

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI
HYDERABAD CAMPUS
FIRST SEMESTER 2021-2022
COURSE HANDOUT (Part-II)

Date: 20/08/2021

In addition to part-I (General Handout for all courses appended to the timetable) this portion gives further specific details regarding the course.

Course No. : PHA F244
Course Title : Physical Pharmacy
Instructor-in-charge : Venkata Vamsi Krishna Venuganti
Instructors : B. Sony Priyanka, Parameshwar Patra

1. Course description:

This course is designed to make the students conversant with the applications of physico-chemical principles to the study of the drug stability, behaviour of drug powders and of other pharmaceutical systems; it includes the discussion of drug degradation, micromeritics, rheology and interactions of drugs.

2. Scope and objective of the course:

This course deals with the applications of physico-chemical principles to the study of drug stability, behavior of drug powders and their pharmaceutical systems. It also includes the discussions on surface properties, kinetics and rheology.

3. Learning outcomes:

- The student should be able to understand the importance of physical and chemical properties of compounds and their role in formulation development
- The student should be able to differentiate different solid compounds into crystalline and amorphous substance
- The student should be able to understand and apply the concept of solubility and perform solubility determination study
- The students should be able to determine average particle size of powders and dispersions and relate to their performance
- The student should be able to understand different stability problems of pharmaceuticals and perform simple stability tests
- The student should be able to understand stabilizing multi-phase systems by altering surface tension using amphipathic substances
- The student should be able to measure the viscosity and understand its relation to different pharmaceutical product performance
- The students should know the concept of diffusion and dissolution

4. Textbook:

a) Sinko, Patrick J Martin's Physical Pharmacy & Pharm, SC B.I./Lippincott, 5th ed, 2006.

Reference Books:

- (i) Gennaro, A.R., Remington Pharmaceutical Sciences, Hack Pubs. Pennsylvania, 17th Ed. (1995)
- (ii) Liberman, H and Lachman, L, Theory and Practice of Industrial Pharmacy. Verghese Pubs., Bombay., 1994, 3rd Edn.
- (iii) Liberman, H and Lachman, L, Pharmaceutical dosage forms: Tablets Vol.2, Marcel Dekker, New York, 1980.
- (iv) Liberman, H and Lachman, L, Pharmaceutical dosage forms: Disperse systems Vol.1, Marcel Dekker, New York, 1987.

5. Course Plan:

L. No.	Learning objectives	Topics to be covered	Chapter in the Text Book
1, 2	Application of Physical Pharmacy	Introduction to Physical Pharmacy, states of matter, phase distribution	3(a) ch 2
3, 4	Crystallinity, amorphous compounds and polymorphism, characterization of polymorphs	Solid state pharmaceuticals	3(a) ch 4 and class notes
5, 6	Solubility terminology, factors influencing aqueous solubility, determination of solubility, solubility enhancement	Solubility	3(a) ch 10
7-10	Kinetics and order of reactions & its determination, rate expressions, determination of shelf life of pharmaceuticals	Stability of drugs	3(a) ch 15
11, 12	Knowledge of various methods for determining surface tension	Determination of surface tension	3(a) ch 16
13-15	Applications of adsorption at solid/liquid interfaces	Adsorption at interfaces	3(a) ch 16
16-19	Applications of colloids & molecular weight determination	Colloids	3(a) ch 17
20, 21	Factors influencing properties of suspensions	Suspensions	3(a) ch 18
22	Factors influencing properties of emulsions	Emulsions	3(a) ch 18
23-25	Concept of viscosity, viscosity measurement & pharmaceutical applications	Rheology	3(a) ch 20
26, 27	Particle size characterization, measurement & analysis	Micrometrics	3(a) ch 19
28-30	Principles of diffusion & dissolution, mathematical models & applications	Diffusion & Dissolution	3(a) ch 13

List of experiments

S No	Experiment Name
1	Demonstration of X-ray diffractometer
2	Preparation of a ternary phase diagram
3	Determination of equilibrium solubility of paracetamol by shake flask method
4	Determination of pKa of a compound
5	Determination of log P of a compound
6	Determination of rate constant of acid hydrolysis of ethyl acetate

7	Determination of surface tension of liquid mixtures
8	Determination of adsorption isotherm of glacial acetic acid
9	Determination of total surface area of stearic acid adsorbed on to kaolin
10	Determination of cloud point temperature of a surfactant
11	Determination of rate of sedimentation (Stability of a suspension)
12	Determination of viscosity using Ostwald viscometer
13	Micromeritics of lactose and CaCO ₃
14	Dissolution profile of marketed paracetamol tablets

6. Evaluation Schedule:

Component	Duration	Weightage (%)	Date & Time	Nature of Component
Midsemester test	90 minutes	30	18/10/2021 3.30 - 5.00PM	Open book
Quizzes, Assignments		15	Continuous	Open book
Laboratory component	Weekly	15	Continuous	
Comprehensive exam	120 minutes	40	13/12 FN	Open book

Mid-semester evaluation: Will be announced after midsemester test.

7. (i) Make-up's for tests will be granted only on genuine grounds.

8. **Chamber consultation hour:** Will be announced in the class

9. **Notices:** All notices regarding this Course will be displayed on CMS.

Academic Honesty and Integrity Policy: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

Instructor-in-charge
PHA F244