

## CHAPTER 7: ENERGY

### Energy (Optional)

Energy is the capacity to do work and it is measured in joules (J). Work is said to be done when an object is made to move or when a moving object is stopped. Chemical energy is the energy stored in the bonds of chemical compounds.

An exothermic reaction is one in which heat is given out to the surroundings. Such reactions are normally accompanied by a rise in temperature. Combustion of fuels (wood, coal, oil, natural gas and hydrogen) are examples of useful exothermic reactions.

An endothermic reaction is one during which heat is absorbed from the surroundings. Such reactions are accompanied by a fall in temperature. Photosynthesis is regarded as an endothermic reaction because it takes place in the presence of sunlight.

### Renewable and non-renewable sources of energy

A renewable source of energy is one which can be used without the risk of finishing all. Some energy sources like biomass, hydroelectric energy, solar energy, tidal energy, wind energy are called renewable energy or alternative energy sources. They refer to usable energy derived from replenishable sources.

A non-renewable source of energy is one that cannot be replaced after use. Fossil and nuclear fuels are examples of non-renewable or finite energy sources. One day they will be completely used up.

### Fossil fuels

Fossil fuels include coal, petroleum, natural gas and heavy oils. Chemical energy is easy to obtain simply by burning fossil fuels, but they cause pollution and lead to global warming by the emission of greenhouse gases like carbon dioxide.

### The need for sustainable use of energy resources

Fossil fuels will be used up in less than two centuries. This is why there is a need for alternative energy sources for the future of humankind.

Alternative sources of energy include solar energy, wind energy, hydroelectric energy, biomass and tidal energy. They can be used again and again without any risk of running out.

### Different alternatives for sustainable production of energy

#### Solar energy

Solar energy refers to radiation from the Sun capable of producing heat, causing chemical reactions, or generating electricity. Although it is a cheap source of energy and does not cause pollution, it is available only during the day.

#### Wind energy

Wind energy is a form of energy conversion in which turbines convert the kinetic energy of wind into mechanical or electrical energy. Although it is cheap, it is only available intermittently.

### Hydroelectric energy

It refers to electricity produced from generators driven by water turbines that convert the potential energy in falling or fast-flowing water to mechanical energy. Although the electricity produced is cheap, it costs a lot to build hydroelectric power stations.

### Biomass

The term biomass refers to plant materials and animal waste used especially as a source of fuel. Biomass energy is derived from five distinct energy sources: garbage, wood, waste, landfill gases and alcohol fuels. They are renewable sources of energy but are thought to contribute to global warming by the emission of carbon dioxide gas.

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