WORK AND ENERGY

ENERGY

Energy

When a car runs, the engine of the car generates a force which displaces the car. In other words, work is done by the car. This work is done on the expense of fuel. Fuel provides the energy needed to run the car. Had the petrol tank been empty, car could not be run. The conclusion is that, if there is no source of energy, no work will be done.

Let us take another example. Suppose a lift takes some persons from ground floor to second floor. Then the lift performs work. If you enquire, you will find that the lift is operated by an electrical motor. Thus, electrical energy does the work. If there is no electricity the lift will not operate. Again, if there is no source of energy, no work will be done.

The above statement is not just true for the above two examples, but is true for all processes. Therefore, energy is defined as the capacity to do work. Energy is the ability to do work. More the energy, more the work that can be performed and vice-versa.

Units of energy

Energy is a scalar quantity. The S.I. unit of energy is joule (J).

(Bigger units is 1 kJ = 1000 J, 1 MJ = 106 J)

The C.G.S. unit of energy is erg.

Note:

(i) kilo Watt × hour (kWh) is commercial unit of energy.

1 kWh = 1000 watt × 60 × 60 sec

$= 3.6 \times 10^6$ watt × sec.

1 kWh = 3.6×10^6 J.

(ii) Electron volt (eV) is also the unit of energy. The energy of an electron, when it is accelerated by a potential difference of 1 volt, is known as one eV

$1eV = 1.6 \times 10–19J$

Forms of energy

Nature-has been very kind to us in providing us energy in various forms. These forms of energy are as follows.

1. Solar energy.

The energy radiated by the Sun is called solar energy. Plants collect and store this energy to make food through photosynthesis.

2. Heat energy.

It is the energy released when coal, oil, gas or wood burn and it produces in us the sensation of warmth.

3. Light energy.

It is the form of energy which produces in us the sensation of light. Sun is the natural source of light.

4. Chemical energy.

It is the energy possessed by fossil fuels (coal; petroleum and natural gas) and is also called the fuel energy. The food that we eat has chemical energy stored in it.

5. Hydro energy.

The energy possessed by water flowing in rivers and streams is called hydro energy. This energy is used to generate electricity in hydroelectric power plants.

6. Wind energy.

The energy possessed by moving air is called wind energy.

7. Ocean thermal energy (ote).

Solar energy stored in the oceans in the form of heat is called ocean thermal energy.

8. Geothermal energy.

It is the heat energy of the Earth and is found within rock formations and the fluids held within those formations.

9. Biomass energy. it is the energy obtained from biomass (i.e., living matter or its residues).

10. Tidal energy.

It is the energy derived from the rising and falling ocean tides.

11. Sound energy.

It is the energy possessed by vibrating objects and it produces in us the sensation of hearing.

12. Mechanical energy.

It is the energy possessed by a body due to its position (or configuration) or motion. The energy possessed due to position or configuration is called potential energy and that due to motion is called kinetic energy. The sum of these two energies is called the mechanical energy.

13. Electric energy.

The energy possessed by charges (either at rest or in motion) is called electric energy.

14. Magnetic energy.

It is the energy possessed by magnetized bodies e.g., a magnet.

15. Electromagnetic energy.

It is the general name for electric and magnetic energies.

16. Nuclear energy.

The energy produced in the processes of fission and fusion is called nuclear energy.