8. Chemistry for human progress

Let us Assess

1. Question

The balanced chemical equation for the thermal decomposition of heptane is given.

C_7H_{16} (l) → C_4H_{10} (g) + C_3H_6 (g)

a) Which of these components can be used as LPG?

b) In which state is the component collected and stored?

Answer

a) Butane

C_7H_{16} (l) → C_4H_{10} (g) + C_3H_6 (g)

Heptane Butane Propene

i. Liquefied petroleum gas (LPG) is obtained from butane gas.

ii. When butane gas is liquefied under high pressure, LPG is obtained.

iii. Butane gas is separated from uncondensed gases obtained from petroleum and then can be converted to LPG.

b) In the gaseous state, butane is collected and stored.

2. Question

The characteristics of some components of petroleum are given. Match them appropriately.

A	B
Component	Use
1. Diesel	• Lubricant
2. Petrol	• Fuel in diesel engines
3. Kerosene	• Motor fuel
4. Grease	• To light lamps
	• To make wax

Answer

1- Fuel in diesel engines

Diesel is used as a fuel in diesel engines. Diesel is one of the components we get from fractional distillation of petroleum.

2- Motor fuel

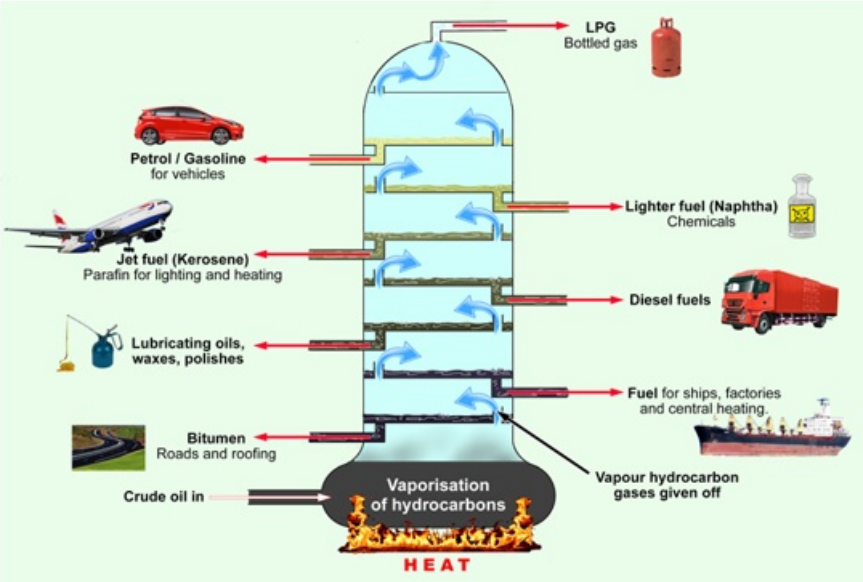
Petrol is used as a motor fuel. It is used in cars, motorbikes etc. Diesel is one of the components we get from fractional distillation of petroleum.

3- to light lamps

Kerosene is used as a fuel for domestic purposes. When electricity is unavailable, kerosene is used as a fuel to light lamps. Kerosene is also one of the components we get from fractional distillation of petroleum.

4- Lubricant

Grease (lubricating oil) is used as a lubricant in machines. It reduces the friction between the two layers. It increases the working flow of machines. Grease is also one of the components we get from fractional distillation of petroleum.



Fractional distillation of petroleum and uses of components formed

3. Question

Prepare a short note on petrochemicals.

Answer

Petrochemicals are the chemicals prepared from the hydrocarbons that are separated from petroleum.

i. These include some components obtained by fractional distillation of petroleum and the substances prepared from them.

ii. Various substances such as paints, plastic, ointment, creams etc. are obtained from petrochemicals.

4. Question

List the important uses of coal. Name the form of coal with the highest carbon content.

Answer

Important uses of coal:

i. It is used as a fuel in locomotives.

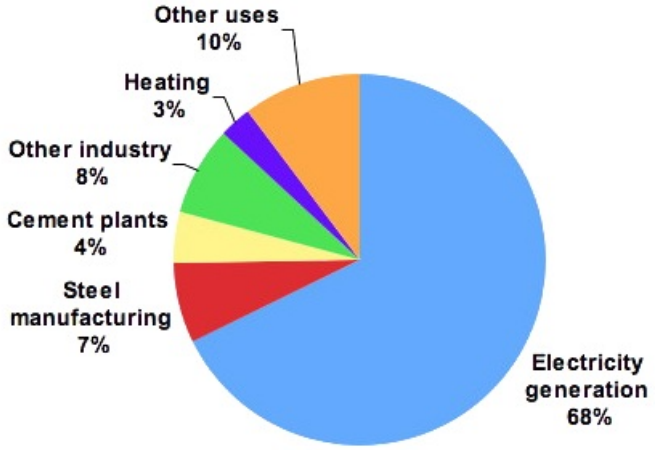
ii. It used for domestic purposes to cook food especially in villages.

iii. It is used in the manufacture of producer gas, water gas.

iv. It used in industries and cement plants.

v. It is used in the manufacture of steel and graphite.

vi. It plays an important role in providing electricity and power around 68%.



