Sources of Energy

1 Mark Questions

1. A solar cooker may not cook food if.
(a) Interior of the box and the container of food are perfectly shining.
(b) Glass sheet over the box is not closed.
(c) Solar cooker is placed in the shade.
(d) All the above.
Ans. (d) All the above.

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2. Radiations which are harmful to the living organisms are
(a) Infrared radiation.
(b) ultraviolet radiations
(c) Visible radiation.
(d) micro waves
Ans. (b) ultraviolet radiations

3.Solar cells are made of
(a) metals
(b) insulator
(c)semi conductors
(d) none of these
Ans. (a) Seine conductors

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4. The main constituent of CNG is
(a) butane
(b) methane
(c) ethane
(d) propane
Ans. (b) methane

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5. Which of the following is not a bio mass energy source?
(a) gobar gas
(b) coal
(c) wood
(d) nuclear energy
Ans. (d) nuclear energy

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6. Which of following is more environment friendly?
(a) Burning of coal
(b) burning of fire wood
(c) burning of charcoal
(d) Burning of diesel.
Ans. (c) burning of charcoal

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7. Major problem in harnessing nuclear energy is to
(a) split heavy nucleus
(b) sustain nuclear reactions
(c) Convert nuclear energy into electricity
(d) dispose off spent fuel safety.
Ans. (d) dispose off spent fuel safety.

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8. Fusion reaction is also known as
(a) chemical reaction
(b) elastic scattering
(c) thermonuclear reaction
(d) photo nuclear reaction
Ans. (c) thermonuclear reaction

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9. India exploded her first underground nuclear device at
(a) Ranchi
(b) Kota
(c) Jaipur
(d) Pokhran
Ans. (d) Pokhran

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10. Although charcoal is a clean and a better source of heat energy yet it cannot be used as a domestic fuel because it
(a) cause environmental pollution
(b) produce less heat energy
(c) cannot be stored easily
(d) is expensive fuel
Ans. (d) is expensive fuel

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11. A solar water heater cannot be used to get hot water on
(a) a sunny day
(b) a cloudy day.
(c) a hot day

(d) a windy day.
Ans. (b) a cloudy day.

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12. Which of the following is not an example of a bio-mass energy?
(a) wood
(b) gobar-gas
(c) nuclear energy
(d) coal
Ans. (c) nuclear energy

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13. 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) bio-mass
Ans. (c) nuclear energy

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14. In the given flow chart of energy conversion during hydroelectric power generation, fill in the blanks with appropriate answer.

Ans. Dynamo.

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15. Consider two solar cooker, one covered with a plane glass plate and other kept open. Which of the two cooker would be more efficient and why?
Ans. Solar cooker with covered glass slab, as it will show green house effect.

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16. Give one reason how increasing dependence on nuclear power generation is a threat for future generation?
Ans. Radiation emitted during leakage can change the genetic arrangement or disposal to nuclear waste.

2 Mark Questions

1. Hydro power is a renewable source of energy. Justify.
Ans. Hydro power is a renewable source of energy because if is derived from the renewable source of energy i.e. Sun.

2. Write two qualities of an ideal source of energy?
Ans. The tow qualities of an ideal source if energy are-
(i) It does not cause environ mental pollution-
(ii) Economical.

3. What are the advantages of nuclear energy?
Ans. Advantages of nuclear energy-
(i)A small quantity of fuel provides large amount of energy.
(ii)The nuclear fuel once inserted in nuclear power plant gives large amount of energy for a longer period of time.

4. Name two activities in our daily life in which solar energy is used?
Ans. (i) For cooking food using solar cookers.
(ii) For drying clothes and food grains.

5. Write two advantages of using solar cooker?
Ans. (i) Pollution free
(ii)Nutrition value of food is preserved when food is cooked inside a solar cooker.

6. Suggest two ways to reduce energy consumption?
Ans. (i) Fuels used for burning must be extinguished as soon as their use is over.
(ii) Bulb, tubes, fans and other electrical appliances must be switched off as you leave your room.

7. What is geothermal energy? Write its advantages?
Ans. The heat energy obtained from hot rocks present in earth's crust of geo thermal energy.
The advantages of geo thermal energy are-
(i) Environment friendly.
(ii) Cost of converting geo-thermal energy into electricity is less.

