

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF APPLIED CHEMISTRY
END OF SEMESTER EXAMINATIONS – DECEMBER 2002
ORGANIC INDUSTRIAL CHEMISTRY II – SCH 4115
TIME – (3) THREE HOURS

INSTRUCTIONS TO CANDIDATES

Answer **ALL** questions from Section A and **ANY THREE** questions from Section B.
Each question in Section B carries 20 marks.

SECTION A (Answer all questions.)

1. (a) Who wrote the following text and when?
“There is a tree very much appreciated by the Indians. From this tree a kind of very white thick glutinous fluid flows....” (2 marks)
- (b) What did Henry Wickham do to keep the legacy of rubber alive? (3 marks)
- (c) Differentiate between natural rubber and gutta percha. (5 marks)
- (d) What do you understand by rubber compounding? (5 marks)
- (e) Define the following concepts:
 - (i) Vulcanization
 - (ii) Optimum cure
 - (iii) Reversion
 - (iv) Non-sulphur vulcanization
 - (v) Efficient vulcanization (10 marks)
- (f) Illustrate the crosslinking of NR chains using sulphur. (5 marks)
- (g) Arrange the following rubbers in order starting with the one with the best OIL resistance and ending with the one with the least resistance:
CR; IIR; NBR; EPM; and NR. (5 marks)
- (h) Give an example of each of the following ingredients used in rubber manufacturing:
 - (i) Emulsifier
 - (ii) Modifier
 - (iii) Stabilizer
 - (iv) Viscosity Controller
 - (v) Short Stop (5 marks)

SECTION B (Answer any three questions. Each question carries 20 marks)

2. (a) With the aid of a diagram (flow chart) and an appropriate recipe, describe the polymerization of either SBR or IIR. (14 marks)
- (b) Outline four (4) major properties and two (2) main applications for the chosen elastomer. (6 marks)
3. (a) What do you understand by the following terms:
- (i) Caa-o-chu
 - (ii) Wound response
 - (iii) Creaming
 - (iv) Dry rubber content (4 marks)
- (b) For each of the following monomers, give two (2) methods of commercial production:
- | | | | |
|---------------|----------|-----------|-------------|
| butadiene | styrene | isoprene | chloroprene |
| acrylonitrile | ethylene | propylene | isobutylene |
- (16 marks)
4. (a) What climatic conditions are suitable for the growth of the Hevea Brasiliensis tree and at what age is the tree ready for tapping? (5 marks)
- (b) With the aid of a diagram, explain the process of latex preservation using ammonia. (15 marks)
5. (a) Compare and contrast the advantages and disadvantages of internal and external mixers. (5 marks)
- (b) Explain how a filler like carbon black fulfils the following functions:
- (i) Facilitates manufacturing
 - (ii) Improves product quality
 - (iii) Reduces product cost (15 marks)

END OF QUESTION PAPER!!!