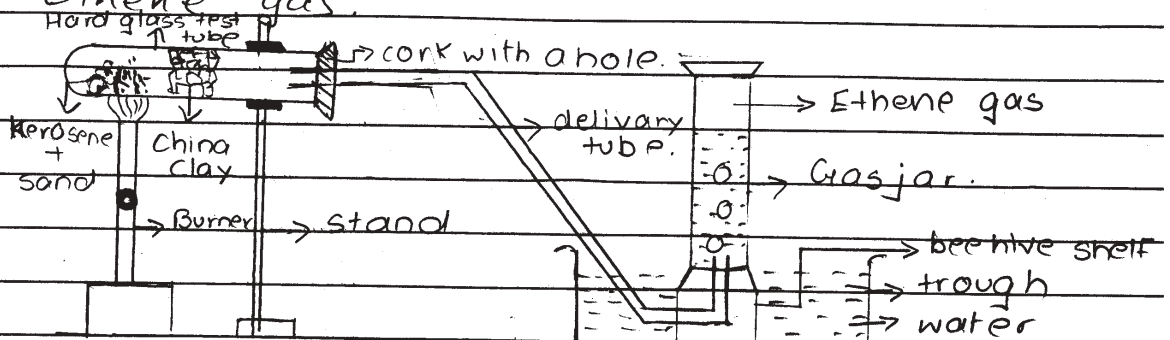
III C1. WWF: World Wide Fund for nature.

2. The mixture of dust particles, carbon particles and water vapour in the atmosphere together forms fog.

3. Soluble particles of colloidal have a diameter of 10^{-7} to 10^{-5} cm.

4. Stratosphere has ozone in it.

IV A1. Ethene gas.



(fig - 1 mark)

Aim: To prepare ethene gas in the lab.

Apparatus: Hard glass test tube, one holed cork, delivery tube, trough, gas jars, beehive shelf stand.

Substances: kerosene, sand, porcelain or china clay.

Procedure:

Mix sand with kerosene and keep the mixture in hard glass test tube.

Introduce china clay pieces in front top portion of the test tube.

- Arrange the apparatus as shown in the fig.
- First heat porcelain pieces and till red hot and then sand portion with kerosene.
- continue alternate heating. (1 mark)

Observation

Ethene gas is liberated by cracking of kerosene, which is collected by the downward displacement of water. (1 mark)

2. Plastic: A polymer material which can be moulded and any desired shape can be given. (1 mark)

Types of plastic:

Thermoplastic: A plastic which becomes soft on heating but regains its properties on cooling.

- molecules form long chain but are not cross linked.

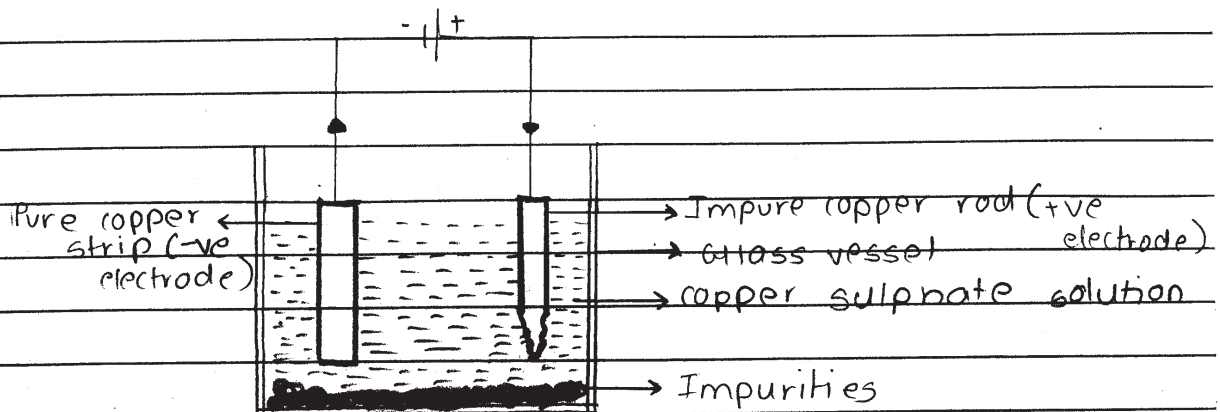
eg: PVC, polystyrene (1 mark)

Thermosetting: A plastic which does not become soft on heating.

many long chains are cross linked and hence on heating do not get displaced.

eg: bakelite, melamine. (1 mark)

3. Electrolysis of Copper. (figure).

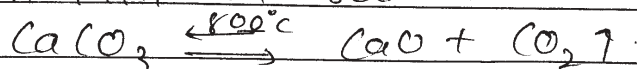


IN A 3. In the electrolytic process of purification of copper a solution of copper sulphate is taken as electrolyte.

