Avinashilingam Institute for Home Science and Higher Education for Women

Coimbatore -641 043

Master's Degree Examination – Nov 2017

I Semester

Class: IPG **Time: 3 Hours**

Major: Chemistry **Max.Marks:60**

17MCHCO3-Thermodynamics and Electrochemistry

Part –A **10 x1/2 =5**

Choose the correct Answer:

1. Which law of thermodynamics is helpful helps to calculate the absolute entropies of various substances at different temperatures.
   a. Zeroth b. First c. Second d. Third

2. Among the following , which is the correct equation to calculate fugacity at moderately low pressure
   a. $f=P^2V/RT$ b. $f=PV/RT$ c. $P=f^2V/RT$ d. $f^2= PV/RT$

3. Which is a maxwellon?
   a. Electron b. A gas at high temperature c. Proton d. ^2D

4. Which of the following is true
   a. $q = q_{tr} \times q_{rot} + q_{vib} \times q_{el}$
   b. $q = (q_{tr} + q_{rot}) \ (q_{vib} \times q_{el})$
   c. $q = q_{tr} \times q_{rot} \times q_{vib} \times q_{el}$
   d. $q = q_{tr} \times q_{rot} / q_{vib} \times q_{el}$

5. Steady state approximation is
   Rate of formation of intermediate species = rate of disappearance of intermediate species
   This is applicable only at
   a. Equilibrium b. Non-equilibrium
   c. Irreversible reaction d. None of the above

6. DHLL relates the mean ionic activity coefficient to
   a. ionic strength b. molarity c. normality d. molalilty

7. In univalent electrolyte like KCl
a. $a = (r \pm m)$ b. $a = (r\,m)^3$ c. $a = (r \pm m)^2$ d. $a = (r\_m^2)^3$

8. On dilution the equivalent conductance of electrolyte
a. decreases b. remains constant c. zero d. increases

9. Rusting of iron sheets are prevented by coating with thin coat of
a. Lead b. Antimony c. Zinc d. Cadmium

10. Non Faradic electrochemical modification of catalytic activity is called as
a. NEMC b. NEMCA c. NFMCA d. NEMOCA

PART-B **(5X4=20)**

Answer all Questions

Each answer should not exceed 200 words or one page

11.a. Define entropy and explain Carnot efficiency

[OR]

b. i. State III law of Thermodynamics
ii. List out the needs for III law.

12.a. Explain stirlings theorem.

[OR]

b. Calculate the entropy change when 36g of H_2O evaporates at 373 K. Its Δ H value is 40.63KJ mol^{-1}.

13.a . Explain entropy flow and entropy production.

[OR]

b. Describe microscopic reversibility.

14.a. Describe Debye-Huckel Theory and verify it.

[OR]

b. What is half wave potential? Write its significance.

15.a. Explain Nernst equation

[OR]

b. What are primary storage batteries? Give one example.

PART-C (5x7= 35)

Answer all questions

Each answer should not exceed 600 words or three pages

16.a. Write short notes on

i. Maxwell relations
ii. Gibbs-Duhem equation

[OR]

b. How will you determine fugacity of gases by graphical method and from equations of state?

17.a. Explain

i. Maxwell Boltzmann statistics.
ii. Fermi-Dirac Statistics

[OR]

b. Calculate the free energy change accompanying the compression of 1 mole of a gas at 57^0C from 25 to 200atm. The fugacities of the gas at 57^0C may be taken as 23 and 91 atm, respectively, at pressure 25 and 200 atm.

18.a. Describe the transformations of generalised fluxes and forces.

[OR]

b. Give short notes on
   i. Electro kinetic phenomenon
   ii. Coupled Reactions.

19.a. Derive the Butler Volmer equation**[OR]**

b. i. Explain the theory of polarography.
   ii. Write Ilkovic equation and explain its terms.

20.a. i. Explain secondary storage batteries with suitable examples.

ii. How will you manufacture aluminium by electrolytic method.

[OR]

b. i. What are the factors which are influencing corrosion?
   iii. How will you prevent corrosion?

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