Navrachana University
School of Liberal Studies and Education
End-Semester Examination November 2017
M.Sc., Semester-I
Basics of Analytical Chemistry, CH-112

Date: 29/11/2017   Marks: 40
Time: 10:30 AM to 12:30 PM

Instructions:
→ *All Sections are compulsory.*
→ *Please read the questions carefully and answer accordingly.*
→ *Draw a neat and labeled diagram wherever necessary.*
→ *This question paper contains FOUR pages.*

SECTION A. Answer the following   [Marks = 1 × 20 = 20]

I. Multiple Choice Questions

1. What piece of laboratory equipment is best-suited for accurately measuring the volume of a liquid?

    a) graduated cylinder

    b) beaker

    c) Erlenmeyer flask

    d) d) more than one of the above

2. The independent variable in an experiment is

    a) The variable you hope to observe in an experiment.

    b) The variable you change in an experiment.

    c) The variable that isn't changed in an experiment.

    d) none of these is correct

3. "Qualitative results" refer to

    a) Results that can be observed during an experiment.

    b) Results that are difficult to observe during an experiment.

    c) Results that require numerical data.

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d) none of these is correct.

4. When drawing a graph that measures family average income over a period of 50 years, the independent variable is

   a) Income

   b) Average

   c) Years

   d) It is impossible to say

5. Accuracy is defined as

   a) A measure of how often an experimental value can be repeated.

   b) The closeness of a measured value to the real value.

   c) The number of significant figures used in a measurement.

   d) None of these

6. How many significant figures are present in the number 10,450?

   a) three

   b) four

   c) five

   d) none of these

7. A homogenous material is defined as being

   a) An element

   b) Any material with uniform composition

   c) Synonymous with "solution"

   d) More than one of these

8. 10 times the standard deviation of the blank

   a) selectivity (specificity)

   b) detection limit (LOD)

   c) standard operating procedures (SOP)

   d) lower limit of quantitation (LOQ)

9. _____ must collect representative samples, and analyte must be preserved after sample is collected; otherwise, even the most accurate analysis is meanin~~ (quality assurance

begins with sampling)

- a) accuracy and precision
- b) spike (fortification)
- c) sampling requirements
- d) types of precision

10. capability of responding reliably and measurably to changes in analyte concentration; the detection limit of an analytical method must be lower than the concentrations to be measured; slope of the calibration curve (delta signal / delta analyte concentration)

- a) specificity
- b) robustness
- c) method validation
- d) sensitivity

II. Write True or False

1. Instrument precision, intra-assay precision, intermediate precision, interlaboratory precision → types of precision.

2. Everything in the sample other than the analyte → specificity.

3. The process of proving that an analytical method is acceptable for its intended purpose; demonstrate that requirements are met for specificity, linearity, accuracy, precision, range, limit of detection, limit of quantitation, and robustness → method blank.

4. The ability of an analytical method to be unaffected by small changes in operating parameters → assessment.

5. The relative response to analyte and standard → response F factor.

6. A plot between volume of solution and amount of acid/base added from a burette is known as titration cure.

7. If [HIn] / [In] ratio ≥ 10 or [HIn] / [In] ratio ≤ 0.1 color will not appears constant.

8. Four type of algebraic equations are used to solved multiple equilibrium problems.

9. Mass balance equations are direct results of conversation of mass moles.

10. When the solution of   salt of EDTA is added to metallic solution it will liberate 4 H^+ ions.

SECTION B. Answer any FIVE of the following.   [Marks = 2 × 5 = 10]

1. Monobasic acid has dissociation constant 1.8×10^{-5} at 25 C. Calculate degree of dissociation at concentration 0.2M at same temperature. What will concentration of Hydrogen ion.

2. 0.1 M acetic acid is dissociated to the extent of 1.33% at room temperature. Calculate dissociation constant at this temperature.

3. Dissociation constant of formic acid and acetic acid is 1.77×10^{-4} & 1.75×10^{-5} calculate relative strength of two acids.

4. Calculate the pH and the hydrogen ion concentration of 3.2×10^{-3} M solution of $Ba(OH)_2$ in water at 25 °C

5. Calculate the H^+ ion concentration in moles per liter of solution whose pH is 2.1.

6. Write about the Arrhenius concept of acid-base.

7. Write Bronsted lowry concept.

SECTION C. Answer any TWO of the following questions.   [Marks = 5 × 2 = 10]

1. Discuss different type of EDTA titration.

2. Write the Mass balance equation for equilibrium system.

3. Write the Charge balance equation for equilibrium system.

4. Explain Job's Method for continous variation.

---------End of Question Paper---------