- Impure Copper rods are anode and pure copper rods are cathode.
- Both the electrodes are connected to the battery (1 mark)
- Direct current is passed through the solution
- Pure copper deposits at negative electrode and copper from positive electrode goes into the solution as copper ions.
- Less reactive metals like, gold, silver, can be collected at the bottom of the cell. (1 mark)

[B] 1) Quick lime:

It is obtained by heating limestone in a modern kiln. at 800°C .



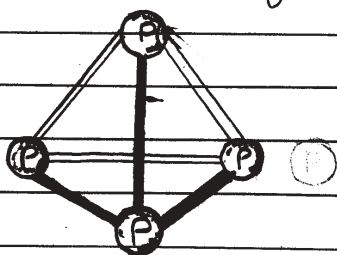
The process being reversible, CO_2 is removed and temp is reduced. (1 mark)

Uses: Lime water is used as a reagent in lab, white washing walls, making cement & glass (1 mark)

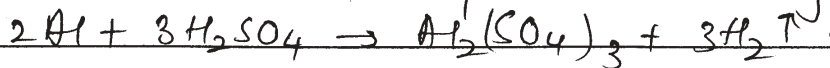
2. Yellow phosphorous: Atomic number 15

$_{15}\text{P} = 2, 8, 5$. most active allotrope,

- Atoms of yellow phosphorous in air and in crystal are arranged in tetrahedral form.
- four atoms are arranged in four corners of tetrahedron. Each atom is joined with three other atoms of P_4 by covalent bonds. (1 mark)



3. When Aluminium reacts with dil H_2SO_4 it forms aluminium sulphate, evolving H_2 gas.



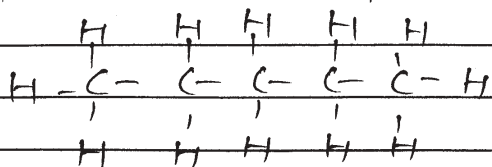
(obs 1 mark, eqn 1 mark)

4. Ores of sulphur: Galena - PbS ,
Iron pyrites: FeS_2
flint $CaSO_4$

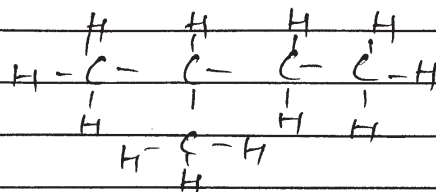
(1 mark each) Epsom salt $MgSO_4 \cdot 7H_2O$.
any two.

5. The two or more organic compounds having same molecular formula but different structural formula are called isomers and the phenomenon is called isomerism. (1 mark)

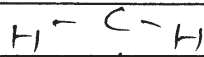
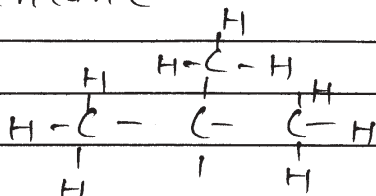
Isomers of pentane C_5H_{12}



n-pentane



iso pentane



neo-pentane. (1 mark)

6. Carbon fibres:

Reprocessed fibres or artificial fibres when heated in absence of oxygen, split up and form carbon fibres. (1 mark)

uses: making space ships, mfg of sports goods. (1 mark)

IV C 1. Monomer of neoprene is Chloroprene.

