CBSE Test Paper 03

Chapter 14 Sources of Energy

1. Which of the following is not a bio mass energy source? **(1)**

   a. Nuclear energy
   b. Wood
   c. Gobar gas
   d. Coal

2. The mass number of elements P, Q, R are 2, 180, 235 respectively which one of them is most suitable to make a hydrogen bomb? **(1)**

   a. P only
   b. P and Q both
   c. Q only
   d. Q and R both

3. Which of the following nuclei are isotopes? **(1)**

   ${}^{226}_{88}A, {}^{228}_{87}B, {}^{228}_{88}C, {}^{228}_{90}D$

   a. ${}^{226}_{88}A, {}^{228}_{88}C$
   b. ${}^{228}_{87}B, {}^{228}_{88}C$
   c. Both ${}^{228}_{87}B, {}^{228}_{88}C$ and ${}^{228}_{88}C, {}^{228}_{90}D$
   d. ${}^{228}_{88}C, {}^{228}_{90}D$

4. Which of the following acts as control rods in Nuclear reactor? **(1)**

   a. D_2O
   b. cadmium rod
   c. Boron rod
   d. Both cadmium rod and Boron rod

5. The conditions for producing biogas is? **(1)**

a. water but not air
b. Air but not water
c. Neither air nor water
d. Air and water

6. What is a good fuel? **(1)**

7. Name the fuel that provides most of the energy needs of the world. **(1)**

8. The cost of production of electricity in a thermal power station located in Bihar/ Jharkhand/ Odisha is lesser than in Gujarat/Maharashtra. Do you agree? Justify your answer. **(1)**

9. Give one disadvantage of nuclear power. **(1)**

10. Give some uses and advantages of solar energy. **(3)**

11. Why a heap of coal or wood does not catch fire at room temperature though sufficient quantity of oxygen is present in air ? **(3)**

12. Can any source of energy be pollution free ? Why **(3)**

13. Name two energy sources that you would consider to be renewable. Give its reason. **(3)**

14. What are the environmental consequences of using fossil fuels? Suggest the steps to minimise the pollution caused by various sources of energy including non-conventional sources of energy causing global warming. **(5)**

15. What is combustion ? What are the essential conditions for combustion to take place? **(5)**

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Answers

1. a. Nuclear energy

   Explanation: Nuclear energy is not a biomass energy source because it is not produced by any type of biological activity but produced from Uranium and Thorium.

2. a. P only

   Explanation: The first barrier to building a nuclear weapon is finding nuclear fuel. Very few types of atoms are both the right size and abundant enough to **make** a nuclear weapon. It's either uranium or plutonium for fission **bombs**, or a mixture of deuterium and tritium (both of them rare forms of **hydrogen whose mass number is 2**) for nuclear fusion.

3. a. ${}^{226}_{88}A, {}^{228}_{88}C$

   Explanation: Isotopes are the elements with same atomic number but different mass numbers. In the above given elements A and C are having same atomic number 88 but different mass number 226 and 228 respectively.

4. c. Boron rod

   Explanation: Control rods are used in nuclear reactors to control the fission rate. Boron, silver, Indium and cadmium are capable of absorbing many neutrons without themselves fissioning, So they are used

5. a. Water but not air

   Explanation: Biogas means a gas produced by the anaerobic digestion or fermentation of organic matter. The organic matter can be manure, sewage sludge, municipal solid waste, biodegradable waste or any other biodegradable feedstock. **Biogas** is mainly methane and carbon dioxide.

6. A good fuel is that which release more heat on burning, It should be easily available, it should be economical and should not cause environmental pollution.

7. Petroleum and coal (fossil fuel) provides most of the energy needs of the world.

8. Yes, it is because in Bihar/Jharkhand/Odisha coal for thermal power plant is easily available whereas it has to be transported to Gujarat/Maharashtra for thermal power plant.

9. Nuclear fuels are non-renewable sources of energy and large amount of radioactive materials, which are toxic in nature, are released in the environment which are extremely hazardous to the health of living being for thousands of years. The major disadvantage of nuclear power is Emission and poor management of radioactive waste.

