Class 10th Science

Chapter - 14

Source of Energy

Textual Questions and Answers :

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Q.1. What is a good source of energy?

Ans :- A good source of energy would be one

(i) Which would do a large amount of work per unit volume or mass.

(ii) Be easily accessible.

(iii) Be easy to store and transport and

(iv) Perhaps most importantly, be economical.

Q.2. What is a good fuel?

Ans :- A good fuel :-

(i) It should be easily available.

(ii) Its calorific value should be large.

(iii) It should burn easily.

(iv) It should produce no smoke and should not leave any residence.

(v) Its combustion rate should be steady and controllable.

(vi) It should burn at controllable rate.

Q.3. If you could use any source of energy for cooking your food, which one would you use and why?

Ans :- We would prefer to use L.P.G. or Gobar gas. Because these gases have high calorific value, not produce pollution, easily available and is economical.

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Q.1. What are disadvantages of fossil fuels?

Ans :- Disadvantages of fossil fuels are :-

(i) The end product is carbon dioxide which causes green house effect.

(ii) When petrol is burnt, harmful substances like unburnt hydrocarbons, carbon monoxide, oxides of nitrogen sulphur are processed. These cause acid rain and thus soil and water pollution give innumerable problem to health.

Q.2. Why are we looking at alternative sources of energy?

Ans :- We are looking for a alternative sources of energy because conventional sources of energy

(i) Like coal and petroleum are not going to last long.

(ii) Are mostly non-renewable sources of energy

(iii) Cause pollution. They are costly.

Q.3. How has the traditional use of wind and water energy been modified for our convenience?

Ans :- The energy of the wind can be usefully employed by working of wind-mills. Wind mill helps us to produce electricity. Energy of the wind can be used to do mechanical work i.e. to lift water from the well and run a grain grinding machine.

To use water energy for producing electricity, a large number of high rise dams are constructed on the suitable river spots to obstruct the flow of water and collect water in large reservoirs. The kinetic energy of the following water is converted in to potential energy. Then the water form the high level in the dam is carried through pipes to the turbine at the bottom of the dam. Thus the potential energy of falling water is converted into electrical energy.

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Q.1. What kind of mirror-concave, convex or plane mirror would be best suited for use in a solar cooker? Why?

Ans :- A plane mirror is used because it reflects all the light falling on it to the desired place.

Q.2. What are the limitations of the energy that can be obtained from the oceans?

Ans :- Due to alteration of the moon, there are high and low tides in the sea. Tidal energy is harnessed by constructing a dam across a narrow opening to the sea. A turbine fixed at the opening of the dam converts tidal energy to electricity. The limitation to such dams is due to scarcity of locations where such dams can be constructed.

Ocean thermal energy of the sea or ocean is also used to produce electricity but these plants operate if the temperature difference between water at the surface and water at the depth up to 2 km is 20°C or more.

Q.3. What is geothermal energy?

Ans :- Energy derived from hot spots beneath the earth is called geothermal energy.

Q.4. What are the advantages of nuclear energy?

Ans :- Nuclear energy is preferred to fossil energy, hydro energy, thermal energy etc for the following reasons.

(i) A smaller space is required to get nuclear energy as compared to space required to harness hydro energy, thermal energy etc.

(ii) It produces much more energy than other conventional sources.

(iii) It causes lesser pollution then fossil energy.

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Q.1. Can any source of energy be pollution free? Why or why not?

Ans :- No source of energy can be pollution free because even if it is clean, its assembly could have caused environmental damage.

Q.2. Hydrogen has been used as a rocket fuel. Would you consider it a cleaner fuel than CNG? Why or why not?

Ans :- Hydrogen is cleaner fuel than CNG because hydrogen when burnt in presence of oxygen produces harmless water vapour. But when C.N.G. burnt produces carbon dioxide.

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Q.1. Name two energy sources that you would consider to be renewable. Give reasons for your choices.

Ans :- (i) Energy derived from biomass is a renewable source of energy because waste products are continuously produced.

(ii) The energy derived from flowing water, wind, sun and ocean are renewable sources because these sources can be harmless into energy so long as the present solar system exists.

Q.2. Give the names of two energy sources that you would consider to be exhaustible. Give reasons for your choice.

Ans :- Coal and petroleum are two exhaustible sources of energy. They are present in limited quantity in nature and can be exhausted by human activities.

EXERCISES

Q.1. A solar water heater can not be used to get hot water

(a) A sunny day.

(b) A cloudy day.

(c) A hot day.

(d) A windy day.

