KATHMANDU UNIVERSITY
End Semester Examination
January/February 2024

Level : B.Pharm.
Year : II
Time : 2 hrs. 30mins.

05 FEB 2024

Course : PHAR 220
Semester : I
F. M. : 55

SECTION "B"
[5 Q. × 3 = 15 marks]

Attempt *ANY FIVE* questions

1. Explain the concept of pseudo reaction order with example.

2. Explain the principle of critical micelle concentration of a surfactant.

3. How does the parameters in Noyes-Whitney equation affect the dissolution rate of drug particles?

4. Classify organic molecular complexes with suitable examples of each type.

5. Define different types of densities and methods used for their determination.

6. Give proper justification for the following: [2 × 1.5 =3]
   a. During preparation of buffer compound with *pKa* equal to the pH at which the buffer is to be used is selected.
   b. How buffer protects the formulation from a sudden change in pH?

7. Write Short Note [2 ×1.5 =3]
   a. Eutectic mixtures
   b. Electrolysis
   c. Arrhenius theory of Electrolytic dissociation

SECTION "C"
[5 Q. × 5 = 25 marks]

Attempt *ANY FIVE* questions.

8. Give your opinion on the impact of reaction kinetics in the context of drug formulations. Estimate the shelf life (t90) of drugs at storage temperature by analyzing accelerated stability-testing data.

9. Distinguish between lyophilic and lyophobic colloids. State the unique properties of colloids.

10. Physical stability is the major problem in the colloidal system. Describe the approaches to improve the stability of the colloidal system.

11. How many grams of sodium chloride should be added to the following formulation to make it isotonic? (Given molecular weight of pilocarpine nitrate= 101 g, Liso of pilocarpine nitrate= 0.23). Pilocarpine nitrate 0.3 g Sodium chloride q.s. Purified water q.s. 100 mL

12. Protein binding of drugs is the formation of reversible complexes between drugs and blood components, which may include plasma proteins and the constituents of red cells. Explain the method used for the determination of such binding.

13. You have prepared flocculated particles in a concentrated suspension of calamine in your company.
    a. Which type of flow is exhibited by this suspension? Explain the characteristics of this flow. [3]
    b. Discuss the reasons for this type of flow. [2]

14. Particle size distribution data of paracetamol obtained by particle size analysis is given in the table below.

Particle size range(um)	Weight (gm)
10-30	100
30-50	200
50-70	400
70-90	800
90-110	400
110-130	200
130-150	100

Calculate the geometric *mean diameter, d and* standard deviation of paracetamol powder.

SECTION "C"

[2 Q. × 7.5 = 15 marks]

Attempt *ANY TWO* questions.

15. Discuss on surface and interfacial phenomena with their significances in biological and pharmaceutical systems. Wetting agents are common excipients in tablets and capsules used to enhance the wetting of drug crystals by gastrointestinal fluids. Explain how they effect on contact angle and potentially improve a drug's bioavailability.

16. Define solubility. Explain the various factors affecting the solubility of solids in liquids.

17. Pharmaceutical liquids have different rheological properties. Explain the different types of rheological properties with suitable rheogram. Discuss the different types of viscometers used for the determination of such properties.

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F. M. : 20

Registration No.:

Date :

SECTION "A"

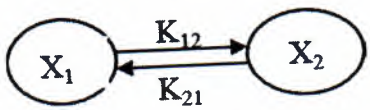
[20Q. × 1 = 20 marks]

Choose and encircle the most appropriate option from each set of choices.

1. For a zero-order degradation:
   a. A plot of concentration versus time yields a straight line
   b. A plot of the logarithm of concentration versus time yields a straight line
   c. A plot of 1/concentration versus time yields a straight line
   d. A plot of the concentration versus logarithm of time yields a curved line

2. According to ICH guidelines on stability testing what is the protocol for accelerated conditions for solid orals:
   a. 40°C/65% relative humidity
   b. 30°C/65% relative humidity
   c. 40°C/75% relative humidity
   d. 30°C/75% relative humidity

3. ..... is the suitable differential equation for the given schematic reaction.



   a. $-dX_1/dt = K_{12}.X_2 - K_{21}.X_1$
   b. $-dX_1/dt = K_{21}.X_1 - K_{12}.X_2$
   c. $-dX_1/dt = K_{12}.X_2 - K_{21}.X_1$
   d. $-dX_1/dt = K_{21}.X_2 - K_{12}.X_1$

4. What is the main result of adding surfactants into a liquid composed of two immiscible phases such as oil and water?
   a. Reduction in the interfacial tension between the phases
   b. Increase in the interfacial tension between the phases
   c. Catalysation of a chemical reaction between the phases
   d. Instability due to phase separation

5. The contact angle forming between magnesium stearate and water is larger than that between lactose and water because:
   a. Magnesium stearate is more hydrophilic
   b. Magnesium stearate is more hydrophobic
   c. Lactose has more surface energy
   d. Both have equal hydrophilicity

6. Cohesive forces are the forces acting:
   a. Between molecules of different materials
   b. Between molecules of same material
   c. Between water and glass capillary tube
   d. Due to gravity

