NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF INDUSTRIAL TECHNOLOGY

DEPARTMENT OF TECHNICAL TEACHER EDUCATION

BACHELOR OF SCIENCE HONOURS DEGREE

END OF SECOND SEMESTER EXAMINATIONS

ANALYTICAL CHEMISTRY I – SCH 1206   **TIME: 3 HOURS**

INSTRUCTIONS TO CANDIDATES

Answer **FOUR** questions out of **FIVE** questions provided.

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1.   Explain the difference between the following terms.

   (a)   Accuracy and precision   (5 marks)

   (b)   Constant and proportional error   (5 marks)

   (c)   Random and systematic error   (5 marks)

   (d)   Absolute and relative error   (5 marks)

   (e)   Mean and median   (5 marks)

2.   (a)   Explain the difference between the equivalence point and end point in

         relation to titrations.   (10 marks)

   (b)   At elevated temperatures, NaHCO3 is converted quantitatively to Na2CO3:

         $2NaHCO_3(s)$ -------- $Na2CO3(s)$ $+ CO_2(g)$ $+ H_2O(g)$

         Ignition of a 0.3592-g sample of an antacid tablet containing NaHCO3 and nonvolatile impurities yielded a residue weighing 0.2362 g. Calculate the percent purity of the sample.

(15 marks)

3. (a) BaF_2 has a Ksp of 1.8×10^{-7}. What is the concentration of barium in a
        saturated solution of BaF_2 (15 marks)

    (b) Calculate the ionic strength of   (i) 0.1 M solution of KNO_3 (5 marks)
                                          (ii) 0.1 M solution of Na_2SO_4 (5 marks)

4. (a) What factors affect sharpness in an acid/base titration?   (5 marks)

    (b) Why is it common practice to boil the solution near the equivalence
        point in the standardization of Na_2CO_3 with acid   (10 marks)

    (c) What are the conditions that warrant the use of a back titration
        using EDTA?   (10 marks)

5. Will the results of determination of chloride by the usual gravimetric procedure
    be made too high or too low, or will there be no effect, if each of the following
    occurs? Explain each answer.

    (a) Some carbonate is present in the original sample.   (5 marks)
    (b) The water used in preparing the wash liquid contains some chloride ion. (5 marks)
    (c) The precipitate is exposed to bright sunlight while it is in the mother liquid. (5 marks)
    (d) The precipitate is exposed to bright sunlight after it is washed but prior

END OF EXAMINIATION