8. Why are many thermal power plants set up near coal or oil fields?
Ans. The thermal power plants are usually set up near coal or oil fields so that the fuel is easily available and the problem of air pollution while transporting the fuel may be minimized.

9. What is a good fuel?
Ans. A good fuel is that which release more heat on burning, is easily available at the economical rate and do not cause environmental pollution.

10. If you could use any source of energy for heating your food, which one would you use and why?
Ans. We shall use LPG/PNG gas or electricity for heating your food because these are pollution free and have high calorific value.

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11. What kind of mirror –concave or convex or plain –would be best suited for use in a solar cooker? Why?
Ans. Large size concave mirrors are best suited for use in solar cooker, because they focus large amount of solar radiation on a small surface area so temperature will rise quickly.

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12. Can any source of energy be pollution free? Why or why not?
Ans. No, source of energy is completely pollution free. A source of energy to be pollution free if neither it causes any pollution during its actual operation nor there any pollution during assembly of devices utilizing that source of energy. Solar cell device may have caused some pollution.

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13. Hydrogen has been used as rocket fuel; would you consider it a clear fuel than CNG? Why of why not?
Ans. Hydrogen can be considered a cleaner fuel because its burning produces water vapor which is non-polluting. However, due to explosive nature of hydrogen, its storage and transportation is difficult.

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14. The cost of production of electricity in a thermal power station located in Bihar/Tharkliand/Orissa is less than in Gujarat/Maharashtra. Do you agree? Justify your answer.
Ans. It is because coal is available in Bihar/Jharkhand/Orissa locally, whereas it has to be transported for any thermal power plant in Gujarat/Maharashtra.

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15. Which of the following sources of electricity involves more running expenses and why? Thermal power station, Hydro power station, solar cells or Geothermal source.
Ans. Thermal power stations involve more running cost due to continuous use of coal.

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16. Why is there so much emphasis on changing over from petrol/diesel driven automobiles to CNG-driven vehicles?
Ans. CNG on burning produces only carbon dioxide and water. It does not produce smoke.

-It does not leave unburnt hydrocarbons, lead particulates etc.

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17. Which of the following is not an example of the biomass energy source?
(a) Wood (b) gobar gas (c) atomic energy (d)coal.
Ans. Atomic energy is not an example of biomass energy source.

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18. How is the supply of electricity maintained in a windmill when there is no wind? In a solar panel when there is no sun?
Ans. In both the cases, the electricity generated is stored in a battery. This battery provides electricity when there is no wind in the case of a windmill and no sun in the case of a solar panel.

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19. Can any source of energy be pollution-free? Why or why not?
Ans. No source of energy can be called pollution-free, because the use of any source of energy disturbs the environment in one way or the other. The actual source of energy may be pollution-free, but the assembly of the device might have caused some damage to the environment. So, in absolute sense, no source of energy can be called pollution-free.

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20. Though a hot iron emits radiation, yet it is not visible in the dark, why?
Ans. Hot iron emits infra-red rays and these are not visible to our eyes.

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21. Define: OTE (ocean thermal energy).
Ans. The energy available due to the difference in the temperature of water at the surface of the ocean and at deeper levels is called OFF.

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22. Give two ways in which animal dung can be used as fuel. Which way is better and why?
Ans. As dung cake and as Biogas. Biogas is better because it spreads less pollution and has more calorific value.

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23. The wind velocity at three places A, B and C are 5Km/hr, l5Km/hr, 10Km/hr respectively. Which is the most suitable place for installing wind mill & why?
Ans. B, Maximum velocity required is 15km/h. At lower speed it will not work. At very high speed it may break the blades.

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24. What are two advantages of charcoal over wood as fuel?
Ans. High calorific value & pollution free

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25. Mention any two reasons, why wood is not preferred as fuel.

Ans. (i) Burning wood causes pollution
(ii) Excess use of wood would cause deforestation.

