CHAPTER 1 INTRODUCTION TO CHEMISTRY

Natural science is a systematic study of natural concept or phenomena obtained generally through controlled laboratory experimentation and observation. To facilitate study and investigation, natural science is compartmentalized or divided into different disciplines such as biology, physics and chemistry. Biology deals with the study of living things (plants and animals). Physics deals with the study of various forms of energy and matter.

Chemistry is therefore the branch of natural science that deals with the study of the composition of matter, its properties, the changes it undergoes, its reaction with other substances, its uses and synthesis. The term substance refers to any pure element or pure compound. Knowledge of chemistry is very significant in our life because almost everything in existence is produced by the application of the knowledge of chemistry. For example, plastic containers, foam, pomades, cements, soap, cutlery, textile materials, detergent, drugs, food, furniture and some drinks are all manufactured or made through the application of knowledge of chemistry. Chemistry is of vital importance in our daily life. Basic knowledge of chemistry enables us to face the challenges of modern society and to enjoy our lives. Both science and art students should realize the important role chemistry plays in their lives and should endeavour to have at least the basic knowledge of it. This is why we study integrated or basic science in the junior secondary school to show the unification and inter-relationship of scientific knowledge. Today, knowledge of chemistry is used either directly or indirectly in almost all spheres of human activities such as in the processing of cassava, production of shoe polish, hair relaxer and others.

1.1 **Scientific Method**: The procedure the scientists use in searching for scientific knowledge is known as scientific method. It involves the following steps:

1. Identification of the problem
2. Collection of relevant data
3. Formation of hypothesis
4. Experimentation to test the hypothesis
5. Observation of results of experiment
6. Writing out the results of the experiment.
7. Communicating the result of the experiment to other natural scientists who might wish to repeat the experiment or accept the findings.

Some methods used in the teaching of chemistry includes;

Discussion method, Lecture method, demonstration method, discovery method, field trips, laboratory method and project method.

1.1 **Hypothesis**: It is an idea put forward which has not been proved correct or wrong. It is an intelligent guess of an answer to the problem under investigation. It is an idea or answer, which has no evidence supporting it until a full investigation is carried out.

1.2 **Theory**: A theory is a scientifically accepted idea supported by scientific evidence. If a hypothesis is correctly proved by a scientific investigator or a scientist and other scientists accept the correctness of the hypothesis, then the hypothesis becomes a theory.

1.3 **Law**: A scientific law is a theory which has been proved correct by large number of scientists and from which valid predictions can be made.

1.4 **Careers in Chemistry**: Some of the employment opportunities in the area of chemistry include working in the laboratory as a laboratory technician, in an industry as a research and development chemist, process development chemist, environmental control chemist, analysis and quality control chemist, self reliant chemist, working in the laboratory as a laboratory assistant in the post primary school or institution of higher learning and teaching chemistry in post primary school or institution of higher learning.

Branches of Chemistry

Chemistry is divided into three main branches. They are:

1) Inorganic Chemistry:- This deals with the study of matter in our environment which is non-living. It is concerned with the study of elements, their properties and uses.

2) Organic Chemistry:- This deals with the study of matter found in living things; both plants and animals. It is concerned with the study of carbon and its compounds.

3) Physical Chemistry:- This deals with the study of energy changes accompanying the transformation of matter. It is concerned with aspects of chemistry such as quantum theory, heat and electricity.

Careers in Chemistry

Chemistry is involved in our everyday lives and there is a vast range of careers open to those who have studied chemistry at any level. Great career opportunities exist both inside and outside the laboratory. You can choose a career from different fields such as:

Pharmaceutical/drug development

Science education/teaching service

Chemical engineering

Food processing

Mining and metallurgy

Pure and applied chemistry

Petroleum and petrochemical engineering

Quality control

Health service

Medicine and surgery

Chemical analysis/forensic science

Environmental chemistry

Science laboratory technology

Biochemistry

Uses/Applications of Chemistry I

Chemistry is applied in our everyday life as different activities take place in the environment. Some of the applications or uses of chemistry include:

1) Food supply:- The study of chemistry provided the world with chemical fertilizers, insecticides, fungicides and pesticides to increase crop yield and protect crops from insects and pests. It has also led to the discovery of preservatives to prevent food wastage and spoilage.

2) Medicine:- The healthy life that many of us enjoy is due to the variety of medicines that are available as a result of chemical research and technology. Some of these drugs include:

Antiseptics - To stop infection of wounds.

Disinfectants - To kill micro-organisms.

Anaesthetics - To make surgical operations more successful.

Analgesics - To relieve pain.

Antibiotics - To curb infection and cure diseases.

Tranquillizers - To reduce tension or sedate patients.

3) Clothing:- A wide range of clothing materials are made available because of the man-made fibres produced as a result of intensive research. Synthetic fibres such as nylon, terylene and rayon are easy to wash, dry quickly and are more attractive, comfortable and durable.

4) Articles of domestic use:- The chemistry has made our homes more comfortable by supplying a large number of articles of domestic use. Examples include detergents, oils, fats, sugar, paper, glass, plastic, paints, cosmetics, perfumes, cooking gas etc.

5) Transportation:- All means of transport use either petrol or diesel or coal which are all chemical products.

6) Housing:- The mechanical properties of building materials such as cement, concrete, steel, bricks and tiles are a result of chemical research.

7) Supply of metals:- Metals such as gold, silver, copper, iron, aluminium, zinc and a large number of alloys are used for making various objects such as ornaments, utensils, coins, and many Industrial and agricultural implements.

8) Entertainment:- Cinema, video cameras and simple cameras make use of films which are made of celluloid and coated with suitable chemicals. Fireworks are also chemical products.

9) Military and space science:- Chemistry contributes to the discovery of chemical substances such as explosives used by the military. It has also helped in an effort to gain more knowledge of the other planets and outer space around us.

10) Nuclear atomic energy:- The study of chemistry has led to the provision of an alternative source of energy (nuclear energy).

Adverse Effects of Chemistry

Some of the adverse effects of chemistry include:

1) Drug abuse: Drugs such as heroin, cocaine and morphine are highly addictive. Although these drugs are not used in medical treatment, unscrupulous people produce and sell them for huge amounts in order to make profit.

2) Corrosion of metals: This is the slow deterioration of iron. It occurs in the presence of water. It can be observed on iron sheets at the top of our buildings after exposure to constant rain. Corrosion of metals is also called rusting.

3) Pollution: This is caused by chemical industries who through their various processes, emit dangerous chemicals into the environment. Examples are the release of carbon mono-oxide, pesticides, fertilizers and oil spillage.