Name: _____ Index No: _____/_____

1408/313
CHEMISTRY TECHNIQUES
June/ July 2014
Time: 3 hours

Candidate's Signature: _____

Date: _____

THE KENYA NATIONAL EXAMINATIONS COUNCIL

CRAFT CERTIFICATE IN SCIENCE LABORATORY TECHNOLOGY

CHEMISTRY TECHNIQUES

3 hours

INSTRUCTIONS TO CANDIDATES

Write your name and index number in the spaces provided above.
Sign and write the date of examination in the spaces provided above.
You should have a Scientific calculator for this examination.
*This paper consists of **TWO** sections; **A** and **B**.*
*Answer **ALL** questions in section **A** in the spaces provided and any **TWO** questions from section **B** in the spaces provided after question 19.*
*Each question in section **A** carries 4 marks while each question in section **B** carries 20 marks.*
Candidates should answer the questions in English.

For Examiner's Use Only

Section A

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total Score
Candidate's Score																

Section B

Question	16	17	18	19	Total Score
Candidate's Score					

GRAND TOTAL

This paper consists of 16 printed pages.

Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

Turn over

SECTION A (60 marks)

Answer ALL the questions in this section in the spaces provided.

1. Name any **two** methods of digesting solid samples in a chemistry laboratory. (4 marks)

2. Describe the method used in calibrating a pH meter. (4 marks)

3. 25 cm^3 of 0.02 M $AgNO_3$ solution was mixed with excess of dilute hydrochloric acid. Calculate the mass of the precipitate formed.
(Ag = 108, Cl = 35.5, H = 1, N = 14, 0 = 16) (4 marks)

4. List any **four** factors that can determine column efficiency in column chromatography. (4 marks)

5. Calculate molarity of a copper (II) sulphate solution which is 5% w/v. (Cu = 64, S = 32, O = 16) (4 marks)

6. (a) Define the term primary standard. (2 marks)

(b) List any **two** methods of preparing standard solutions. (2 marks)

7. 10.08 g of hydrated oxalic acid crystals, $H_2C_2O_4.nH_2O$ were dissolved in 100 cm^3 of solution. 20 cm^3 of this solution required 25 cm^3 of 0.128 M NaOH for complete neutralization. Calculate the number of moles of water of crystallization in one mole of oxalic acid. (H = 1, C= 12, O = 16) (4 marks)

8. List the components of a flame photometer. (4 marks)

9. At 580 nm, which is the wavelength of maximum absorption, a complex compound has a molar absorptivity 7.00×10^3 dm^3 cm^{-1} mol^{-1}. Calculate the absorbance of 9.5×10^{-5} M solution of this compound at 580 nm in a 1 cm cuvette. (4 marks)

10. Describe the analysis of a sample using the Lovibond colour comparator. (4 marks)

11. Outline the determination of moisture content of a biological sample. (4 marks)

12. List the advantages of the Soxhlet extraction method. (4 marks)

13. A current of 5.0 A was passed through a molten solution of sodium chloride for 30 minutes. Calculate the volume of chlorine gas evolved at r.t.p. (IF = 96500 C, gas molar volume at r.t.p = 24 L) (4 marks)

14. Outline the procedure for determination of conductivity of a sample solution. (4 marks)

15. 2 cm^3 of a sample of hydrogen peroxide was diluted to 50 cm^3 with pure water. 20 cm^3 of this solution required 13.5 cm^3 of 0.05 M acidified potassium permanganate. Calculate the molarity of the original hydrogen peroxide solution. (4 marks)

SECTION B (40 marks)

*Answer any **THREE** questions from this section in the spaces provided after question 19.*

16. (a) Draw a labelled diagram of vacuum filtration in operation. (10 marks)

(b) List the:

(i) advantages;
(ii) disadvantages;
of vacuum filtration over gravity filtration. (4 marks)

(c) Give **four** reasons why precipitates are ignited after filtration. (2 marks)

(d) (i) Define the term "filter pulp".

(ii) Describe how a filter-pulp is prepared in a chemistry laboratory. (4 marks)

17. (a) Outline the basic steps that lead to the production of analytical signal in flame photometry. (8 marks)

(b) Explain why during analysis of calcium by flamephotometry EDTA is always added to both the samples and the standards. (4 marks)

(c) (i) Explain the purpose of zero-adjustment during analysis of a sample by a flame photometer. (3 marks)

(ii) Describe how zero-adjustment is effected during analysis. (1 mark)

(d) Describe the procedure used in calibrating a flame photometer. (4 marks)

18. (a) Outline the basic principles involved in the determination of crude fibre. (10 marks)

(b) A 0.200 g sample was analysed for crude protein. The ammonia produced was distilled in 50 cm^3 of 0.05 M H_2SO_4. The excess acid was backtitrated with 0.05 M NaOH and the titre volume was 3.40 cm^3. Calculate the percentage of protein in the sample. (Use a conversion factor of 6.2) (10 marks)

19. (a) Define sampling. (2 marks)

(b) Explain the importance of:

(i) sampling;
(ii) sample storage in chemistry.

(6 marks)

(c) Differentiate between grab and composite samples. (4 marks)

(d) State the characteristics of an ideal sample. (2 marks)

(e) Name **one** common method used in sampling. (2 marks)

(f) Describe the procedure for digesting a rock sample for determination of metals. (4 marks)