3 Mark Questions

1. (a) Distinguish between renewable and non- renewable sources of energy?
(b) Choose the renewable source of energy from the following list: coal, biogas, sun, natural gas.
Ans.(a) Difference between renewable and non-renewable sources:

Renewable Sources	Non-Renewable Sources
The sources of energy which can never be finished and are continuously supplied by nature are known as renewable sources of energy.	The sources of energy which are exhaustible (can be finished) and took lots of time to be formed again are known as non-renewable sources of energy.
For example: Wind, the Sun, Bio-Gas, Hydro-power etc.	For example: Coal, Natural Gas, Petroleum etc.

(b) Biogas and the sun are renewable sources of energy.

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2. (a) Name the device used to convert
(i) Solar energy in to heat and
(ii) solar energy in to electricity.
(b) Explain the working of windmill
Ans.(a) (i) Solar cooker
ii)Solar cell.
(b)When the wind blows with a minimum speed of 15km/hr, the kinetic energy of the wind is used to rotate the blades of wind mill. The rotation energy of the blades is used to rotate the armature of the generator and generator in turn produce electricity.

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3. What is biogas? How can biogas be obtained? Why the use of biogas obtained from cow dung is advised to use as compared to cow dung cakes?

Ans. Biogas is a mixture of gases namely methane, Co_2, H_2 and H_2S. it is obtained from an aerobic decomposition of cow dung and plants and animal wastes in a biogas plants. Biogas is advised for burning in preference to burning of cow-dung cakes because:
(i) it cause no air pollution
(ii) It is a cheaper source of energy.

4. What are the limitations of extracting energy from
(a) the wind
(b) waves
(c) tides
Ans.(a) Wind energy is not sufficient to operate heavy machines and moreover it is limited to a certain place.
(b)Energy of the waves can be extracted only if strong wind blows all the time across the sea.
(c)Tidal power plant can extract the tidal energy from the water levels of high tide and low tide is very large.

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5. Name three forms in which energy from ocean is made available for use. What are OTEC power plants? How do they operate?
Ans. (i) Muscular energy to perform different activities like taking bath, climbing stairs and muscular energy comes from food we eat.
(ii) Fossil fuel energy used in bus or car to reach the school and this energy come from fossil fuels like petrol, diesel and CNG.
(iii)Chemical energy in the form of breakfast and it also comes from the food we eat.

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6. List three forms of energy we use when we wake up from morning till we reach the school. Also from where do we get these different forms of energy?
Ans. (i) Tidal energy
(ii) Ocean waves energy
(iii) Ocean thermal energy
OTEC power plants are ocean thermal energy conversion plants. For operating OTEC temperature difference of or more between the surface water of ocean and inside water of ocean is required to boil liquid like ammonia
or *chlorofluorocarbon (CFC).* The vapors of the liquid at high pressure used to rotate the turbine of the generator to produce electricity.

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7. Compare and contrast bio- mass and hydro-electricity as source of energy. The production cost of hydroelectricity is cheaper than the electricity produced in a thermal power station. Explain why?
Ans.

In a thermal power station coal is burnt to produce electricity whereas hydroelectricity is produced by allowing the water to fall on turbines. Water in

rivers is available free of cost but the cost of extracting and transporting coal is very high.

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8. What kind of mirror concave, convex or plane would be best suited for the use in a solar cooker. Why? What is the role of glass sheet used in a solar cooker? Also write two disadvantages of using a solar cooker?
Ans. Concave mirror will be best suited for the use in solar cooker because it concentrates all the sunlight to a point after reflection from the mirror and thus raises the temperature of that point.
Plane glass plate does not allow the infrared or heat radiation entered in the box to go outside the box thus heating the box and creating greenhouse effect.
The two disadvantages of using a solar cooker are:
(i)Food cannot be cooked at night and on a cloudy day by using a solar cooker.
(ii)Food cannot be cooked quickly by using a solar cooker.

9.What is a good source of energy?
Ans. A good source of energy should have the following qualities:
(a) It should be easily available.
(b) It should have high calorific value.
(c) It should be easy to store and transport
(d) It should be economical
(e) It should not cause environmental pollution.

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10. What are the disadvantages of fossil fuels?
Ans. There are following disadvantage of fossil fuels:
(a) Burning of fossil fuels causes' pollution.
(b) Oxides of Sulpher and nitrogen produced on burning of fossil fuel causes acid rain.
(c) Carbon dioxide causes greenhouse effect.
(d) Fossil fuels are non-renewable sources of energy.

