NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF APPLIED SCIENCES

DEPARTMENT OF APPLIED CHEMISTRY

ANALYTICAL III

SCH 4206

Supplementary Examination Paper

August 2017

This examination paper consists of 3 pages

Time Allowed: **3 hours**

Total Marks: **100**

Examiner's Name: Dr. A. Maringa

INSTRUCTIONS

a) Answer ALL questions in section A and any three (3) questions in section B
b) Each question in section A carries 10 marks and each question in section B carries 20 marks

Special requirements: Calculator and graph paper.

MARK ALLOCATION

QUESTION	MARKS
SECTION A: 1.	**10**
2.	**10**
3.	**10**
4.	**10**
SECTION B: 5	**20**
6	**20**
7	**20**
8	**20**
TOTAL POSSIBLE MARKS	**100**

SECTION A

1. (a). State the acid which is effective for the digestion of silicates and explain why. [4 marks]

   (b). How do we prepare the sample container prior to sample storage? [6 marks]

2. (a). Explain why CO_2 is the supercritical fluid of choice. [4 marks]

   (b). What are the main reasons for the use of solid phase extraction (SPE) for quantitative analysis in GC or HPLC. [6 marks]

3. (a). H_2SO_4 must never be used in PTFE vessels. Explain why? [3 marks]

   (b). What problems might result from a sample with high salt content. [3 marks]

   (c). Describe briefly the procedure for acid digestion of soil using aqua regia. [4 marks]

4. (a). Why might the nature and type of storage vessel be important? [10 marks]

SECTION B

5. (a). What problem may occur when a sample is stored? [3 marks]

   (b). Describe the factors to consider when preparing a sample for analysis. [5 marks]

   (c). Explain briefly the relative merit of investigating metal or insoluble organic compound pollution in a river or sea by:

   i. Analysis of water.
   ii. Analysis of sediments.
   iii. Analysis of seaweed.
   iv. Analysis of fish or shellfish. [12 marks]

6. (a). What is a masking agent and how does it function? [5 marks]

   (b). The distribution constant for iodine between an organic solvent and H_2O is 85. Find the concentration of I_2 remaining in the aqueous layer after extraction of 50.0 mL of 1.00×10^{-3} M I_2 with the following quantities of the organic solvent:

   i. 50.0 mL [5 marks]

   ii. Two 25.0 mL portions [5 marks]

   iii. Five 10.0 mL portions [5 marks]

7. Discuss the properties of an ideal extraction solvent. [20 marks]

8. Describe the problems in relation to scaling, corrosion and carryover that are encountered in the operation of boiler systems and state the causes of the problem. [20 marks]

End of question paper!!!!