Ans :- (b) A cloudy day.

Q.2. In Which of the following is not an example of a biomass energy source?

(a) Wood.

(b) Gobar-gas.

(c) Nuclear energy.

(d) Coal.

Ans :- (c) Nuclear energy.

Q.3. Most of the sources of energy we use represent stored solar energy. Which of the following is not ultimately derived from the Sun's energy?

(a) Geothermal energy.

(b) Wind energy.

(c) Nuclear energy.

(d) Biomass.

Ans :- (c) Nuclear energy.

Q.4. Compare and contrast fossil fuels and the Sun as direct sources of energy.

Ans :- Similarity :-

(i) Both are natural sources of energy.

(ii) Both are widely used sources of energy.

Contrast :-

(i) Fossil fuels are non-renewable. But the energy of Sun in renewable.

(ii) Fossil fuels causes lot of air pollution. But the energy of Sun pollution free.

Q.5. Compare and contrast bio-bass and hydro electricity as sources of energy.

Ans :- Similarity :- (i) Both are renewable sources of energy.

(ii) Working cost of both sources is very low.

Contrast :-

(i) Large area of land get submerged under water in hydroelectric.

(ii) Plant where as a very small area is used for biomass plants.

Q.6. What ar the limitations of extracting energy from

(a) The wind?

(b) Waves?

(c) Tides?

Ans :- (a) Limitations of wind energy :-

(i) Need a large open space to couple a number of wind mills.

(ii) It is not available everywhere and at all the times.

(iii) Wind velocity must be sufficient.

(b) Limitations of extracting energy from waves :-

(i) Wave energy is viable proposition only when and where the waves are very strong. This has constraints of time and location.

(c) Limitation of tidal energy :-

(i) Its cost is huge and is not possible to build such dams everywhere.

(ii) Huge amount of silt gets deposited on basins in the dams.

Q.7. On what basis would you classify energy sources as :-

(a) Renewable and non-renewable?

(b) Exhaustible and inexhaustible?

Ans :- (a) The energy sources that can be regenerated are called renewable sources of energy.

Non-renewable sources are produced over millions of years under special conditions. Once consumed are not replaceable for a very long time. Fossil fuels like coal. Petroleum and natural gas are non-renewable sources.

(b) Exhaustible sources are non-renewable sources and inexhaustible sources are renewable sources.

Q.8. What are the qualities of an ideal sources of energy?

Ans :- Am ideal source of energy :-

(i) Which would do a large amount of work per unit volume or mass.

(ii) Be easily accessible.

(iii) Be easy to store and transport and

(iv) Perhaps most importantly be economical.

Q.9. What are the advantages and disadvantages of using a solar cooker? Are there places where solar cookers would have limited utility?

Ans :- Advantages :- (i) It does not produce any pollution.

(ii) It provides cost free.

Disadvantages :- (i) The efficiency of a solar cooker is very low.

(ii) It cannot be used for frying purpose. Solar cookers cannot be used at places where there is insufficient amount of sun shine.

Q.10. What are the environmental consequences of the increasing demand for energy? What steps suggest to reduce energy consumption?

Ans :- The demand of energy is increasing day by day. Exploiting any would no. source of energy may disturb the environment in one way or other. For example getting energy from fossil fuel may cause lot of pollution in air.

Steps for reducing energy consumption :-

(i) Ease and cost of extracting energy from the source.

(ii) The efficiency of the available technology.

(iii) Environmental impact of using that source.

Additional Questions and Answers:

Q.1. What are two types of of energy?

Ans :- The two types of energy are :

(i) Renewable.

(ii) Non-renewable.

Q.2. Which process converts solar energy to chemical energy?

Ans :- Photosynthesis.

Q.3. Name the components of solar energy not visible to us.

Ans :- Ultraviolet and infrared rays.

Q.4. What is full form of L.P.G.?

Ans :- Liquified Petroleum Gas.

Q.5. Write the full name of C.N.G.

Ans :- Compressed Natural Gas.

Q.6. Write the name of two fossil fuel.

Ans :- Coal and petroleum.

Q.7. What is the alternative name for renewable sources of energy?

Ans :- Non-conventional sources.

Q.8. Mention any two fuels that form the renewable sources of energy.

Ans :- Wood and biogas.

Q.9. In a hydroelectric power plant, what kind of energy is converted into electrical energy?

Ans :- Potential energy into electrical energy.

Q.10. Mention any two uses of wind energy.

Ans :- (a) To construct windmills.

(b) To sail boats.

