

Birla Institute of Technology and Science, Pilani (Raj.)
Second Semester 2021-22
PHA F244: Physical Pharmacy
COMPREHENSIVE EXAMINATION

Max. Marks: 15
Date 14-05-2022

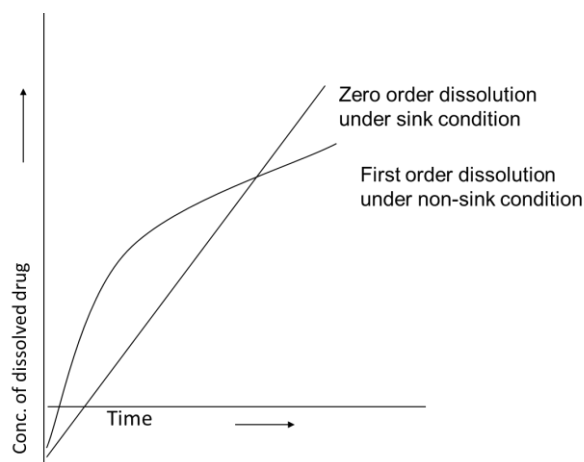
OPEN BOOK
Duration: 75 Minutes

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- a. All questions are compulsory.
b. Attempt all the questions in the order as given in the question paper and all the parts of a question should be attempted together.
c. **NO MARKS WILL BE AWARDED FOR DIRECTLY COPYING FROM THE SLIDES**, marks shall be awarded based on student's understanding of the concept.
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1. Justify the following statements: [5 M]
- Benzene initially spreads on water but later separates out as a globule on the surface of water.
 - Zero order release is achieved from non-disintegrating dosage forms such as topical or transdermal delivery systems
 - A drug substance is considered highly permeable when the extent of absorption in humans is determined to be 90% or more of the administered dose based on a mass-balance determination or in comparison to an intravenous dose.
 - In a suspension formulation of an API CDG621, the suspended particles exhibited a positive charge however, no "double layer" of electric charges was observed.
 - A molecular dispersion changes to colloidal dispersion at CMC.
2. Discuss the major limitations of Type I dissolution apparatus. *No marks for just writing the limitations* [2M]

3. Discuss the effect of following factors on the rate of dissolution with examples: [3M]
- Physicochemical properties of the API
 - Pharmaceutical excipients
 - Compression force

4. How do you explain the following release patterns under the given conditions (*see the graph*)? [3M]



5. In an experiment, a student adds 0.50 grams of caffeine in 125 mL of water. The student extracts the caffeine using a single extraction of 21 mL of methylene chloride. Determine the amount of caffeine in methylene chloride and water assuming partition coefficient of caffeine as 5.05. [2M]

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Max. Marks: 20

Date 13-05-2022

CLOSED BOOK

Duration: 105 Minutes

All questions are compulsory.

Attempt all the questions in the order as given in the question paper and all the parts of a question should be attempted together.

1. Justify the following statements: [5 M]

- i. In capillary rise method for determination of surface tension, ρ° , θ and w can usually be disregarded
- ii. Fatty acid amines are adsorbed on the surface of drug particles to be formulated as flocculated suspensions
- iii. Heparin can cause flocculation and aggregation of triglyceride emulsions stabilized using lecithin and co-administered with Ca^{2+} ions.
- iv. Combination of Tween 80 and Span 80 gives greater stability to the emulsion. *Support your answer with a diagram.*
- v. Addition of a small amount of electrolyte improves the stability of lyophobic colloid while addition in excess results in aggregation.

2. Using the Faraday-Tyndall phenomenon, how do you determine the molecular weight of an association colloid. Explain the equation used and support your answer with suitable graphical representation. [2M]

3. Why some fluids behave as plastic systems while some others exhibit pseudoplastic behaviour? Represent graph of both the systems. [2M]

4. How does Gold number play an important role in protecting the lyophobic colloids against the instability induced by electrolytes? Support your answer with some examples of gold number. [3M]

5. What is the role of DLVO theory in formulation of dispersed systems? [3M]

6. An aspirin suspension is formulated containing 6.5 gm of aspirin/100 ml. The reaction kinetics of drug degradation were studied and it was observed that the degradation rate of aspirin in the formulation was independent of the initial concentration of aspirin. Can we conclude that it is a zero-order reaction? Yes, or no, please justify your answer in detail. [3M]

7. Calculate the half-life of the first-order reaction, $\text{C}_2\text{H}_4\text{O (g)} \rightarrow \text{CH}_4\text{ (g)} + \text{CO (g)}$, if the initial pressure of $\text{C}_2\text{H}_4\text{O (g)}$ is 80 mm and the total pressure at the end of 20 minutes is 120 mm. [2M]

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