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UNIVERSITY OF RUHUNA – FACULTY OF ALLIED HEALTH SCIENCES

DEPARTMENT OF PHARMACY

FIRST BPHARM PART II EXAMINATION– SEPTEMBER/OCTOBER 2020

PH 1242 PHARMACEUTICS IB (SEQ)

TIME: TWO HOURS

INSTRUCTIONS

- There are **four** questions in parts **A, B, C** and **D** in this paper.
- Answer **all** questions.
- No paper should be removed from the examination hall.
- Do not use any correction fluid.
- Use illustrations where necessary.

PART A

01.

1.1 Define the term "sedimentation volume". (***10 marks***)

1.2 Briefly explain following tests which are used to identify the types of emulsions.

1.2.1 Conductivity test (***10 marks***)

1.2.2 Miscibility test (***10 marks***)

1.3 Briefly explain about lyophobic colloids. (***20 marks***)

1.4 Briefly describe elector-dispersion method used to prepare lyophobic sols. (***20 marks***)

1.5 Briefly explain three important reasons for studying about drug stability. (***30 marks***)

02.

2.1

2.1.1 State one difference between zero order reaction and first order reaction. (***10 marks***)

2.1.2 Draw the concentration vs. time graph for a zero-order reaction. (***10 marks***)

2.1.3 List two methods which can be used to determine the order of a reaction. (***05 marks***)

PART B

2.2

2.2.1 While soap bubbles are spherical, rain droplets are of tear shape naturally. Using thermodynamic aspects explain the reason for the above natural shapes. (***15 marks***)

2.2.2 Calculate the pressure differential of water across the surface of a spherical droplet of radius 300 nm at 20°C. (*15 marks*)

Note: γ_{water} at 20°C is 72.75 mN m^{-1}.

2.2.3 The dependence of the surface tension on the surfactant concentration on a surface interface can be expressed using the Gibbs adsorption equation,

$\Gamma = -\frac{1}{RT}\left(\frac{d\gamma}{dc}\right)_T$ where all the symbols have their usual meaning.

For a 1.00 x 10^{-4} M aqueous solution of n-butanoic acid at 25°C, $d\gamma/dc$ = -0.080 N m^2 mol^{-1}.

2.2.3.1 Using the Gibbs adsorption equation, determine the surface excess of butanoic acid. (*10 marks*)

2.2.3.2 Calculate the average surface area available for each molecule. (*10 marks*)

PART C

2.3

2.3.1 What is a closed system in thermodynamics? (*05 marks*)

2.3.2 Define the first law of thermodynamics. (*10 marks*)

2.3.3 Internal energy of a gas U= n Cv T. Calculate the internal energy of 6 mol of a monatomic gas at 27 °C temperature. (R = 8.314 $Jmol^{-1}$ K^{-1}) (*10 marks*)

03.

3.1

3.1.1 What is ionizing radiation? (*10 marks*)

3.1.2 Define the intensity of ionizing radiation. (*10 marks*)

3.1.3 Briefly describe the Photoelectric effect in diagnostic radiology and write the energy equation that explains the energy of the exiting electron. (*20 marks*)

3.1.4 Explain the dependence of Photoelectric interactions on atomic number of the medium and the photon energy. (*20 marks*)

3.2

3.2.1 Briefly explain the shear thinning and shear thickening behavior of non-Newtonian fluids and give two examples for each. (*20 marks*)

3.2.2 Draw following graphs for shear thinning and shear thickening behavior of non-Newtonian fluids.

3.2.2.1 shear stress Vs shear rate (*10 marks*)

3.2.2.2 viscosity Vs shear rate (*10 marks*)

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PART D

04.

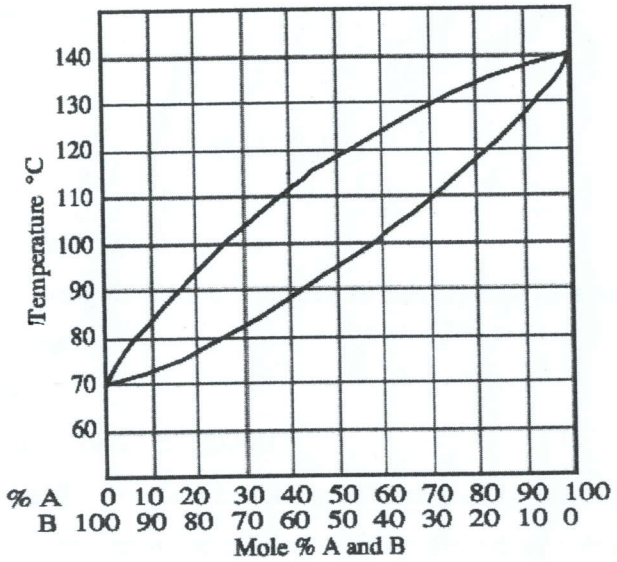
4.1

4.1.1 Briefly define "Distillation"? (***10 marks***)

4.1.2 Draw and label the diagram of simple distillation apparatus. (***20 marks***)

4.1.3 Briefly explain the fractional distillation process. (***15 marks***)

4.2 The temperature composition diagram for binary mixture of two compounds A & B is given below. Assume the vapors are ideal gases and the mixture is an ideal mixture.



Consider a 70:30 mixture of A and B.

4.2.1 What would be the boiling temperature of this mixture? (***10 marks***)

4.2.2 What would be the composition of the vapors coming from this liquid mixture? (***10 marks***)

4.2.3 Name the process which the above vapor mixture must undergo to obtain the same composition of A and B in liquid form. (***10 marks***)

4.2.4 What is the boiling temperature of pure A? (***10 marks***)

4.3 State three applications of fractional distillation. (***15 marks***)

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