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11. Why are we looking at alternate sources of energy?
Ans. Fossil fuels are non-renewable sources of energy and their reserves are limited one. Hence, we need to conserve them. If we continue consuming these sources at same rate as presently, we may soon run out of energy. To avoid such a situation we are looking for alternative sources of energy.

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

Ans. To use energy of flowing water large dams are built in hilly regions to store huge amount of water at a height. This water is used to produce hydroelectricity. Wind energy is used to generate electricity by using windmill that converts the wind energy into electricity.

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13. What are limitations of the energy that can be obtained from the oceans?
Ans. Limitations of energy obtained from oceans:
(a) There are very few locations where dams to utilize tidal energy can be built.
(b) Cost of installation of power houses is extremely high and efficiency of plants is comparatively small.
(c) Power plants built in oceans will need high continuous maintenance.

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14. What is geothermal energy?
Ans. Geothermal energy is the heat energy present inside the earth in certain regions called hot spots. When underground water comes in contact with the hot spot, steam is generated. This steam is routed through a pipe to a turbine and used to generate electricity.

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15. What are the advantages of nuclear energy?
Ans. Geothermal energy is the heat energy present inside the earth in certain regions called hot spots. When underground water comes in contact with the hot spot, steam is generated. This steam is routed through a pipe to a turbine and used to generate electricity.

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16. Name two energy sources that you would consider to be renewable. Give reasons for your choices.
Ans. Solar energy, wind energy, ocean energy etc. are renewable sources of energy due to the following reasons:
(a) These forms of energy are available in plenty in our natural environment.
(b) These energy sources will not be depleted because their supply is large and extraction of usable energy from these sources is negligible.

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17. Give the names of two energy sources that you would consider to be exhaustible. Give reasons for your choices.
Ans. Coal and petroleum are two exhaustible sources of energy. These fuels were formed over million for years ago and there are only limited reserves. If we continue to use them as at present, these reserves will be exhausted soon.

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18. Compare and contrast fossils fuels and the Sun as direct sources of energy.

Ans. Distinction between fossils fuels and Sun energy:

Fossil fuels	Sun energy
i. These are non-renewable and exhaustible sources of energy. ii. Combination of these causes pollution. iii. Fossil fuels are costly but energy can be obtained easily.	i. Sun is a renewable and inexhaustible source of energy. ii. It does not cause pollution or degradation of environment. iii. It is freely available but devices used to harness it are costly.

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19. Compare and contrast bio-mass and hydroelectricity as sources of energy.
Ans. Difference between bio-mass and hydroelectricity:

Bio-mass energy	Hydro electricity
i. Bio-gas plant is cheap, small in size and can be installed anywhere. ii. These utilize wastes bio-mass materials like cow dung, plant residue, vegetable waste and sewage etc.	i. It can be generated only at few places in hilly terrain by constructing dam over river. ii. These utilize kinetic energy of flowing water or potential energy of water stored at a height.

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20. What are the qualities of an ideal source of energy?
Ans. The qualities of ideal sources of energy are:
(a)It should be easily accessible, inexhaustible and a renewable source of energy and cost of harnessing energy should be reasonably small.
(b)It should be easily stored and transported.
(c)It should have high calorific value.
(d)It should be pollution free.

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21. H_2 has been used as a rocket fuel. Would you consider it as a cleaner fuel than CNG? Why or why not?
Ans.H when burnt in presence of 02 produces 1120 as the only product with release of lot of heat energy. Water does not cause any damage to environment while CNG during burning produces CO and water. CO is not a pollutant yet it leads to rise in the temperature (global warming), this rise is called greenhouse effect and this will affect polar ice, and life on the earth is at risk. Thus, 1 is a cleaner fuel than CNG.

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22. Why is biogas a better fuel than animal dung-cakes.
Ans. Biogas is a better fuel than animal dung-cakes because-

(a) Burning of animal dung-cakes produces lot of pollution whereas biogas is a smokeless fuel.
(b) The calorific value of Biogas is much higher than that of animal dung-cakes.
(c) Animal dung cakes leaves residue after burning whereas biogas leaves no residue.

