

**(B. Pharm)**  
**(Semester - III)**

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<b>Course Code</b>	<b>BP302T</b>
<b>Course Title</b>	<b>Physical Pharmaceutics I - Theory</b>

**Scope:**

The course deals with the various physical and physicochemical properties, and principles involved in dosage forms/formulations. Theory and practical components of the subject help the student to get a better insight into various areas of formulation research and development, and stability studies of pharmaceutical dosage forms.

**Objectives:**

After completion of course student is able to know

1. Understand various physicochemical properties of drug molecules in the designing the dosage forms.
2. Know the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations.
3. Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.

**Course Learning Outcomes (CLO):**

At the end of the course, students will be able to –

1. Recognize basic concepts of physical and chemical properties of various materials
2. Describe principles and methodology related to above properties.
3. Determine properties of solid and liquid samples using various methods.
4. Discuss factors affecting properties of drug and excipients.
5. Explain particle properties and its impact on various parameters.
6. Solve calculations related to above topics.

**Syllabus:**

**Teaching hours: 45 Hours**

**UNIT I**

**10 Hours**

**Solubility of drugs:**

Solubility expressions, mechanisms of solute solvent interactions, ideal solubility parameters, solvation & association, quantitative approach to the factors influencing solubility of drugs, diffusion principles in biological systems. Solubility of gas in liquids, solubility of liquids in liquids, (Binary solutions, ideal solutions) Raoult's law, real solutions. Partially miscible liquids, Critical solution temperature and applications. Distribution law, its limitations and applications.

**UNIT II**

**12 Hours**

**States of Matter and properties of matter:**

State of matter, changes in the state of matter, latent heats, vapour pressure, sublimation critical point, eutectic mixtures, gases, aerosols-inhalers, relative humidity, liquid complexes, liquid crystals, glassy

states, solid- crystalline, amorphous & polymorphism and its applications.

**Physicochemical properties of drug molecules:**

Refractive index, optical rotation, dielectric constant, dipole moment, dissociation constant, determinations and applications.

**UNIT III**

**08 Hours**

**Surface and interfacial phenomenon:**

Liquid interface, surface & interfacial tensions, surface free energy, measurement of surface & interfacial tensions, spreading coefficient, adsorption at liquid interfaces, surface active agents, HLB Scale, solubilisation, detergency, adsorption at solid interface and its determination.

**UNIT IV**

**08 Hours**

**Complexation and protein binding:**

Introduction, Classification of Complexation, Applications, methods of analysis, protein binding, Complexation and drug action, crystalline structures of complexes and thermodynamic treatment of stability constants.

**UNIT V**

**07 Hours**

**pH, buffers and Isotonic solutions:**

Sorensen's pH scale, pH determination (electrometric and calorimetric), applications of buffers, buffer equation, buffer capacity, buffers in pharmaceutical and biological systems, buffered isotonic solutions.

**TUTORIALS**

**Teaching hours: 15 Hours**

Tutorials will be based on above syllabus

**Suggested Readings<sup>^</sup>:** (Latest edition)

1. Martin, A. *Physical Pharmacy*. New York, Lippincott Williams & Wilkins
2. Eugene, P. *Experimental Pharmaceutics*. USA, Burgess Pub. Co.
3. Cooper and Gunn. *Tutorial Pharmacy*. Delhi. CBS Publishers & Distributors
4. Stocklosam, J. *Pharmaceutical Calculations*. Philadelphia, USA, Lea & Febiger
5. Liberman, H.A, Lachman, C. *Pharmaceutical Dosage forms, Tablets. Volume-1 to 3*, New York, USA, Marcel Dekker Inc
6. Liberman, H.A, Lachman, C. *Pharmaceutical Dosage forms, Disperse systems. Volume-1 to 3*, New York, USA, Marcel Dekker Inc
7. Ramasamy, C. Manavalan, R. *Physical Pharmaceutics*. Chennai, Vignesh Publisher.
8. Subramanyam, C.V.S, Thimmasettee, J. *Laboratory Manual of Physical Pharmaceutics*. Delhi, Vallabh Prakashan
9. Subramanyam, C.V.S. *Physical Pharmaceutics*. Delhi, Vallabh Prakashan
10. Jain, G. Khar, R.K. *Test book of Physical Pharmacy*. India, Elsevier

L= Lecture, T= Tutorial, P= Practical, C= Credit

<sup>^</sup> this is not an exhaustive list