

Calculations in Analytical Chemistry

The Mole

The mole is the SI unit for amount of substance. It corresponds to the amount of a chemical substance that contains the same number of particles present in 12 grams of C-12 which is equivalent to Avogadro's number, that is, $NA=6.022\times10^{23}$.

The molar mass is given as the mass of a compound in grams per mole of that substance. It is calculated by adding the molar masses of all the component elements in the compound. Take glucose for example:

Element	Molar mass per element	Number of atoms	Mass
C	12 g/mol	6	72 g/mol
H	1 g/mol	12	12 g/mol
O	16 g/mol	6	96 g/mol
Molar Mass			180 g/mol

Mole and Millimole Calculations

The millimole is simply 1/1000 of a mole. It is sometimes used in calculations because of its convenience.

Example (Skoog, et al., 2014):

- Find the number of moles and millimoles of benzoic acid (122.1 g/mol) that are contained in 2.00 g of pure acid.

If we use HBz to represent benzoic acid:

$$HBz_{mol} = 2.00 \frac{g_{HBz}}{122.1 \frac{g_{HBz}}{mol_{HBz}}} = 0.0164 mol_{HBz}$$

To obtain the number of millimoles, the millimolar mass of benzoic acid will be used:

$$HBz_{mmol} = 2.00 \frac{g_{HBz}}{0.1221 \frac{g_{HBz}}{mmol_{HBz}}} = 16.4 mmol_{HBz}$$

- What is the mass in grams of Na^+ (22.99 g/mol) in 25.0 g of Na_2SO_4 (142.0 g/mol)?

$$mass_{Na^+} = 25.0 \frac{g_{Na_2SO_4}}{142.0 \frac{g_{Na_2SO_4}}{mol_{Na_2SO_4}}} \times \frac{2 mol_{Na^+}}{1 mol_{Na_2SO_4}} \times \frac{22.99 g_{Na^+}}{1 mol_{Na^+}}$$

$$mass_{Na^+} = 8.10 g_{Na^+}$$

Analytical Chemistry 3

**Caulfield Institute of Technology,D. L.
Renfrew**

Analytical Chemistry 3:

Analytical Chemistry—3 P. Gh. Zugrăvescu, 2013-10-22 Analytical Chemistry 3 provides information pertinent to the development of analytical chemistry. This book discusses the significant role of analytical chemistry in the progress of the chemical industry. Organized into nine chapters, this book begins with an overview of the contribution of analytical chemistry in the development as well as in process control of the industrial chemistry. This text then presents a brief history concerning the development of analytical chemistry in Romania. Other chapters consider the general problem of utilizing gradients in chromatography. This book discusses as well the developments in the determination of some common anions and describes the separation of anions of the same species. The final chapter deals with the classification of enrichment methods according to the type of sample for which they are to be used. This book is a valuable resource for chemists, analytical chemists, and pharmaceutical chemists. Teachers, scientists, researchers, and specialists in Romanian school of chemistry will also find this book useful.

Chemometrics in Analytical Chemistry 3 3. International conference on chemometrics in analytical chemistry, 1986

Analytical Chemistry, Presents information on Analytical Chemistry a semimonthly magazine published by the American Chemical Society. Offers ordering information and a FAQ section. Contains a sample issue and the table of contents for the current issue. Highlights information for authors and subscription information.

Analytical Chemistry Juliette Lantz, Renée Cole, The POGIL Project, 2014-12-31 An essential guide to inquiry approach instrumental analysis. Analytical Chemistry offers an essential guide to inquiry approach instrumental analysis collection. The book focuses on more in depth coverage and information about an inquiry approach. This authoritative guide reviews the basic principles and techniques. Topics covered include method of standard, the microscopic view of electrochemistry, calculating cell potentials, the Berri-Lambert atomic and molecular absorption processes, vibrational modes, mass spectra, interpretation, and much more.

New Advances in Analytical Chemistry Atta-ur Rahman, 2002-04-11 New Advances in Analytical Chemistry Volume 3 presents recent developments in various spectroscopic techniques such as NMR spectroscopy and mass spectroscopy in the form of comprehensive reviews written by leading authorities in the field. With new and updated information, the book is invaluable to both research students and postdoctoral workers who wish to keep abreast of frontiers in analytical techniques. Each chapter provides a broad overall account of recent developments so that the readers can stay current not only with the authors' own contributions but also with contributions of other eminent scientists working in this area.

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Treatise on Analytical Chemistry, 1971

Handbook of Green Analytical Chemistry Miguel de la Guardia, Salvador Garrigues, 2012-04-23 The

emerging field of green analytical chemistry is concerned with the development of analytical procedures that minimize consumption of hazardous reagents and solvents and maximize safety for operators and the environment. In recent years there have been significant developments in methodological and technological tools to prevent and reduce the deleterious effects of analytical activities. Key strategies include recycling, replacement, reduction, and detoxification of reagents and solvents. The *Handbook of Green Analytical Chemistry* provides a comprehensive overview of the present state and recent developments in green chemical analysis. A series of detailed chapters written by international specialists in the field discuss the fundamental principles of green analytical chemistry and present a catalogue of tools for developing environmentally friendly analytical techniques. Topics covered include Concepts, Fundamental principles, education, laboratory experiments, and publication in green analytical chemistry. The Analytical Process, Green sampling techniques, and sample preparation, direct analysis of samples, green methods for capillary electrophoresis, chromatography, atomic spectroscopy, solid phase molecular spectroscopy, derivative molecular spectroscopy, and electroanalytical methods. Strategies, Energy saving, automation, miniaturization, and photocatalytic treatment of laboratory wastes. Fields of Application, Green bioanalytical chemistry, biodiagnostics, environmental analysis, and industrial analysis. This advanced handbook is a practical resource for experienced analytical chemists who are interested in implementing green approaches in their work.

Green Analytical Chemistry Marcello Locatelli, Savaş Kaya, 2024-10-05

Green Analytical Chemistry: Current Status and Future Perspectives in Sample Preparation presents the state of the art in the field of GAC sample preparation procedures. With a focus on green chemistry, the book highlights how new techniques make it possible to observe a lower environmental impact without sacrificing the performance of the procedure. By proving a theoretical background of novel green technologies and proposing new protocols, this book addresses innovative methodologies in analytical chemistry and sample preparation following the requirements of green analytical chemistry demands. It is a valuable resource for researchers, chemist students, and all those interested in the allied field.

Current Topics in Analytical Chemistry, 2002

Basic Concepts Of Analytical Chemistry S M Khopkar, 1998

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