

**HANDBOOK OF**

**PRACTICAL PHARMACEUTICS**

FOR POSTGRADUATES

**N. K. JAIN  
SUNIL K. JAIN  
AKHLESH JAIN  
DINESH MISHRA**

HANDBOOK OF  
**Practical Pharmaceutics**

FOR POSTGRADUATES

**N.K. Jain**

M.Pharm., Ph.D., LL.M., F.I.C.

**Sunil K. Jain**

M.Pharm., Ph.D.

**Akhlesh Jain**

M.Pharm., Ph.D.

**Dinesh Mishra**

M.Pharm., Ph.D.



DELHI  
VALLABH PRAKASHAN®

## PREFACE

Emergence of controlled and novel drug delivery systems has brought out transformation in the pharmaceuticals practical field. The students as well as teachers find it difficult to design suitable exercises as per the prescribed syllabs and over a decade; they have been searching for such a concise handbook of experiments to fulfill their needs. This book is based on the expertise based on actual trial experiments conducted by the authors at different institutions. Each experiment is divided into at least three sub-sections: related theory, method of preparation of delivery system and evaluation parameters. This handbook contains twenty two experiments in three Modules based on the Novel Drug Delivery Systems, Advanced Pharmaceutics, and Biopharmaceutics and Pharmacokinetics.

Most of the material in this book was developed for experimental purpose in order to teach pharmaceuticals for undergraduate and post graduate pharmacy students. A substantial proportion of the material is original, and has been prepared specifically for this book.

The novel pattern of this book, excellent flow chart demonstration of the method and complete desired information in a single unified document will fulfill long unmet demand for a practical guide, particularly among pharmacy graduates and post graduates students.

Authors are thankful to M/s Vallabh Prakashan, New Delhi for all their efforts to turn our beneficial concept to reality, a publisher whose mission is to publish most competitive quality books in pharmacy.

The authors welcome valuable ideas and criticism in order to make this book more informative and useful.

12 January 2018  
Sagar

N. K. Jain  
Sunil K. Jain  
Akhlesh Jain  
Dinesh Mishra

## CONTENTS

### **Module I—Novel Drug Delivery Technology**

EXPERIMENT 1	Preparation and Evaluation of Microemulsion System of a Given Drug	1
EXPERIMENT 2	Preparation and Evaluation of Floating Microspheres of a Given Drug	7
EXPERIMENT 3	Preparation and Evaluation of Nanoparticles (NPs) of a Given Drug	15
EXPERIMENT 4	Preparation and Evaluation of Liposomes of a Given Drug	21
EXPERIMENT 5	Preparation and Evaluation of Transfersomes of a Given Drug	27
EXPERIMENT 6	Preparation and Evaluation of multiple Emulsion System of a Given Drug	32
EXPERIMENT 7	Preparation and Evaluation of Niosomes of a Given Drug	37

### **Module II—Advanced Pharmaceutics**

EXPERIMENT 8	Preparation and Evaluation of Alginate Beads of a Given Drug	42
EXPERIMENT 9	Preparation and Evaluation of Dispersible Tablets of a Given Drug	48
EXPERIMENT 10	Preparation and Evaluation of Floating Tablets of a Given Drug	52
EXPERIMENT 11	Preparation and Evaluation of Matrix Tablets of a Given Drug	57
EXPERIMENT 12	Preparation and Evaluation of Transdermal Patch of a Given Drug	61
EXPERIMENT 13	Solubility Enhancement of a Poorly Soluble Drug using Solid Dispersion Technique	67
EXPERIMENT 14	Preparation and Evaluation of Osmotic Pump (oral tablets) of a Given Drug	72
EXPERIMENT 15	Preparation and Evaluation of Mouth Dissolving Tablets (MDT) of a Given Drug	78

## Module III—Biopharmaceutics and Pharmacokinetics

EXPERIMENT 16	Determination of Bioavailability of a Given Drug Using Urinary Excretion Rate Data	83
EXPERIMENT 17	Determination of Buccal Absorption of a Given Drug	88
EXPERIMENT 18	Comparison of Dissolution Profile of a Given Dosage form using Different Dissolution Apparatus	93
EXPERIMENT 19	Determination of Pharmaceutical Equivalence of Two Marketed Tablet Formulations	98
EXPERIMENT 20	Determination of Absolute Bioavailability and Relative Bioavailability from a Given Blood Plasma Data After Oral and i.v., Drug Administration	102
EXPERIMENT 21	Determination of Various Pharmacokinetic Parameters from Given Plasma Data	107
EXPERIMENT 22	Determination of Protein Binding Efficiency of a Given Drug	111
	<i>Appendix</i>	115
	<i>Bibliography</i>	119
	<i>Index</i>	121