

(B. Pharm.)
(Semester - IV)

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Course Code	BP403T
Course Title	Physical Pharmaceutics II – Theory

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:

Upon completion of the course the student should be able to:

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. Understand physicochemical properties of solids and dispersed systems.
2. Discuss colloidal dispersion systems in designing formulations.
3. Describe rheological behavior of various compounds and its measurement by viscometers.
4. Determine coarse dispersion systems, its properties and stability.
5. Explain particle properties and its impact on various parameters.
6. Identify various conditions for stability testing.

Syllabus:

Teaching hours: 45 Hours

UNIT I

05 Hours

Colloidal dispersions:

Classification of dispersed systems & their general characteristics, size & shapes of colloidal particles, classification of colloids & comparative account of their general properties. Optical, kinetic & electrical properties. Effect of electrolytes, coacervation, peptization & protective action.

UNIT II

10 Hours

Rheology:

Newtonian systems, law of flow, kinematic viscosity, effect of temperature, non-Newtonian

systems, pseudoplastic, dilatant, plastic, thixotropy, thixotropy in formulation, determination of viscosity, capillary, falling Sphere, rotational viscometers.

Deformation of solids:

Plastic and elastic deformation, Heckel equation, Stress, Strain, Elastic Modulus.

UNIT – III

10 Hours

Coarse dispersion:

Suspension, interfacial properties of suspended particles, settling in suspensions, formulation of flocculated and deflocculated suspensions. Emulsions and theories of emulsification, microemulsion and multiple emulsions; Stability of emulsions, preservation of emulsions, rheological properties of emulsions and emulsion formulation by HLB method.

UNIT – IV

10 Hours

Micromeritics:

Particle size and distribution, mean particle size, number and weight distribution, particle number, methods for determining particle size by different methods, counting and separation method, particle shape, specific surface, methods for determining surface area, permeability, adsorption, derived properties of powders, porosity, packing arrangement, densities, bulkiness & flow properties.

UNIT – V

10 Hours

Drug stability:

Reaction kinetics: zero, pseudo-zero, first & second order, units of basic rate constants, determination of reaction order. Physical and chemical factors influencing the chemical degradation of pharmaceutical product: temperature, solvent, ionic strength, dielectric constant, specific & general acid base catalysis, Simple numerical problems. Stabilization of medicinal agents against common reactions like hydrolysis & oxidation. Accelerated stability testing in expiration dating of pharmaceutical dosage forms. Photolytic degradation and its prevention.

Tutorials

Teaching hours: 15 Hours

Tutorials will be based on above syllabus

Suggested Readings[^]: (Latest edition)

1. Sinko, P. J., & Martin, A. N. *Martin's physical pharmacy and pharmaceutical sciences: Physical chemical and biopharmaceutical principles in the pharmaceutical sciences*. Philadelphia: Lippincott Williams & Wilkins.
2. Parrott, E.L. *Experimental Pharmaceutics*. Burgess Pub. Co
3. Cooper, J.W., Gunn, C., & Carter S.J. *Cooper and Gunn's tutorial pharmacy*. London: Pitman Medical.
4. Stocklosa, M.J., & Ansel, H.C. *Pharmaceutical calculations*. Philadelphia: Lea & Febiger.
5. Lieberman, H.A., Lachman, L., & Schwartz, J.B. *Pharmaceutical Dosage forms - Tablets*, volume 1 to 3. New York: Marcel Dekkar Inc.
6. Lieberman, H.A., Rieger, M.M., & Banker, G.S. *Pharmaceutical dosage forms - Disperse systems*, volume 1 to 3. New York: Marcel Dekkar Inc.
7. Ramasamy, C., & Manavalan, R. *Physical Pharmaceutics*. India: Vignesh Publisher

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

[^] this is not an exhaustive list