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**AI—84—2017**

**FACULTY OF SCIENCE**

**M.Sc. (Second Year) (Third Semester) EXAMINATION**

**NOVEMBER/DECEMBER, 2017**

**(CBCS Pattern)**

**ANALYTICAL CHEMISTRY**

**Paper (CH-532/4)**

**(Fundamentals of Analytical Chemistry)**

**(Monday, 13-11-2017)**

**Time : 2.00 p.m. to 5.00 p.m.**

*Time—Three Hours*

*Maximum Marks—75*

*N.B. :— (i) All questions carry equal marks.*

*(ii) Use of logarithmic table/calculator is allowed.*

*(iii) Figures on right shows full marks.*

1. Answer any three : 15

(a) Discuss merits and demerits of instrumental methods of chemical analysis.

(b) What are corrigible errors ? Write sources of personal corrigible errors.

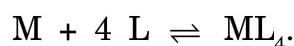
(c) The following results for glucose in blood were obtained in a clinical analysis of blood sample :

105, 101, 108, 106, 108, 105 mg/dL.

Calculate central value and variance for the set of clinical data.

(d) How many millimoles of carbon will be present in 24 g of diamond ?

(e) Write expressions for equilibrium constants for complex formation reaction :



P.T.O.

2. Answer any *three* :

15

- (a) Explain in brief sampling of liquids.
  - (b) Discuss various statistical criterion used for rejection of outliers in a set of data.
  - (c) Explain effect of concentration and catalysts on equilibrium constants.
  - (d) The density of a 85%(w/w) formic acid solution is 1.20 g/ml. Calculate its molar concentration.
  - (e) Applying significant figures and computation rules compute molar mass of lead bromide and lead chloride. Provided that atomic masses of lead, bromine and chlorine are 207.19, 79.909 and 35.453 amu respectively
3. (a) Write safety rules to be followed and enforced in academic laboratories.

8

*Or*

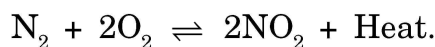
Discuss in detail various criterion applied for selection of analytical method.

- (b) Explain the terms equivalent and milliequivalent with suitable examples.

7

*Or*

State and explain law of the chemical equilibrium. Calculate equilibrium constant for the reaction :



At equilibrium 5.0 mol of  $\text{N}_2$ , 7.5 mol of  $\text{O}_2$  and 0.10 mol of  $\text{NO}_2$  was present in a 2.5 L vessel at 298K.

4. (a) Discuss percent concentration units : w/w%, v/v%, w/v% with suitable examples. 8

Or

Define free energy. Deduce relation between  $\Delta G$  and equilibrium constant of a chemical reaction. How will you predict spontaneity of a chemical reaction ?

- (b) Define equivalent weight of an acid. Calculate equivalent weights of any *two* organic acids used as primary standard substances. 7

Or

Discuss effect of pressure and temperature on equilibrium constants of chemical reactions.

5. (a) Select the *correct* alternative : 5

- (i) Which acid is preferably used for decomposition of carbonate minerals and ores ?

- |                                    |                      |
|------------------------------------|----------------------|
| (a) HCl                            | (b) HNO <sub>3</sub> |
| (c) H <sub>2</sub> SO <sub>4</sub> | (d) HF               |

- (ii) Precision is expressed in .....

- |                    |                        |
|--------------------|------------------------|
| (a) mean deviation | (b) standard deviation |
| (c) variance       | (d) all of these       |

- (iii) How many carbon dioxide molecules would be present in 2.000g of pure dry-ice ?

- |                            |                            |
|----------------------------|----------------------------|
| (a) $1.648 \times 10^{22}$ | (b) $1.648 \times 10^{23}$ |
| (c) $1.648 \times 10^{24}$ | (d) $1.648 \times 10^{25}$ |

- (iv) At equilibrium  $\Delta G$  for a chemical reaction is always.....

- |              |                   |
|--------------|-------------------|
| (a) positive | (b) negative      |
| (c) zero     | (d) none of these |

P.T.O.

- (v) How many moles of sulphuric acid would furnish eighteen kg of water on dehydration ?
- (a) one mole (b) ten mole  
(c) hundred mole (d) thousand mole
- (b) Write short notes on any *two* : 10
- (i) Weighing scales  
(ii) Least squares method  
(iii) Titer value.