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23. How difference in temperature helps to harness energy from ocean?
Ans. The difference in temperature helps to obtain energy in ocean- thermal — energy conservation plants, which operate for temperature difference of 200 C or more. The warm surface water is used to boil a volatile liquid. The vapour of the liquid are used to run the turbine of generator, the cold water from the depth of the ocean is pumped up and condense vapour again to liquid.

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24. Write three reasons why construction of Tehri Dam on river Ganga and Sardar Sarovar project on river Narmada is opposed by local people and environmentalist?
Ans. (i) Rehabilitation problems, loss of agricultural land.
(ii)Disturbance of ecological balance.
(iii) Forming of greenhouse gases due to decomposition of plant in water.

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25. Write three environmental consequences of the various source of energy we used?
Ans. Greenhouse effect, improper use of natural resources, pollution.

5 Mark Questions

1. A student constructed a box type solar cooker. He found that it did not work efficiently. What could this be due to? Give any four possible mistakes in the construction and operation of the solar cooker. What maximum temperature can ordinarily be reached inside a solar cooker?
Ans. He might have committed some mistakes.
(i) Interior of the solar cooker not painted in black colour.
(ii) Instead of glass sheet, plastic sheet is used to cover it.
(iii) Solar cooker is without insulation.
(iv) Black containers have not been used.
Maximum temperature is $140^{\circ}C$ b in solar cooker.

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2. (i) What is biogas? Name two main combustible components of biogas?
(ii) What is the use of spent slurry in a biogas plant?

(iii) Name the microorganisms responsible for the fermentation of slurry in the digester?
Ans. (i) Biogas is a mixture of various gases formed when the animal dung mixed with water is allowed to decompose in the absence of air. The two combustible component of biogas are $CH_4 and H_2$ gas.
(ii) The spent slurry in biogas plant is rich in nitrogen and phosphorous required for the growth of plants and hence can be used as a manure.
(iii) Anaerobic micro- organism.

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3. What are the limitations of extracting energy from:
(i) the wind? (ii) waves? (iii) tides?
Ans. (i) The Wind:
(a) It is not available at all times.
(b) It requires a very large area of land.
(c) It is not possible to have a windmill everywhere as to run it, the minimum wind speed of 15 km/hr is required (only possible in open areas like the seaside).
(ii) Waves:
(a) Wave energy would be a viable proposition only where waves are very strong.
(b) It is costly to set up devices to trap wave energy.
(iii) Tides:
(a) Very few sea coasts in the world have suitable sites for the purpose of harnessing tidal energy.
(b) The rise and fall of tides happen only twice in a day is not sufficient to generate electricity continuously.

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4. On what basis would you classify energy sources as
(a) renewable and non-renewable?
(b) exhaustible and inexhaustible?
Are the options given in (a) and (b) the same.
Ans. (a) Renewable sources of energy are those sources which can be regenerated again. Non-renewable sources of energy are those sources which would get depleted some day and cannot be regenerated.
(b) Exhaustible sources of energy are those which will be exhausted some day and cannot be regenerated. Inexhaustible sources of energy are those which can be regenerated again due to some continuing or repetitive currents of energy and are inexhaustible.
Options in both cases are exactly same.

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5. What are the advantages and disadvantages of using a solar cooker? Are there places where solar cookers would have limited utility?
Ans. Advantage of solar cooker:
a. There is no cost of fuel.
b. It is environment friendly and there is no residue like ash etc.
c. Cooking is hygienic and nutritious.
Disadvantage of solar cooker:
a. The cooking is slow.
b. It cannot be used at all times.
c. A solar cooker can perform only limited functions.

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6. What are the environmental consequences of the increasing demand for energy? What steps would you suggest to reduce energy consumption?
Ans. The increasing demand for energy is largely being met by the use of fossil fuels. But these fuels are exhaustible and non-renewable sources of energy. Moreover, burning of fossils fuels cause air pollution. Release of acidic oxides leading to acid rain that affect our water and soil resources. These gases also produce greenhouse effect leading to increase the temperature of earth. To reduce energy consumption we should lead a simple and a natural life. As an example, instead of using an air conditioner in a closed room we should live in an airy room having appropriate number of windows.