7. Which method for the production of dispersions involves the formation of particles from materials dissolved in true solutions?
   a. Bottom-up
   b. Top-down
   c. Milling
   d. High pressure homogenization

8. What is the best description of blood?
   a. Sol
   b. Foam
   c. Solution
   d. Aerosol

9. According to Fick's law of diffusion, the rate of passive diffusion of drugs depends on
   a. Lipid solubility of the drug
   b. Surface area
   c. Thickness of the membrane
   d. all of these

10. Rate of dissolution can be expected to increase by:
   a. Increase in particle size
   b. Decrease in surface area
   c. Unionized form of drug
   d. Ionized form of drug

11. Indicate which of the following statement relating to the protein binding of drug is not true.
   a. Protein binding decreases the free drug concentration
   b. Protein binding to plasma albumin is a reversible process
   c. Prolongs the duration of action of a drug
   d. Protein-bound drug is pharmacologically active

12. The most widely used method for the study of inclusion complexation
   a. Jobs Method
   b. Solubility Method
   c. Distribution Method
   d. pH Titration Method

13. Fluidity is a term associated with Newtonian fluids. An equivalent term for the flow of plastic fluids is :
   a. Plastic fluidity
   b. Mobility
   c. Flexibility
   d. Apparent fluidity

14. For a spherical particle, value of shape factor ratio α_s/α_v is:
   a. 0
   b. 1
   c. 6
   d. 12

15. The pKa, value of aspirin, which is a weak acid, is about 3.5. If the pH of the gastric contents is 2.0. The ratio of unionized to ionized aspirin.....
   a. 31.62:1
   b. 41.67:2
   c. 2:41.67
   d. 1:31.62

16. The type of particle diameter obtained by optical microscopy method is :
   a. Stokes diameter
   b. Projected diameter
   c. Surface-volume diameter
   d. Volume-surface diameter

17. The flow property of a given mass of powder could be improved by :
   a. Drying of powders
   b. Addition of glidants
   c. Reduction of electrostatic charges
   d. All of the above

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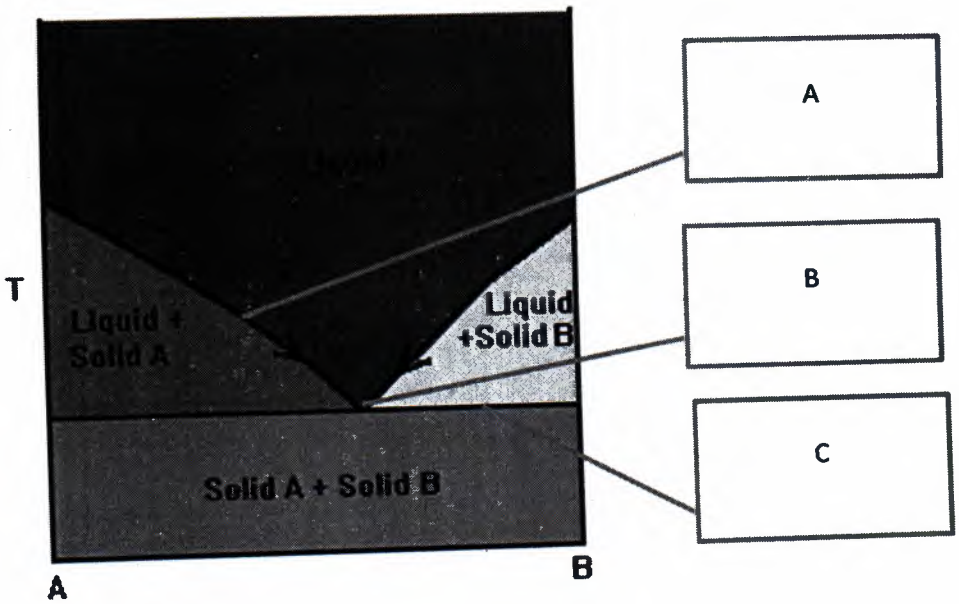
18. Triple point of water corresponds to :
    a. Pressure 600 N/m2 and 0.0075°C temperature
    b. Pressure 605 N/m2 and 0.0075°C temperature
    c. Pressure 610 N/m2 and 0.0075°C temperature
    d. Pressure 61O N/m2 and 0.0070°C temperature

19. Henderson-Hasselbalch equation for weak acid is given as :
    a. pH= pKa +log [acid]/[salt]
    b. pKa =pH+ log [acid]/[salt]
    b. pH= pKa+log [salt]/[acid]
    d. pKa =pH+ log [salt]/[acid]

20. The figure illustrates the two components are completely miscible in the liquid state and completely immiscible as pure solids. The points A, B and C denotes..... respectively



    a. Solidus Curve, Liquidus Curve, Eutectic Point
    b. Liquidus Curve, Solidus Curve, Eutectic Point
    c. Liquidus Curve, Eutectic Point, Solidus Curve
    d. Eutectic Point, Liquidus Curve, Solidus Curve