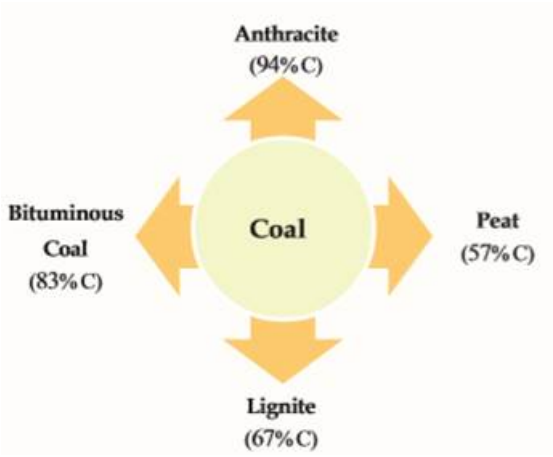
There are four forms of carbon:

i. Anthracite coal

ii. Bituminous coal

iii. Peat coal

iv. Lignite Coal



Thus, anthracite is a form of coal with the highest carbon content.

5. Question

Describe how coal is formed?

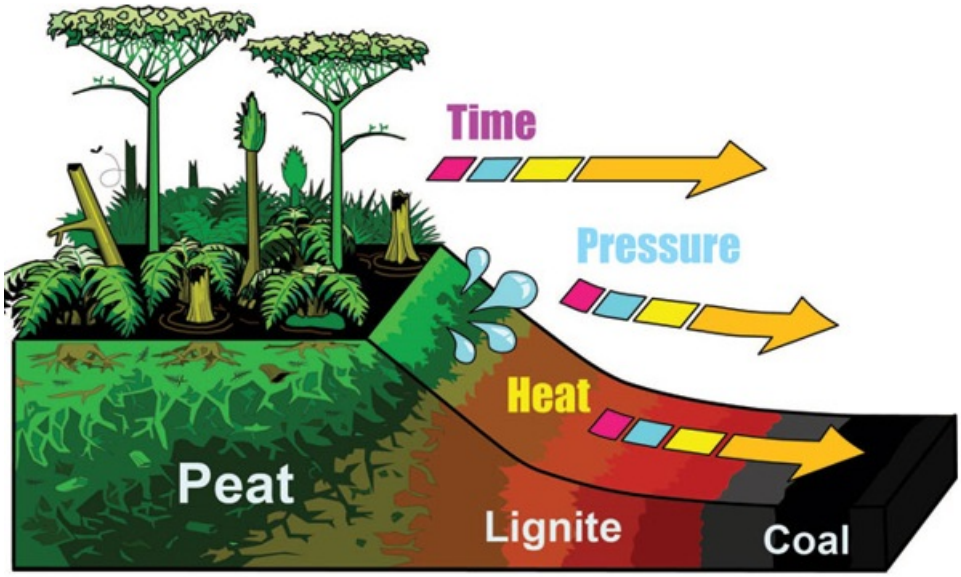
Answer

Coal is formed by a process called carbonization.

i. The process by which the remains of plants transform into coal in the absence of air under high temperature and pressure is known as carbonization.

ii. Coal is formed as a result of the carbonization on the remains of plants.

iii. It is obtained from the depths of the earth.



6. Question

Which constituents form the basis of the variety of colours in the world of colours? What are their characteristics?

Answer

Dyes and pigments are the constituents which form the the basis of the variety of colours in the world of colours.

The characteristics of dyes and pigments are:

i. Dyes and pigments release their colour when they are absorbed or stained.

ii. These are the chemical substances which impart colour to other objects.

iii. The constituents used for colouring clothes, paper, leather, plastics, ink, cosmetics, food items etc. contain different dyes and pigments.

iv. In ancient days, plant pigments were used to give colours for clothing, historical art forms, palaces, pictures, murals etc.

7. Question

How are glasses manufactured? What are the raw materials needed for hard glass and borosilicate glass?

Answer

There are different types of glasses. The different constituents are used for their manufactures.

i. Soda lime glass/Soda glass/Soft glass

Constituents used in the manufacture:

a) Silicon dioxide (SiO_2)

b) Calcium carbonate ($CaCO_3$)

c) Sodium carbonate (Na_2CO_3)

ii. Hard glass

Constituents used in the manufacture:

a) Silicon dioxide (SiO_2)

b) Potassium carbonate (K_2CO_3)

c) Calcium carbonate ($CaCO_3$)

iii. Borosilicate glass

Constituents used in the manufacture:

a) Boron oxide (B_2O_3)

b) Aluminum oxide (Al_2O_3)

c) Silicon dioxide (SiO_2)

iv. Find glass/Optical glass/lead glass

Constituents used in the manufacture:

a) Silicon dioxide (SiO_2)

b) Potassium carbonate (K_2CO_3)

c) Lead oxide (PbO)

The raw materials needed for hard glass and borosilicate glass are:

For hard glass: Silicon dioxide (SiO_2), potassium carbonate (K_2CO_3), calcium carbonate ($CaCO_3$)

For borosilicate glass: Boron oxide (B_2O_3), aluminium oxide (Al_2O_3), silicon dioxide (SiO_2)

8. Question

Which are the compounds used for imparting the following colours to glass?