2. Sodium sulphate & sodium silicate keep the detergent dry.

3. Silicon carbide is very hard.

4. Tin, lead, bismuth can be purified by liquification. (1 mark each ans)

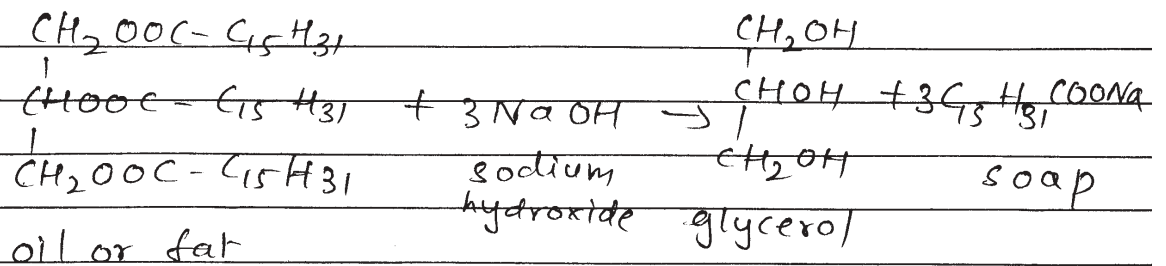
V A 11 Black hole:

A point like object with infinite density through which even radiations cannot escape is called a black hole. (1 mark)

- The gravitational contraction of a very massive neutron star goes on continuously. Thus the star experiences infinite contraction and density becomes very high.
- due to high density even electromagnetic waves cannot pass through it. (1 mark)
- It is invisible. but if a star is found to be revolving in a circular orbit with no other star at its centre, then it is possible that there is a black hole at the centre of its orbit. (1 mark)

2. Saponification:

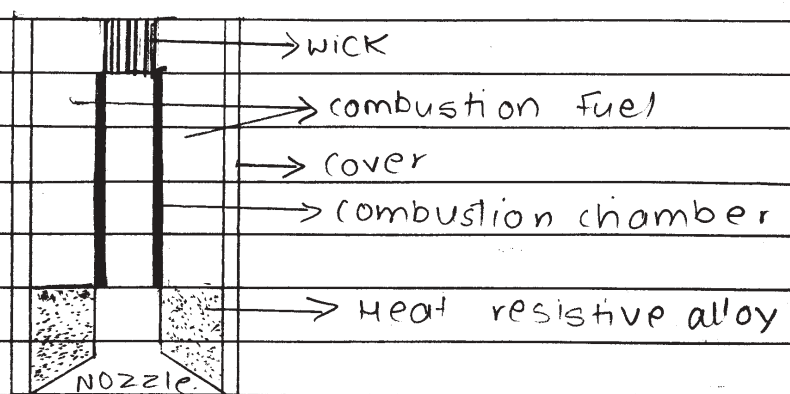
A chemical reaction in which oil or fat reacts with hot sodium hydroxide solution forming glycerol and sodium salt of fatty acid (soap) is called saponification. (1 mark)



(2 marks)

3. Solid fuel rocket:

fig 1 mark.



Principle: Action and reaction are equal in magnitude but opposite in direction.

Construction:

- Walls of the rocket with solid fuel are made of special alloys having high melting point.
- fuel used is solid.

Ignition of fuel is done by ammunition or chemical reaction of chlorides. (1 mark)

Working: Combustion of the fuel is ^{initiated by} ignited by a wick in the upper portion of the rocket.

- In a short while after combustion, the temp reaches to more than 3000°C .
- Gases produced rush out from lower end with tremendous momentum which gives thrust to the rocket in the upward direction.
- Rocket moves in the direction of thrust. (1 mark)

√ B.1. Asteroids:

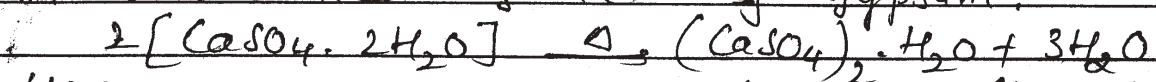
- They are the debris of small objects which failed to assemble into planet.
- 10^5 asteroids.
- made up of rocks & metals.
- found in the belt of Mars and Jupiter. (each pt $\frac{1}{2}$ mark)

2. Moon

- > day temp 100°C , night -115°C (1 mark)
- > feeble gravitation & hence gases needed for atmosphere escape into space.
- hence no life is possible. (1 mark)

3. Plaster of Paris:

It is obtained by heating gypsum.



Uses: sealing agent in lab, (1 mark)
preparing idols, orthopedic surgery