Q.11. Name the device which directly converts solar into electrical energy.

Ans :- Solar cells.

Q.12. What are the disadvantages of gaseous fuels?

Ans :- (i) Gaseous fuel are highly inflammable. They can catch fire very readily. Therefore special care to be taken while storing and transporting them.

(ii) Gaseous fuel occupy more volume as compared to solid and liquid fuels. Therefore, big containers and large space is needed for their storage.

Q.13. Why L.P.G. is called a good fuel?

Ans :- L.P.G. is considered as a good fuel because of the following reasons :-

(i) L.P.G. has a high calorific value. Therefore it has higher efficiency as a fuel.

(ii) It burns with a smokeless flame and so does not cause pollution.

(iii) It does not produce any poisonous gases on burning.

(iv) It undergoes complete combustion.

Q.14. Write two advantages of classifying energy sources as renewable and non-renewable.

Ans :- (i) Which energy source should be used judiciously, that it could be used for maximum length of time e.g. non-renewable sources.

(ii) To develop newer methods to use a particular source economically, e.g. - renewable sources.

Q.15. What is a fuel?

Ans :- Any substance which may be burnt in air to produce heat and light in known as a fuel. For example - wood, coal, kerosene etc.

Q.16. What is biomass?

Ans :- The material obtained from plants and animals used as fuels is called biomass.

Q.17. Give the raw materials used for the preparation of bio- gas.

Ans :- The following materials may be used to produce biogas :

(i) Plant waste like husk, grass, dry leaves, weeds, vegetable htlf-strains.

(ii) Animal wastes like cow-dung, dungs of horse, elephant, poultry wastes.

(iii) Industrial and domestic wastes.

(iv) Human excreta and faecal matter.

Q.18. Write uses of the dams on rivers.

Ans :- (i) Potential energy of the stored water is first converted to kinetic energy of the falling water which is finally converted to electric energy.

(ii) Water is stored in the dams during rains and used for irrigation purposes during draught.

Q.19. Mention three advantages of solar cell.

Ans :- (i) Solar cells can be used in remote areas.

(ii) Solar cells are easy to use and require least maintenance.

(iii) Solar cells have no moving parts and don't require much technical knowledge to use it.

Q.20. State two major advantages of preparing biogas from sewage.

Ans :- (i) It helps control water pollution by removing undesirable sewage disposal.

(ii) It provides useful manure for agriculture.

Q.21. What is the main constituent of biogas?

Ans :- Methane.

Q.22. What are the constituents of L.P.G.?

Ans :- Butane, propane and ethane.

Q.23. Name the process by which large scale energy is produced in the sun.

Ans :- By nuclear fusion.

Q.24. Describe tidal energy.

Ans :- Due to the gravitational pull of mainly the moon on the spinning earth, the level of water in the sea rises and falls. This phenomenon is called high and low tides and the difference in sea-levels gives us tidal energy. Tidal energy is harnessed by constructing a dam across a narrow opening to the sea. A turbine fixed at the opening of the dam converts tidal energy to electricity.

Q.25. Biogas contains 70% methane. The calorific value of methane is 55 KJ/g. If a family requires 10,000 KJ of energy per day, how much biogas will be needed per day?

Ans :- 55 KJ of energy is produced by 1 g of methane.

10,000 KJ of energy is produced by

$$= \frac{10'000}{55}$$

= 181.8 g methane .

Since, biogas contains 70% methane

Amount of biogas required per day

$$= \frac{181.8 \times 100}{70}$$

= 259.74 g

Multiple Choice Questions:

Q.1. Which one of the following is not a source of energy?

(a) Levers.

(b) Muscle power.

(c) Water stored at dams.

(d) Flowing water.

Ans :- (a) Levers.

Q.2. The process of burning fuel is called

(a) Respiration.

(b) Oxidation.

(c) Explosion.

(d) Combustion.

Ans :- (d) Combustion.

Q.3. Which gas cannot used as a fuel?

(a) C.N.G.

(b) L.P.G.

(c) Oxygen.

(d) Hydrogen.

Ans :- (c) Oxygen.

Q.4. Infra-red rays are

(a) Harmful to skin.

(b) Bright red in colour.

(c) Having more energy than ultraviolet rays.

(d) Having less energy as compared to ultraviolet rays.

Ans :- (d) Having less energy as compared to ultraviolet rays.

Q.5. Natural gas is mostly

(a) Oxygen.

(b) Hydrogen.

(c) Ammonia.

(d) Methane.

Ans :- (d) Méthane.

