Birla Institute of Technology and Science, Pilani
First Semester 2022-23
Pharmaceutical Formulations II (PHA F315)
Comprehensive Examination

Max. Marks: 35 **Part A (Closed Book)** **Duration: 90 Minutes**

Q1. Discuss the influence of the lipophilicity, molecular weight, and melting point of a polymer to be used in the microencapsulation process using the spray drying method. What is the difference between spray drying and spray congealing? Which one is more applicable and why? **[3+2+2 = 7]**

Q2. How the coating material gets phase-separated during the coacervation-phase-separation technique? Discuss 3 strategies. What influences the coating material to get deposited on the core particles? **[3+2 = 5]**

Q3. What is the effect of polymer molecular weight on the drug release rate from microencapsulation done using the emulsion-solvent evaporation method? What will be the effect of solvent volatility on the particle size and release rate? **[3+3 = 6]**

Q4. Write the advantages and disadvantages of targeted drug delivery. Define active and passive targeting. If a nanoparticle formulation was prepared to target tumor cells based on active targeting alone, will it be successful? Discuss. **[2+2+2 = 6]**

Q5. What are the drug-related factors that influence the transdermal absorption of drugs? Explain. **[3]**

Q6. Why cryoprotectants and lyoprotectants are used in a parenteral formulation? How do cryoprotectants work? **[2+2 = 4]**

Q7. Compare between matrix systems and reservoir systems for diffusion-controlled microcapsules. How the drug release rate can be tuned in an osmotic pressure-controlled drug delivery system? **[2+2 = 4]**

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Max. Marks: 35 **Part B (Open Book)** **Duration: 90 Minutes**

Q1. You have been given a drug with a logP value of minus 2.3. You have been asked to make a sustained release microcapsule of this drug. Discuss a suitable method for making the same. **[3]**

Q2. Write a brief note regarding the physicochemical properties of a candidate drug molecule that can influence its clinical use. Describe the importance of those physicochemical properties. **[5]**

Q3. Preservatives have a very wide spectrum of activity. They are also effective in low concentration. Then why are they not used therapeutically for the treatment of systemic infection? **[3]**

Q4. A common perception is the solubilization of a drug is a must for its intestinal absorption, and improving solubilization will improve drug absorption. However, it has been demonstrated that highly water-soluble drugs never get absorbed well. Discuss the interplay between solubility and permeability influencing drug absorption. **[3]**

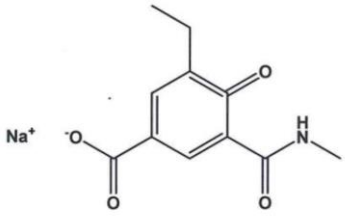
Q5. The taste of an antibiotic X, which is basic in nature, was found out to be very bitter. A suitable formulation of this drug should be made for pediatric use. The physicochemical properties of drug X are as follows:

logP: 1.2; pKa: 8.2 (basic); non-hydrolyzable, stable in aqueous solution at all pH.

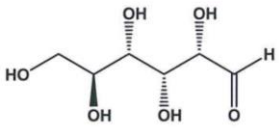
a) Can you propose a suitable formulation for this drug? Explain why you think this formulation should work. **[3]**

b) One colleague of yours has developed a derivative of antibiotic X, which has exhibited significantly improved efficacy and potency as well as an increased spectrum. Though the other properties remain the same, this derivative was found to be quickly hydrolyzable at acidic pH. Can the previous formulation be used for this derivative? If not, can you suggest a suitable formulation? **[3]**

Q6. The drug nialtoxmycin shown below is given as an i.v. infusion. You need to give a dose of 4 gm in 500 ml of dextrose solution. You have already prepared a sterile dextrose solution of a concentration of 0.86 gm/ml. How much dextrose solution and sterile water for injection should be added for 500 ml of nialtoxmycin (4 gm)? **[5]**



Nialtoxmycin



D-glucose (Dextrose)

Q7. Ram found out that a new API was extremely efficacious when given as tablets. However, the microencapsulation of the same API made through the solvent evaporation method was less efficacious. What could be the possible reason(s), and what can he do to make his microencapsulation better? **[2+2 = 4]**

Q8. What are the challenges associated with designing a sustained-release oral formulation against dysentery? What design strategy can be used for a successful formulation? **[2+2 = 4]**

Q9. If a drug exhibited a very low volume of distribution, what can you predict about its physicochemical properties? **[2]**

◊◊◊◊ All the best! ◊◊◊◊