

About the Book

This book on “Introduction to Thermal Methods of Analysis” is dedicated to all the educators who made their educational content freely available during the pandemic (Covid 19). Overnight transition from offline to online mode and limited access to reference books during the pandemic has made many more educators realise the importance of Open Educational Resources (OER).

The internet is flooded with information on basic topics in chemistry. But when it comes to specific topics in chemistry there is a dearth of information. This is an attempt to fill such gap through an interactive textbook on “thermal methods of analysis”. The contents of this book include principles, instrumentation and applications of thermal methods viz thermogravimetry, differential thermal analysis and differential scanning calorimetry. The book is designed in a different way from other books in the sense that there are activities after every topic and the reader will be able to assess their understanding of the topic by taking a simple test or performing a self-assessment activity.

Introduction

Have you ever wondered how the manufacturer of a non-stick pan so confidently offers a warranty on the product? Why silicone baking tray does not melt away even while using the oven at a very high temperature? Was there any study carried out to check the stability of these materials at high temperature? The answer is yes “Thermal Analysis” can give information about stability of the materials at high/low temperature.

Thermal analysis includes a group of techniques in which specific physical properties of a material are measured as a function of temperature. The production of new high technology materials and the resulting requirement for a more precise characterization of these substances have increased the demand for thermal analysis techniques. Current areas of application include environmental measurements, composition analysis, product reliability, stability, chemical reactions and dynamic properties. Thermal analysis has been used to determine the physical and chemical properties of polymers, electronic circuit boards, geological materials and coals.

Thermal analysis is useful in both qualitative and quantitative analyses. Samples may be identified and characterized by qualitative investigations of their thermal behavior. Information concerning the detailed structure and composition of different phases of a given sample is obtained from the analysis of thermal data. Quantitative results are obtained from changes in weight and enthalpy as the sample is heated. The temperature of phase changes and reaction as well as heat of reaction are used to determine the purity of materials.

Thermal analysis is valuable in many scientific disciplines ranging from astronomy to zoology-literally from **A to Z** !

Let us learn in detail about “Thermal Methods of Analysis”.