



KENYATTA UNIVERSITY
EXAMINATION FOR THE DEGREE OF BACHELOR OF PHARMACY

PPA 320: PHARMACEUTICS II

2ND SEMESTER 2020/2021

TIME: 3 Hours

INSTRUCTIONS:

1. This question paper has three sections: SECTION A,B, C
2. Answer all questions
3. Answer questions in each section in a separate answer booklet

SECTION A: 40 MARKS

- 1.(a)Describe the three types of mixtures (3 marks)
- (b) Using relevant examples, describe the scale of scrutiny in the mixing process. (3 marks)
- (c) Outline four reasons why a Pharmacist working in a Pharmaceutical manufacturing Industry would require to monitor the degree of mixing. (3 marks)
2. As a production Pharmacist, you want to formulate a tablet weighing 50mg which contains 50µg of a potent steroid and the product specifications require 99.7% of the tablet to contain between 47.5% and 52.5% of the steroid. If the mean particle density of the components is 1.5g/cm^3 (1500kg/m^3), calculate the particle size of the steroid (API) and the excipients. (5 marks)
3. (a) Outline six types of centrifugation. (3 marks)
- (b) Explain four methods used to increase filtration rate (2 marks)

4. (a) Describe six product related factors to be considered when selecting filters for a pharmaceutical process. (3 marks)
- (b) Describe six applications of filtration in Pharmacy practice. (3 marks)
5. (a) Outline six Pharmaceutical processes that involve the transfer of heat energy. (3 marks)
- (b) Describe four considerations in the choice of a drying method for pharmaceuticals. (4 marks)
6. Discuss the advantages of fluidized-bed drying. (4 marks)
7. Discuss the stages of freeze drying process. (4 marks)

SECTION B 40 MARKS

1. Differentiate between the following terms

i) Dynamic and kinematic viscosity. (2 marks)

iii) Newtonian and non-Newtonian fluids. (2 marks)

2. (a) An Ostwald viscometer was used to measure the viscosity of acetone, which was found to be 0.913cp at 25°C. Its density at 25°C is 0.788 g/cm³. What is the kinematic viscosity of acetone at 25°C? (2 Marks)

(b) Water is ordinarily used as a standard for measuring the viscosity of liquids. Its viscosity at 25°C is 0.8904 cp. What is the viscosity of acetone relative to that of water (relative viscosity, η_r) at 25°C? (2 marks)

3. A plastic material was found to have a yield value of 1,400 dynes/cm².

At shearing stresses above the yield value, shear stress (σ) was found to increase linearly with shear rate ($\dot{\gamma}$).

If the rate of shear ($\dot{\gamma}$) was 150 sec⁻¹ when shear stress (σ) was 5000 dynes/cm², calculate the plastic viscosity, η_p of the sample. (3 marks)

4. Plot rheograms that show the following

- a) Plastic flow (1 mark)
- b) Pseudoplastic flow (1 mark)
- c) Dilatant flow (1 mark)

5. Discuss thixotropy in rheology. (4 marks)

6. Explain the difference between Couette type of viscometer and the Searle type of viscometer. (4 marks)

7. Outline the advantages of the cone and plate viscometer over the cup and bob viscometer. (2 marks)

8. Describe the phenomenon of plug flow in rheology. (4 marks)

9. Describe the following profiles of Newtonian and Non-Newtonian behaviour as a function of shear rate.

a) Flow profile. (2 marks)

b) Viscosity profile. (2 marks)

10. A sample of a gel was analyzed in a modified Stormer viscometer.

A driving weight, w , of 250 g produced a bob velocity, v , of 1350 rpm.

A series of velocities was obtained using other driving weights, and the data were plotted.

The yield value intercept, w_f , was obtained by extrapolating the curve to the shear stress axis where $v = 0$, and the value of w_f was found to be 225 g.

The instrumental constant, K_v , is 52.0, and K_f is 20.0.

Calculate:

- a) The yield value of the sample. (2 marks)
- b) The plastic viscosity. (2 marks)

11. A new ointment base was designed and subjected to rheological analysis at 20°C in a cone-plate viscometer with an instrumental constant, C , of 18.277 cm^{-3} .

At a cone velocity of $v=125\text{ rpm}$ the torque reading, T , was 1287.0 dyne cm .

The torque, T_f , at the shearing stress axis was found to be 63.5 dyne cm .

$C_f = 113.6\text{ cm}^{-3}$ for a medium-size cone (radius of 2.007 cm)

Calculate the following:

- a) The plastic viscosity of the ointment base. (2 marks)
- b) The yield value of the ointment base. (2 marks)

SECTION C

ANSWER ALL QUESTIONS (40 MARKS)

1. a) Differentiate between the Capillary rise method and the Dunouy method of measuring surface and interfacial tension. (6 marks)
b) Classify surface active agents (surfactants) on the basis of their polar head groups. (4 marks)
c) How are HLB (Hydrophilic-Lipohilic Balance) numbers assigned to surfactants? (4 marks)
2. Explain how Gibbs Phase Rule can be used in the field of pharmacy. (5 marks)
3. a) Describe the triple point of a substance (1 mark)
b) Explain the significance of a triple point with reference to freeze drying operations. (4 marks)
4. Differentiate between colloids, true solutions and coarse dispersions. (5 marks)
5. Describe the various properties of colloids giving examples in nature. (5 marks)
6. Using relevant examples, discuss the phenomenon of complexes in pharmaceutical systems. (6 marks)