

**NATIONAL UNIVERSITY OF LESOTHO**  
**FACULTY OF HEALTH SCIENCES**  
**DEPARTMENT OF PHARMACY**  
**BACHELOR OF PHARMACY (HONOURS)**

**PHA 2402- PHARMACEUTICS 1**

**EXAMINATION PAPER**

**JANUARY 2024**

**TIME: 3 HOURS**

**TOTAL: 100 Marks**

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**INSTRUCTIONS**

- **ANSWER ALL THE QUESTIONS IN THIS PAPER**
- **BEGIN EACH ANSWER ON A NEW PAGE**
- **SHOW ALL YOUR WORKINGS WHERE NECESSARY**

**QUESTION 1****10 marks**

- a) Briefly discuss the importance of dosage form design. **(6)**
- b) Mention two **advantages and disadvantages** associated with sublingual route of administration. **(4)**

**QUESTION 2****10 marks**

Briefly discuss the following drug factors in dosage form design. **(5 marks each)**

- a) Organoleptic properties
- b) Particle size

**QUESTION 3****10 marks**

- a) Differentiate between dissolution and solubility. **(2)**
- b) Explain the dissolution process of solids into liquids. **(8)**

**QUESTION 4****10 marks**

Discuss how the following factors below affect the solubility of solids in liquids.

- a) Temperature **(3)**
- b) Common ion effect **(3)**
- c) Polymorphism **(4)**

**QUESTION 5****10 marks**

a) "Degree of ionization of a drug in a solution can be calculated from rearranged Henderson– Hasselbalch equations for weak acids and weak bases". Demonstrate your understanding by answering the following questions below. **(2 marks each)**

- i. Calculate the pH of a solution with hydrogen ion concentration of  **$3.0 \times 10^{-5} \text{ M}$** .
- ii. Calculate the ratio of the concentration of Unionized: Ionized Aspirin at pH **2** given that the pKa is **3.5**.
- iii. Calculate the ratio of bicarbonate: dissolved  $\text{CO}_2$  at pH **7.4** given that the pKa is **6.05**.

b). Discuss the effect of pH on the following pharmaceutical processes below. (2 marks each)

- i. Degree of ionization and solubility of weakly acidic and weakly basic drugs.
- ii. Absorption of drugs from the GIT into systemic circulation.

**QUESTION 6**

**20**

**marks**

- a) Outline the principle Ring (Du Nouy) method for measuring surface and interfacial tension. (4)
- b) Explain the difference between physical adsorption and chemical adsorption. (6)
- c) Discuss the significance *contact angle and solid wettability* in relation to drug formulation performance. (6)
- d) Explain how the following factors below affects the adsorption from solution onto solids. (2 marks each)
  - i. Temperature
  - ii. Nature of adsorbent

**QUESTION 7**

**10 marks**

- a) Explain the three types of behavior exhibited by Non-Newtonian fluids. (6)
- b) Briefly discuss the applications of rheology under the following pharmaceutical formulation below. (2 marks each)
  - i. Eye preparations
  - ii. Intramuscular preparations

**QUESTION 8**

**20**

**marks**

- a) Define extemporaneous compounding. (1)
- b) You are a pharmacist working in a community pharmacy and you receive a prescription for Pediatric Paracetamol Elixir BP. Unfortunately, the prescribed strength is not commercially available. Your task is to extemporaneously compound Pediatric Paracetamol Elixir BP to meet the prescription's requirements using the provided master formula below.

<b>Ingredients</b>	<b>Master Formula</b>
Paracetamol	24 g
Amaranth solution	2 ml
Chloroform spirit	20 ml
Ethanol (96%)	100 ml
Propylene glycol	100 ml
Syrup	275 ml
Glycerol to	1000 ml

- i)** From the master formula, calculate the quantities of each ingredient required to prepare 100 ml of Pediatric Paracetamol Elixir BP. **(2)**
  - ii)** Calculate the concentration of paracetamol in this elixir and express it as mg/5ml. **(3)**
  - iii)** Briefly discuss the factors which may affect the stability of your drug. **(6)**
- c) As a pharmacist in a compounding pharmacy, you receive a prescription for a 6% w/w Metronidazole Cream. However, the available concentration is 2% w/w. Calculate the amount of both the 2% w/w metronidazole cream and metronidazole powder required to produce 200 g of the prescribed 6% w/w metronidazole cream (to 2 decimal places). **(8)**