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A brief about Chemistry: An importance and scope

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Abstract

In this article, we just try to summarize the brief about history, importance, applications, usesand scope of chemistry in various field.

Introduction

The word 'science' comes from the Greek word Scientia mining to know. Thus, for sciencewe can say, it is defined as the systematic knowledge gained by mankind through observations and experimentation. On the basis of the observations and experimentation, it can be classified into different branches due to its enormous expansion and diversified fields. Out of which chemistry is one of its important branches which deals with the studyof matter, its composition, properties and the changes that takes place in composition as well as in energy during its various processes. Depending upon the specialized fields of study chemistry has been further divided into different branches like inorganic, organic, physical, industrial, analytical, biochemistry, nuclear, pharmaceutical and agricultural chemistry etc. chemistry is playing an important role in the modern era in various fields.

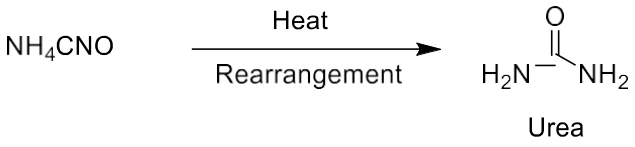
Results and discussion:

A brief about important branches of chemistry:

1) Organic chemistry: organic chemistry is the branch of chemistry in which we are doingdetailed study (reactions, properties and applications) about organic compounds or carbon containing compounds. Organic compounds are the compounds containing carbon, hydrogen, nitrogen, oxygen, sulfur and sometime phosphorous. Initially, near the end of the eighteenth century, according to the Swedish chemist J. J. Berzelius andhir theory called **Vital Force Theory**, it was believed that organic compounds cannot be prepared in the laboratory but can be isolated from animals and plants. Organic compounds are produced only under the influence of some mysterious force existing inthe living organisms, this mysterious force is called the **Vital Force**. In 1828, a German chemist '**Wholer**', made an interesting discovery and he accidentally obtained urea, a well-known organic compound, present in the urine of human beings and other mammals by the evaporating an aqueous solution of ammonium cyanate, an inorganic

compound which is obtained by double decomposition of ammonium chloride andpotassium cyanate:

$$NH_4Cl + KCNO \longrightarrow \underset{\text{Amo. cyanate}}{NH_4CNO} + KCl$$



Urea

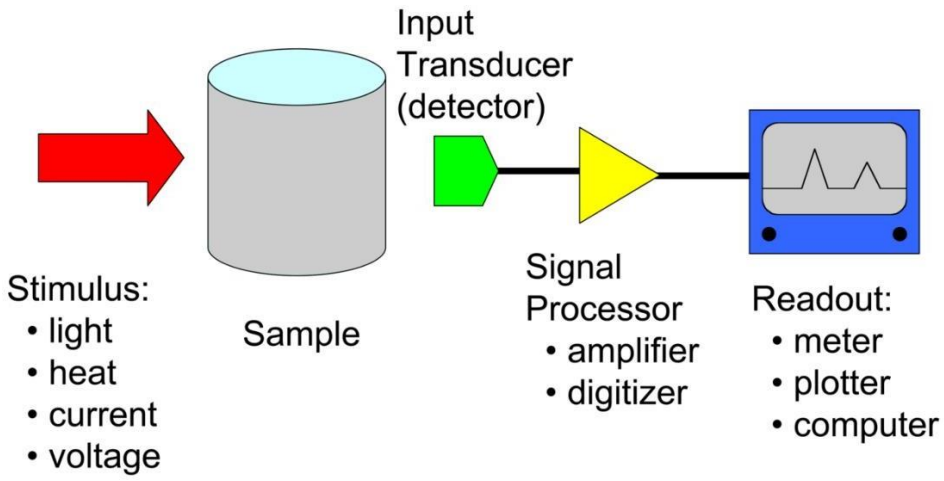
This urea synthesis gave a death blow to Vital Force Theory and demonstrated that there is no any mysterious force is required in the formation of organic compounds inthe laboratory. Thereafter, a thousand and thousands of an organic compound have been synthesized in the laboratory.

