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2	Dr. K. S. Jain, Ms. D. K. Kadam & Mrs. D. V. Jain	A Practical Book of Medicinal Chemistry	National	2023-2024	978-81--19117-46-8	Nirali Prakashan, Pune





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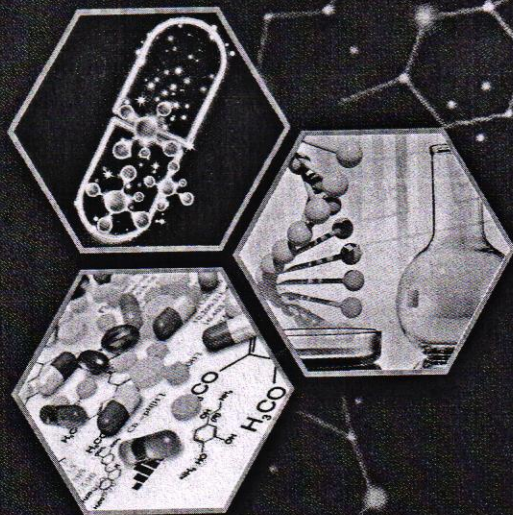
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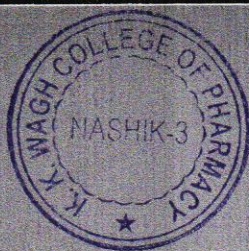
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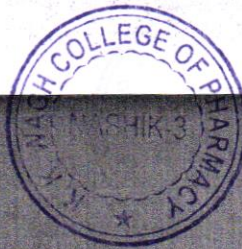
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2	<b>Kajal P Baviskar</b> , Brijesh M Shah, <b>Anjali P Bedse</b> , <b>Shilpa S Raut</b> , Suchita P Dhamane, Dhara J Dave	Book chapter published: Nanoparticle Properties: Size, Shape, Charge, Inertness, Efficacy, Morphology. Nanocarrier Vaccines:	Biopharmaceutics-Based Fast Track Development, 153-191. (Wiley)	2023-2024	9781394175482
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4	<b>Kajal Baviskar</b> , <b>Anjali Bedse</b> , <b>Shilpa Raut</b> , Narayana Darapaneni	Artificial Intelligence and Machine Learning-Based Manufacturing and Drug Product Marketing	Bioinformatics Tools for Pharmaceutical Drug Product Development International	2023-2024	9781119865728





## 5

## Green Analytical Techniques Using Hydrotrophy, Mixed Hydrotrophy, and Mixed Solvency

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### 5.1 Introduction

Analytical chemistry, a crucial branch of chemistry, provides input related to the nature of chemical substances and their occurrence in organisms and in the environment through various analytical measures. It is impossible to understand a product's life cycle without chemical analysis of its components and degradation products. The standards and specifications followed for the use of chemicals in various industries are based on evidence obtained by analytical chemists and are further controlled by the chemical process. Sustainable development aims at decreasing the unfavourable aftereffects of the materials that we use and produce. At the same time, a leading concern is to change the way energy and aromatic chemicals are created from fossil fuels to make reproducible assets. Analytical chemistry is the only field that can validate the environmental friendliness of any novel method, process, or product.

