6.Energy management

FOCUS AREA

1. Incomplete and complete combustion
2. Fossil Fuels – Coal, C N G, L N G, L P G
3. L P G and Safety
4. Green Energy and Brown Energy
5. Energy Crisis – Reasons and Solutions.

1. Incomplete and complete combustion

Combustion of fuels

* Fuels burn with the help of oxygen.

Complete combustion

* Complete combustion is a reaction in which fuels react intensively with oxygen, producing carbon dioxide, steam, heat and light.

Partial combustion.

* If sufficient oxygen is not available, the rate of combustion decreases. If oxygen is not sufficient, large quantities of carbon monoxide, soot and a little of carbon dioxide will be formed. This type of burning is partial combustion.

1. What are the conditions favourable for the complete combustion of different fuels?
   * The solid fuels must be dry.
   * Liquid fuels must evaporate easily.
   * The ignition temperature should be attained.
   * Sufficient oxygen must be available for burning.

2. What are the features of complete combustion?
   * Carbon monoxide is not formed.
   * More heat is generated

3. Write down the situations/specialities for partial combustion.
   * Insufficient availability of O_2
   * Partial dryness
   * Lack of facilities for the removal of oxygen.

4. What are the drawbacks of partial combustion?
   * Loss of fuel
   * Economic loss
   * Fuel loss
   * Atmospheric pollution
   * Wastage of time
   * More smoke is produced

2. Fossil Fuels

* Fossil fuels are formed by the transformation of plants and animals that went under the earth's crust millions of years ago. The transformation took place in the absence of air under high pressure and high temperature.
* Coal, petroleum and natural gases are fossil fuels.

Coal

* Coal is the most abundant fossil fuel on the earth.
* The main component of coal is carbon.
* Based on the carbon content, it is classified into four groups as peat, lignite, anthracite and bituminous coal.
* When coal is distilled in the absence of air, the substances obtained are ammonia, coal gas, coal tar and coke.

petroleum

1. Which are the products obtained from fractional distillation of petroleum?
* Petroleum gas- Petrol – Diesel- Kerosene - Naphtha – Fuel oil – Lubricating oil - Grease – Wax ...

Natural gases (CNG, LNG)

* liquefied natural gas (LNG) and compressed natural gas (CNG) from the natural gas obtained along with petroleum.
* The main component of all these is methane.
* These are used as fuels in vehicles, industries and thermal power stations.
* The importance of LNG is that natural gas can be liquefied and transported to distant places conveniently. It can again be converted into gaseous form at atmospheric temperature and distributed through pipe lines.

LPG

* The full form of LPG is liquefied petroleum gas.

* This is a colourless, odourless gas obtained through the fractional distillation of petroleum.
* Domestic LPG produces an odour since ethyl mercaptan is added as an indicator to detect gas leakage.
* The main constituent of LPG is butane.

3. L P G and Safety

* The expiry date marked on a cooking gas cylinder.

marked on the top of the cylinder	Expiry date
”A 24”	2024 months from January to March
”B24”	2024 months from April to June
”C 24”	2024 months from July to September
”D 24”	2024 months from October to December

* A,B,C,D indicate the month
* 24 indicate the year
* LPG is denser than air.

BLEVE (Boiling Liquid Expanding Vapour Explosion).

* If there is a fire due to leakage of LPG then due to the heat the cylinder/ tanker will also get heated. Owing to the excess heat, the LPG becomes gas increasing the pressure inside .The ability to expand is 250 times for the gaseous LPG. Therefore when LPG becomes gas, the container cannot accommodate the entire gas. This increases the pressure to a very high level causing a huge explosion. This is known as BLEVE.

1.Never switch on or switch off electricity when there is a leakage of LPG. Why?

* It is because the fumes of gas are highly flammable and even smallest of sparks can ignite a huge fire.

2.If there is a leakage of LPG does it rise up or come down in the atmosphere? Why?

* Come down in the atmosphere. LPG is denser than air, so any leakage will sink to the ground and accumulate in low lying areas and may be difficult to disperse.

3.What precautions are to be taken to avoid accidents due to LPG leakage?

* Examine the rubber tube at regular intervals and ensure that it does not have a leakage.
* Turn on the knob of stove only after the regulator is turned on.
* Always store the LPG cylinder in an upright position and away from other combustible and flammable material.
* Check for gas leaks regularly by applying soap solution on cylinder joints and suraksha pipes

4. If a gas leak is suspected or if the fire spreads on a cylinder, what else could be done?

* If you are convinced that there is a gas leak, disconnect electricity from outside the home (switch off the main switches).
* Switch off the regulator and shift the cylinder to an empty space. Keep the windows and doors open.
* Request help from the Fire Force by calling in the toll free number 108.
* Well trained rescue operators can put out the fire by covering the top end of the cylinder with wet sack to prevent the contact with oxygen.
* If the fire is in flat or the top storey, then one should not try to escape using lifts. Only staircase should be used.
* Cover the nose and the mouth with soft cloth to avoid the intake of smoke or gases.

4. Green Energy and Brown Energy

Green Energy / Clean energy

* Green energy is the energy produced from natural sources that does not cause environmental pollution.

* All the energy produced from renewable sources belong to this category.

* The renewable sources like solar energy, wind energy, energy from waves and energy from biomass are considered as green energy.

* This is also referred to as clean energy.

Green Energy

* The energy produced from non renewable sources such as petroleum and coal, and the nuclear energy are named brown energy.

* These are sources which cause environmental problems including global warming.

* Classify the energy sources as green energy and brown energy:

Green Energy	Brown Energy
* Solar cells * Tidal energy * Hydro electric power * Windmills	* Atomic reactors * Diesel engines * Thermal power stations.

* What must be done to ensure maximum utilization of green energy while constructing a house?

1. Sufficient sunlight should be available in the rooms during day time.
2. Comfortable warmth, coolness and air circulation must be available without the help of electricity.

5. Energy Crisis – Reasons and Solutions.

* 'Energy crisis is the consequence of increasing demand but decreasing availability'

* What can be done for reducing energy crisis as far as possible?

1. Judicious utilisation of energy.
2. Maximum utilisation of solar energy.
3. Minimising the wastage of water.
4. Making use of public transportation as far as possible.
5. Construction and beautifying of houses and roads in a scientific manner.
6. Controlling of the street lamps with LDR (Light Dependent Resistor).
7. Timely maintenance of machines.
8. Limiting the size of newly constructed buildings.
9. Ensuring of maximum efficiency of the machines used.

* List down the devices that can be used at home to reduce energy consumption.

1. Hot box
2. Pressure cooker
3. Energy efficient oven