10. Uses:
    i. For cooking food in a solar cooker.
    ii. For heating water in solar geysers.
    iii. For generating electricity in space satellites, calculators, watches, etc., by solar cells and solar panels
    iv. For generating electricity on a large scale by a solar power plant.
    v. To melt metals in solar furnaces.

    Advantages:
    i. It does not cause any pollution.
    ii. It is a renewable source of energy.
    iii. It is free of cost.

11. One of the conditions of combustion to take place is that the fuel temperature should be more than ignition temperature.

12. No source of energy can be perfectly pollution free but bio-mass energy, hydro-energy, wind energy, geothermal energy, solar energy is almost pollution free. If fossil fuel is allowed to burn in presence of excess of oxygen, the pollution produced can be very much reduced.

13. Solar energy, wave energy, tidal energy, wind energy all are renewable sources of energy.
    The solar energy is free and can be used anywhere with ease. Solar energy can be used to produce electric energy in solar cells. It can be used for solar water heaters.

and in solar cookers.

Wind is also available source of energy almost everywhere and can be used to run wind farms to produce electricity, to draw water from the wells and grind the grains.

14. The pollution caused by burning of fossil fuels can be reduced by increasing the efficiency of the combustion process. Also, by using various techniques to reduce the escape of harmful gases and ashes into the surroundings. Along with the direct use of fossil fuels for various purposes like cooking and transport, these are majorly used for generating electricity.

    Various techniques to reduce the escape of harmful gases and Environmental consequences of using fossil fuels are:

    Steps to minimize the pollution are:

    i. They are the largest emitters of greenhouse gases such as carbon dioxide and methane.
    ii. Extraction of conventional fuels threatens the ecological balance in many areas.
    iii. These fuels cause environmental problems.
    iv. The dependency on fossil fuels should be reduced by switching to alternate sources of energy.
    v. The judicious use of energy by avoiding wastage can reduce environmental problems.
    vi. Regular servicing of energy conversion devices should be done in order to maintain their efficiency.
    vii. We should focus on developing technology that could make the energy conversion devices much more efficient and cleaner.
    viii. Research should be continued to produce long-lasting devices so that the environmental damage caused by assembly of devices gets minimized.

15. A very large number of substances burn in oxygen (presence in air) with the release of large amount of heat and light. Substance which burns in the presence of air is called combustible material. Oxygen present in air helps in burning of the substance and is called supporter of combustion. Chemical reaction responsible for release of energy is called combustion. The substance which burns on heating in oxygen or air is called combustible substance. Wood, coal, paper, coke, hydrogen, CNG (compressed natural gas), LPG (liquefied petroleum gas) kerosene, diesel, alcohol, ether, petrol etc.

are all examples of combustible substances. Air contains about 21% of oxygen by volume and 78% nitrogen. Whereas nitrogen is neither combustible nor supports combustion. However oxygen is a strong supporter of combustion. If we allow a substance to burn in pure oxygen (as in welding arc), we observe very fast burning.

Kindling or Ignition Temperature : The minimum temperature to which a substance must be heated before it catches fire is called kindling or ignition temperature. If the temperature of the substance is less than kindling or ignition temperature, it will not catch fire even if it is placed in pure oxygen. Ignition temperature of phosphorus is $35^{o}C$. Phosphorus will not catch fire if its temperature is less than $35^{o}C$. It will catch fire when its temperature is above $35^{o}C$. Inflammable substances are those which can easily catch fire. There ignition temperature is very low. It is usually less than $100^{o}C$. A minor spark is sufficient to cause serious accident. Alcohol, carbon disulphide, ether, benzene, petrol, LPG, nylon fibres are inflammable substances. You must have observed that you ignite LPG burner (used by your mother in kitchen) with a gas lighter which gives a very small (point) spark.

Conditions Necessary for Partial/Complete Combustion

i. There must be a combustible substance.
ii. There must be a supporter of combustion.
iii. Temperature of combustible substance is to be more than ignition temperature for the substance.

If any of the three conditions is not obeyed, the combustion will not take place.