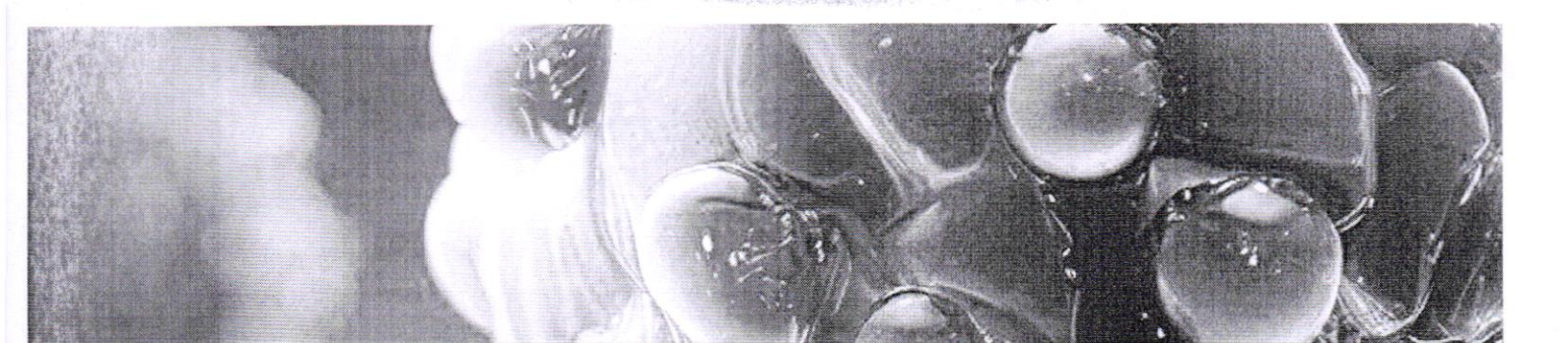
The solubility of active ingredients, particularly low water solubility, poses enumerable challenges not only during drug discovery, but also in the initial and last stages of pharmaceutical development. Aqueous solubility is also associated with discharge and partition of the chemicals in the environment and thus it is considered an elementary parameter in the

*Sustainable Approaches in Pharmaceutical Sciences*, First Edition. Edited by Kamal Shah, Durgesh Nandini Chauhan, and Nagendra Singh Chauhan.

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Chapter 5

## Nanoparticle Properties

Size, Shape, Charge, Inertness, Efficacy, Morphology

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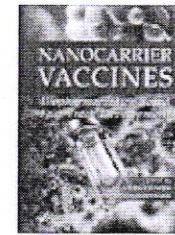
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### Summary

As a constantly expanding class of materials with several applications, NPs have drawn enormous interest. They are being used at an accelerated rate in diverse fields like cosmetics, food industry, and electronics. In the sphere of modern medicine too, NPs have become an inevitable paradigm. Due to the extremely high ratio of atoms on their surface to those inside the particle, NPs have what are known as quantum characteristics. As properties like shape, size, and morphology of NPs diverge from those of bulk materials, their catalytic characteristics improve and so is their applicability. Cellular interactions, behavior of NPs, and their effects are influenced by various properties of NPs, size, shape, and charge being the most prominent. However, while opening the new horizons, unique properties of NPs can also account for toxicity. Thus, it is crucial to understand properties of NPs. The chapter focuses on important properties of NPs. Cellular interactions and toxicity of NPs have been discussed in brief. In addition, the characterization techniques for determining surface properties have been tabulated.

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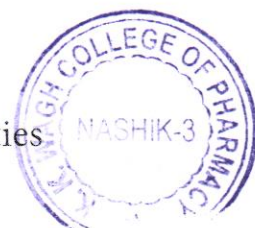
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[Nanoparticle Characterization: What Measure?](#)Mario M. Modena, Bastian Rühle,  
Thomas P. Burg, Stefan Wuttke



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# SARS-CoV-2 Variants and Global Population Vulnerability

Diagnostic Strategies, Vaccine Development,  
and Therapeutic Management

Vivek P. Chavda  
Vladimir N. Uversky  
Editors



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# Artificial Intelligence and Machine Learning-Based Manufacturing and Drug Product Marketing

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## Abstract

Artificial Intelligence (AI) and Machine Learning (ML) are the new drivers for the industry 4.0 revolution. Its use is becoming widespread across society. The dawn of AI and ML can also be witnessed in the pharmaceutical industry. The manufacturing sector has been significantly impacted by AI-ML. The ability of ML strategies to predict future events has allowed for the deciphering of complicated patterns in manufacturing patterns. This has opened the avenues for an intelligent decision support system in different manufacturing tasks like intuitive and continual inspection, fault detection, quality enhancement, process improvement, management of supply chain, and much more. ML approaches allow for the development of actionable intelligence to improve productivity without huge change in the required resources. AI and ML also have the potential to revolutionize marketing. It can assist in different aspects of marketing, like product cost, predictive analytics, market segmentation, etc. This chapter describes how AI and ML can be used in various aspects of pharmaceutical manufacturing and marketing. Different tools have been highlighted. Hurdles in the way of full-fledged applications of AI ML have also been mentioned.

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