• Green • Yellow • Blue

Answer

The colour given by some compounds to glass is

given below:

Chromium /ferrous ion → Green

Ferric ion → Yellow

Cobalt oxide → Blue

Extended Activities

1. Question

Butane obtained by the thermal decomposition of higher hydrocarbons can be liquefied to get LPG. Identify examples for such possible situations.

Answer

C_7H_{16} (l) → C_4H_{10} (g) + C_3H_6 (g)

Heptane Butane Propene

i. Liquefied petroleum gas (LPG) is obtained from butane gas.

ii. When butane gas is liquefied under high pressure, LPG is obtained.

iii. Butane gas is separated from uncondensed gases obtained from petroleum and then can be converted to LPG.

2. Question

Clay is an important constituent in the manufacture of cement. Find other substances for the manufacture of which clay is used.

Answer

Clay is use in the manufacture of:

i. Paints

ii. Organic plastics

iii. Cosmetics

iv. Paper

3. Question

Glass is the substance which changed the very appearance of the world. Enquire and prepare short notes on the different situations in modern facilities where glass is being used.

Answer

i. Soda glasses are used in making tube light, bottles, domestic

utensils etc.

ii. Flint glasses are used in lenses of camera, electric bulbs etc.

iii. Lead glasses are used in making costly glass containers.

iv. Potash glasses are used in making lab equipments.

v. Crooks glasses are used in making goggles.

4. Question

Visit a nearby primary health centre and prepare a short note on medicines used for different purposes and the chemical components in them.

Answer

Medicines:

i. The role of medicines in promoting health and enhancing life span is unique.

ii. Medicine reduces the pain of the body.

iii. It controls microorganisms.

iv. It reduces acidity in the stomach.

v. It reduces the body temperature during fever.

vi. It destroys the germs and prevent their growth.

Some components of medicines:

i. Orthoboric acid

ii. Compounds of sulphur

iii. Washing soda

iv. Potassium permanganate

v. Calcium

vi. Magnesium

5. Question

Chlorine is used as a bleaching agent during the manufacture of paper. Environmental pollution can be controlled if ozone is used instead of chlorine. Identify the contributions of green chemistry in similar situations.

Answer

Green chemistry:

i. A branch of chemistry has emerged which addresses the pollution caused in such situations.

ii. It controls the production of various dangerous chemicals.

iii. As a result, it reduces the bad effects on nature and environment. This is called green chemistry.

iv. It produces eco-friendly products.

v. It reduces pollution.

vi. It converts hazardous chemicals into useful substances.

6. Question

Prepare a write-up on 'Self-treatment and Health'.

Answer

Self-treatment and health:

i. It includes self-hygiene.

ii. It is an important part of self-treatment.

iii. Proper bathing, hand washing, regular physical activity, proper sleep should be done properly.

iv. Regular medical check-up is also necessary so that you can keep an eye on your body parts.

v. In today's era, meditation has become an important part of self-treatment as it provides number of benefits to an individual.

7. Question

Prepare a short note on the manufacture and uses of cement.

Answer

Manufacture:

i. The main raw materials for the manufacture are limestone and clay.

ii. The powdered limestone (3 parts) and clay (1part) are mixed.

iii. The mixture is heated at about 1770-1870K in a rotary kiln.

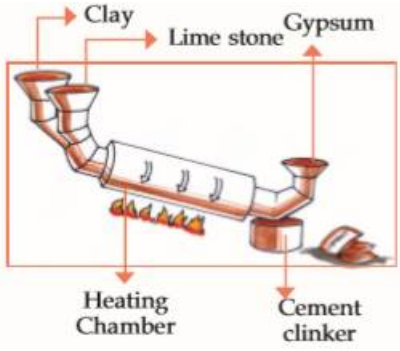
iv. Limestone decomposes to give lime and CO_2.

v. Due to very high temperature about 20%-30% mass melts and combines with solid mass to form pebbles known as cement clinkers.

vi. The clinkers are cooled and mixed with gypsum.

vii. The gypsum slows down the setting of cement so that it gets hard.

The rotary kiln for the manufacture of cement



The pictorial representation of important process takes place

Uses:

i. It is an important construction material.

ii. It used in the construction of buildings, bridges and dams.

iii. It is a major building material.

iv. It is used in the construction of road, footpaths, courts for various sports.

8. Question

Conduct a survey by observing the buildings in your surroundings and list those buildings which are made of environment-friendly materials.

Answer

i. Palm apartments (bamboo material)

ii. Ashiana building (wood)

iii. Rangoli houses (wood)