

Lecture/5 Chemical Analysis

Chemical analysis is the process of identifying, separating and quantifying the components of a sample to understand its nature and composition. The branch of chemistry that deals with chemical analysis is called analytical chemistry.

1. Steps of chemical analysis

 Chemical analysis typically involves the following steps:

1. Collecting a sample

Picking an appropriate analytical method to analyze the sample.

1. Prepping the sample.

3.Analyzing the sample using your chosen method, test, or technique.

4.Interpreting the results of the analysis. This might involve calculations or further tests.

1. Types of chemical analysis:

Chemical analysis is classified into two major types:

1. Qualitative chemical analysis:

Qualitative chemical analysis is a type of analysis used to identify the substances within a sample and determine whether a particular substance is present or not. It tells us exactly which chemical species the sample is made from, be it different molecules, elements, or compounds.

1. Quantitative chemical analysis

 The question is how much of something is answered by quantitative chemical analysis.

Quantitative chemical analysis is a type of analysis used to determine the quantity or the amount of a substance in a sample.

In short, qualitative analysis deals with what is present in a sample, while quantitative analysis answers how much of the substance is there

1. Methods, tests and techniques:

We need to know about different techniques, tests, and methods used in chemical analysis. We should be able to compare them as well as discuss why you might choose one approach over another. Here is an introduction to chemical analytical techniques:

Testing for pure substances using melting and boiling points.

Testing for gases using simple test tube reactions.

Testing for ions using reactions that you can carry out in class, such as flame tests, the sodium hydroxide test, and tests for anions

Instrumental analysis:

The tests for gases and the sodium hydroxide test are all simple reactions that you can try out in class. They are quick and convenient to use, but they are qualitative, not quantitative. If we want a quantitative measure of the sample, we have to use certain analytical instruments. They not only identify components of a sample, but also measure their relative amounts. Using analytical instruments in chemical analysis is called instrumental analysis.

Instrumental methods have certain advantages over test tube reactions. As mentioned above, some are both qualitative and quantitative, whilst most are extremely accurate, sensitive and rapid. In addition, they can work with small samples and are highly versatile.

Here are some examples of instrumental analytical techniques:

NMR, IR, UV, x-ray fluorescence, and flame emission spectroscopy are all types of spectroscopic techniques. They use the interactions between electromagnetic (light) waves and particles to help us identify the structure of atoms and molecules.

Chromatography works by separating a sample into its components. As well as paper chromatography, thin-layer chromatography, gas chromatography, gas-liquid chromatography, and many other variations! For example, if you want to separate a mixture of amino acids, you typically use paper or thin layer chromatography.

**What Is a Solution?**

It is the substance in which a solute dissolves to produce a homogeneous mixture. A solution is a homogeneous mixture of one or more solutes dissolved in a solvent.

* ***solvent***: the substance in which a solute dissolves to produce a homogeneous mixture
* ***solute***: the substance that dissolves in a solvent to produce a homogeneous mixture

Note that the ***solvent*** is the substance that is present in the greatest amount.

Standard Solution

Many different kinds of solutions exist. For example, a solute can be a gas, a liquid or a solid. Solvents can also be gases, liquids or solids. It is any chemical solution which has a precisely known [concentration](https://www.thoughtco.com/definition-of-concentration-605844). Similarly, a solution of known concentration has been standardized. To prepare a standard solution, dissolve a known mass of solute and dilute the solution to a precise volume.

Standard solution concentration is usually expressed in terms of molarity (M) or moles per liter (mol/L). Not all substances are suitable solutes for standard solutions. The reagent must be stable, [pure](https://www.thoughtco.com/what-is-a-pure-substance-608507), and preferably of high [molecular weight](https://www.thoughtco.com/definition-of-molecular-weight-605369).