

CPS



KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS
2021/2022 ACADEMIC YEAR

THIRD YEAR SECOND SEMESTER
MAIN EXAMINATIONS

FOR THE DEGREE OF BACHELOR OF CHEMISTRY

COURSE CODE: SCH 326

COURSE TITLE: SOFT MATTER CHEMISTRY

DURATION: 2 HOURS

DATE: 01/06/09/2022

TIME: 2:00-4:00PM

INSTRUCTIONS TO CANDIDATES

- Answer **QUESTION ONE** (Compulsory) and any other two (2) Questions.
- Indicate **answered questions** on the front cover.
- Start every question on a new page and make sure question's number is written on each page.

This paper consists of 3 printed pages. Please Turn Over



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- b) Discuss the classification of basic constituent molecules of soft matter under the following sub headings (10mrks)
- (i) Colloidal suspensions
 - (ii) Polymers
 - (iii) Ampiphilic molecules

QUESTION FIVE (20MRKS)

- a) Using examples, discuss the physical properties of a polymers that affect their strength and flexibility under the following subheadings: (10mrks)
- (i) Chain length
 - (ii) Side groups
 - (iii) Branching
 - (iv) Cross linking
- b) What is the surface area of a cube having an edge length of 1cm? (3mrks)
- c) What would be the total surface area of this same material if it were subdivided into colloidal size cubes each having an edge length of 1×10^{-7} cm (5mrks)
- d) List two practical applications of glass transition temperature (2mrks)

QUESTION ONE.COMPULSORY (30 MARKS)

- a) Define the term soft matter and explain the defining characteristics of soft matter (4mks)
- b) Explain the difference between natural and synthetic rubber (4mrks)
- c) Name three advantages of natural rubber (3mrks)
- d) State three examples of synthetic rubber (3mrks)
- e) List three uses of rubber (3mrks)
- f) Define the term surface tension and give a reason why water does not spread over the surface of oil (4mrks)
- g) What are some of the polymers that you encounter every day? Describe their physical properties (4mrks)
- h) Explain why the glass transition temperature is strain – rate dependent (3mrks)
- i) Differentiate between physisorption and chemisorption (2mrks)

QUESTION TWO (20 MARKS)

- a) Explain how the following factors affect the strength of polymers
 - (i) Molecular weight (3mrks)
 - (ii) Cross- linking (3mrks)
 - (iii) Crystallinity (3mrks)
- b) List one applications of polymers (1mrk)
- c) Define the term “unit cell” (1mrk)
- d) Using examples, discuss the simple crystal structures found in common metals under the following headings
 - (i) Face centered cubic (3mrks)
 - (ii) Body centered cubic (3mrks)
 - (iii) Hexagonal close – packed (3mks)

QUESTION THREE (20MARKS)

- a) Differentiate between adsorption, desorption and absorption (6mrks)
- b) What role does the surface of an adsorbent have in adsorption process (2mrks)
- c) Describe the method of adsorption and its characteristics (3mks)
- d) Discuss the draw backs of natural rubber and hence deduce the main purpose of vulcanization (9mrks)

QUESTION FOUR (20MRKS)

- a) Soft materials are important in a wide range of technological applications. Discuss using appropriate examples (10mrks)