



NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF APPLIED SCIENCES

DEPARTMENT OF CHEMISTRY

ANALYTICAL CHEMISTRY III

SCH 4206

Supplementary Examination Paper

July 2016

This examination paper consists of 3 pages

Time Allowed: 3 hours

Total Marks: 100

Examiner's Name: Dr A. Maringa

INSTRUCTIONS

1. Answer any five (5) questions.
2. Each question carries 20 marks.
3. Use of calculators is permissible.

MARK ALLOCATION

QUESTION	MARKS
1.	20
2.	20
3.	20
4.	20
5.	20
6.	20
TOTAL POSSIBLE MARKS	100

Copyright: National University of Science and Technology, 2015

SCH 4206 SUPP

1. (a). Differentiate between:
- i. Sorbed water, adsorbed water and occluded water. [6 marks]
 - ii. Essential water and non-essential water. [5 marks]
 - iii. Gross sample and laboratory sample. [5 marks]
 - iv. Total Organic Carbon (TOC) and Chemical Oxygen Demand (COD). [4 marks]
2. (a). What is a super critical fluid? [2 marks]
- (b). What are the main disadvantages of solvent extraction? [3 marks]
- (c). Discuss the advantages of supercritical fluid extraction (SFE) over solvent extraction. [5 marks]
- (d). Differentiate between the following terms as used in solvent extraction.
- i. An exhaustive and countercurrent extraction. [5 marks]
 - ii. Distribution coefficient and distribution ratio. [5 marks]
3. (a). What is a masking agent and how does it function? [5 marks]
- (b). The distribution constant for iodine between an organic solvent and H₂O is 85. Find the concentration of I₂ remaining in the aqueous layer after extraction of 50.0 mL of 1.00 x 10⁻³ M I₂ with the following quantities of the organic solvent:
- i. 50.0 mL [5 marks]
 - ii. Two 25.0mL portions [5 marks]
 - iii. Five 10.0mL portions [5 marks]

4. (a). Discuss the differences and advantages that microwave digestion has over wet ashing using conventional heating. [10 marks]
- (b). How are samples decomposed by inorganic acids in open vessels? [10 marks]
5. (a). Using clearly labelled diagrams describe three discrete automatic systems for sampling and sample definition of fluids. [15 marks]
- (b). Explain how traces of manganese, lead and zinc could be separated from major components of a sample using precipitation methods. [5 marks]
6. (a). In analytical chemistry, what is an interferent and how is it dealt with? Give practical examples in your explanations. [10 marks]
- (b). Describe any two classical separation techniques, also indicate their drawbacks. [10 marks]

End of question Paper!!!