Q.6. Which of the following is an example of biomass energy source?

(a) Ocean energy.

(b) Tidal energy.

(c) Atomic energy.

(d) Gobar energy.

Ans :- (d) Gobar energy.

Q.7. The device which converts solar energy into electrical energy is

(a) Solar cooker.

(b) Solar geyser.

(c) Solar cell.

(d) All the above.

Ans :- (c) solar cell.

Q.8. In a nuclear reactor, liquid sodium metal is used as:

(a) Fuel.

(b) Coolant.

(c) Moderator.

(d) None of these.

Ans :- (b) Coolant.

Q.9. Unit of calorific value of a substance is

(a) Kcal.

(b) Calorie.

(c) Jkg.

(d) Jkg^{-1}

Ans :- (d) J Kg^{-1}

Q.10. Which of the following causes maximum pollution on burning?

(a) Gobar cakes.

(b) Petrol.

(c) C.N.G.

(d) L.P.G.

Ans :- (a) Gobar cakes.

Q.11. Which of the following is a nonrenewable source of energy?

(a) Wood.

(b) Sun.

(c) Fossil fuels.

(d) Wind.

Ans :- (c) Fossil fuels.

Q.12. Fuel used in thermal power plants is

(a) Water.

(b) Uranium.

(c) Biomass.

(d) Fossil fuel.

Ans :- (d) Fossil fuel.

Q.13. Which of the following is not a green house gas?

(a) CO_2

(b) CH_4

(c) SO_2

(d) CO

Ans :- (d) CO.

Q.14. The energy is obtained by nuclear fusion process in

(a) The sun.

(b) Nuclear reactor.

(c) Atomic bomb.

(d) Geosystem.

Ans :- (a) The sun.

Q.15. Which is not a good source of energy?

(a) It is easy to store.

(b) It gives tremendous amount of energy.

(c) It burns easily.

(d) It produces no pollution.

Ans :- (b) It gives tremendous amount of energy.

Q.16. Which is the ultimate source of energy?

(a) Water.

(b) Sun.

(c) Uranium.

(d) Fossil fuels.

Ans :- (b) Sun.

Q.17. Choose the correct statement :

(a) Sun can be taken as an inexhaustible source of energy.

(b) There is infinite storage of fossil fuel inside the earth.

(c) Hydro and wind energy plants are non polluting sources of energy.

(d) Waste from a nuclear power plant can be easily disposed off.

Ans :- (a) Sun can be taken as an inexhaustible source of energy.

Q.18. Gobar gas is-

(a) Foul smelling gas.

(b) Sweet smelling gas.

(c) Having high calorific value.

(d) Useless.

Ans :- (c) Having high calorific value.

Q.19. A turbine can not be rotated by

(a) Flowing water.

(b) Heat of sun.

(c) Steam.

(d) Moving win.

Ans :- (b) Heat of sun.

Q.20. Which of the following substances can be used to construct a solar cell?

(a) Silicon.

(b) Arsenic.

(c) Silver.

(d) Platinumele.

Ans :- (a) Silicon.

Q.21. What are the limitation of using solar energy?

Ans :- (i) Solar energy is not available during cloudy or rainy days.

(ii) Solar energy is not available during night.

Q.22. What is see wave energy? How is it obtained?

Ans :- Sea wave energy is energy of the waves produced in sea due to winds.

Sea wave tidal energy is harnessed in three ways :-

(i) Wave surge or focussing devices :- To overcome the problem of low height of water the barries are constructed in such a manner that water is channelled and concentrated into small area. The technique raise The height of water waves greatly. The raised water is channelled into an elevated reservoir. Now water is made to pass through channels in which water turbines rotate to produce electricity.

(ii) Pitching or Floats devices rise of fall with rising and falling waves. They are connected to a shaft by some mechanical arrangement to produce electricity.

(iii) Oscillating column water are pneumatic devices using up and down motion to compress and decompress air. The rising and falling water devices air into or out of the top of cylindrical shaft powering an air driven turbine.

Q.23. State whether the statements are true or false.

(i) Gobar gas emits foul smell.

(ii) Black surface are good absorber of heat.

(iii) Solar cells convert solar energy into electric energy.

(iv) Ozone layer prevents infrared rays from entering earth's atmosphere.

Ans :- (i) False.

(ii) True.

(iii) True.

(iv) False.

Q.24. What part of solar energy is harmful to us?

Ans :- Ultraviolet rays. These cause skin cancer.

Q.25. What is solar energy?

Ans :- It is the energy got from sun.