2) **Inorganic chemistry:** it is one of the important branches of chemistry in which we study about metals and non-metals, their reactions, their compounds as well as their properties and uses. In simple words, we can say that inorganic chemistry is the branchof chemistry in which we study about the compounds containing other than carbon. Inthis branch of chemistry, we study about the bonding in the compounds, structure of the compounds and detail properties and application of the compounds.

3) **Physical chemistry:** In this branch of chemistry, we have to deal with several physicalquantities and their measurements. The measurement of a physical quantity requires determination of the numerical ratio between two samples of a quantity, one of which is the sample to be measured and the other a standard sample of some kind. Thus, the length of a glass rod can be measured by comparison with a standard meter stick. Similarly, the mass of a body can be measured by comparing it with the mass of standards such as analytical weights which have been calibrated against the standard kilogram, a mass of platinum kept at Sevres, and so on.

Thus, we can say that, physical chemistry is the study of microscopic and macroscopicphenomena in chemical systems in terms of the principles, practices, and concepts of physics like energy, time, force, motion, thermodynamics, quantum chemistry, chemicalequilibria, statistical mechanics and analytical dynamics.

4) **Analytical chemistry:** it is one of the most important branches of chemistry in which we study and uses instruments and methods of separation, quantify and identify matter.In practice, identification, separation and quantification may constitute the entire analysis. The techniques are used in two ways quantitatively and qualitatively. In qualitative analysis we just identify analytes and not get any information about the quantity or amount of the pure sample. But, in case of quantitative analysis we determine the numerical amount of pure substance or concentration. Quantitative methods use separations like precipitation, distillation, extraction and identification ofthe pure compounds may be based on differences in odor, color, boiling point, meltingpoint, solubility and reactivity. The quantitative and qualitative analysis can be performed with the same instruments that uses light interaction, magnetic fields, electricfields, heat interaction and detector techniques to record the signals. The first instrumental analysis used was flame emissive spectrometry and was developed by Gustav Kirchhoff and Robert Bunsen who discovered ceasium (Cs) and rubidium (Rb)in 1860.



Block diagram of an analytical instrument showing the stimulus and measurement of response

Scope and importance of chemistry:

On the basis of broad area of application, chemistry plays a very significant role in almost everywalk of life. The major contributions of chemistry in this modern era are given below:

1.In industry: chemistry plays an important role in every industrial processes out of whichsome important examples are the production of, synthetic fibres (like nylon, orlon, Dacron and many more), plastics (like Polythene Teflon, Bakelite and many more), paints (like dyes, varnishes and enamels and more), optical fibres, ceramics cement, glass and extraction of metals like silver, gold, iron, magnesium and more.

2.In medicines: in medicines, few important contributions of chemistry are the productionof life saving drugs, disinfectants, germicides, antiseptics, anaesthetics and prophylactics such as plain and AZT (azido thymidine) for AIDS and Taxol for cancer.

3.In agriculture: in agriculture, major contribution of chemistry is the use of chemical fertilizers (such as DAP, calcium superphosphate, urea, calcium nitrate and many more)to increase the yield of crops. Insecticides like gammaxene, DDT, etc. for the protectionof crops from insects and help the safe storage of food-ounces. Some Preservatives suchas sodium benzoate, sodium meta-bisulphite, etc. for the batter preservation of food products and check its wastage.

4.In energy resources: the main energy resources on the earth are coal, wood, nuclear fuels and petroleum, the production of solar and nuclear energy is also explained by chemistry.

Conclusion: from the above studies in conclusion, we can say that, in every walk of life the chemistry has been the pioneer contributor towards the happiness of the humanbeings. Domestic requirements like soaps, paper, fabrics, oils, flavoring essences, dyes,perfumes and cosmetics etc. the examples are clearly showing that our daily life involves the sues of many chemical products and many chemical changes although weare unaware of them. Chemistry is also responsible for the production of explosive substances such as TNT, dynamite, picric acid, trinitro glycerin and some other deadlyweapons like hydrogen bomb and atom bomb.

Thus, chemistry can be regarded as greatest benefactor of humanity, yet whether it proves to be a blessing or a curse for humanity depends upon the use to which it is putand how a relative balance is maintained between benefits and problems caused by progress of chemistry.

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