



CHEM 315

UNIVERSITY EXAMINATIONS

FIRST SEMESTER 2025/2026 ACADEMIC YEAR

**THIRD YEAR EXAMINATION FOR THE DEGREE OF
BACHELOR OF SCIENCE (GENERAL)**

CHEM 315: INDUSTRIAL AND APPLIED CHEMISTRY

STREAMS: BSc (GEN)

TIME: 2 HRS

DAY: TUESDAY [14.30 – 16.30 P.M]

DATE: 27/01/2026

THIS QUESTION PAPER CONSISTS OF THREE (3) PAGES

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INSTRUCTIONS: ATTEMPT ALL QUESTIONS. QUESTION ONE CARRIES 30 MARKS, QUESTIONS TWO AND THREE CARRY 20 MARKS EACH.

QUESTION ONE (30 MARKS)

- a) Define the following terms
- i. Hazard data (1 Mark)
 - ii. A patent (1 Mark)
 - iii. Mastication in rubber industry (1 Mark)
 - iv. Vitrification (1 Mark)
 - v. Calendering (1 Mark)
- b) Distinguish between
- i. Unit process and unit operation (2 Marks)
 - ii. Basic and Applied research (2 Marks)
 - iii. Batch and continuous process (2 Marks)
- c) i. Define ceramics and state their formation and any two properties. (3 Marks)
- ii. Explain chlor-alkali process and write balanced chemical equations for the reactions that occur. (6 Marks)
- Mention two uses each of the two gases obtained in the above process.
- d) i. Write the equation for the Haber process and conditions for optimal production. (3 Marks)
- ii. Name an alternative method to the Haber process for the production of ammonia? (1 Mark)
- iii. Draw a simple flow chart of the main steps used to produce soda ash from trona deposits from Lake Magadi. (3 Marks)
- iv. Write the formula of the naturally occurring mineral known as trona. (1 Mark)
- e) Explain the process of vulcanization in the rubber industry (2 Marks)

QUESTION TWO (20 MARKS)

- a) Describe the Contact Process for manufacture of sulphuric acid. Show all reactions including those on how to obtain the raw materials. (7 Marks)

b) Explain the effect of increasing pressure, temperature and amount of catalyst on yield of Sulphur trioxide. (6 Marks)

c) Describe industrial fermentation of beer and the challenges facing the industry. (7 Marks)

QUESTION THREE (20 MARKS)

a) How is sugar manufactured from sugarcane? (8 Marks)

b) Using chemical equations where appropriate show the processes thought to taking place in different zones of the cement rotary kiln (7 Marks)

c) i. Why is soda ash added during melting of raw materials for the manufacture of glass? (2 Marks)

ii. Describe any **three** analytical methods used to determine the quality of sugar. (3 Marks)