PP SAVANI UNIVERSITY

Fifth Semester of B.Sc. Examination

Dec-Jan-2020-21

SSCH3130– Physical Chemistry- VII

04.01.2021, Monday | Time: 10:00 AM to 12:30 PM | Maximum Marks: 60

Section-A (Total Marks - 20)

Q.1 Objectives (20 MCQ Compulsory-20 mark each) **(20)**

1 Which law states that heat energy cannot be transferred from a body at a lower temperature to a body at a higher temperature?

A Zeroth law of Thermodynamics
B First law of Thermodynamics
C Second law of Thermodynamics
D Third law of Thermodynamics

2 The fugacity coefficient value for an ideal gas_____.

A 2
B 3
C 0
D 1

3 Which of the following statements best describes the Second Law of Thermodynamics?

A At absolute zero, the entropy of a perfect crystal is considered to be zero.
B When an isolated system undergoes a spontaneous change, the entropy of the system will increase.
C Energy can be neither created nor destroyed.
D The internal energy of the universe is constant.

4 The S.I. unit of temperature is_____.

A Celsius
B Kelvin
C Fahrenheit
D Centigrade

5 A gas is a theoretical are not subject to interparticle interactions.

A Real gas
B Ideal gas
C Lewis gas
D Noble gas

6 Fugacity is a measure of the

A Relative volatility of a mixture of two miscible liquids
B Behaviour of ideal gases
C Escaping tendencies of the same substance in different phases of a system
D None of these

7 Which is the equation of Lewis fugacity rule?

A $fi = yif$
B $vi = yif$
C $hi = yif$
D $si = yif$

8 At absolute zero temperature, the entropy of each perfectly crystalline solid becomes ____.

A 1
B 0
C 2
D 3

9 The term "activity" was introduced by whose?

A Arrhenius
B Lewis
C Lawry
D Gibbs

10 Which is the Gibbs-Helmholtz relation equation?

A $\Delta H = \Delta G - T(\frac{\partial(\Delta G)}{\partial T})_p$

B $\Delta H = \Delta G - T(\frac{\partial(\Delta G)}{\partial T})_v$

C $\Delta H = \Delta S - T(\frac{\partial(\Delta G)}{\partial T})_p$

D $\Delta H = \Delta S - T(\frac{\partial(\Delta G)}{\partial T})_v$

11 Which law having the statistical Nature.

A The Zero Law of Thermodynamic
B The First Law of Thermodynamic
C The Second Law of Thermodynamic
D The Third Law of Thermodynamic

12 Unit cells are

A An element of pressure in phase space
B An element of Temperature in phase space
C An element of volume in phase space
D An element of energy in phase space

13 The set of occupation number is known as

A formation
B factor
C Wave function
D distribution

14 Which is relates the microscopic properties with macroscopic properties.

A Entropy
B Planck's quantum theory
C Partition function
D Canonical ensembles

15 In translation partition function what is ε_t is

A Translation energy
B Translation direction
C Translation weight
D Translation level

16 Particles obeying-B statistics are called

A maxwellons
B bosones
C fermions
D quantum's

17 The translational partition function (Qtr) =_____

A q^N
B 1
C $\sum g_i e^{-E_i/KT}$
D $2\Pi mkT / h^2]^{3/2} . V$

18 The distribution function is given by _____

A 1/AeEnT−1
B 1/eEnT−A
C 1/eEnT+A
D 1/AeEnT+1

19 Maxwell-Boltzmann statistics cannot be applied to _____
- A Photons
- B Molecules
- C Atoms
- D Lattice

20 Those functions whose wave functions are symmetric
- A maxwellons
- B quantum's
- C fermions
- D bosones

Section-B (Total Marks - 40)

Q.1 Short Notes (attempt all four compulsory- 3 marks each) **(12)**

A Laws of Thermodynamics

B Nernst Heat Theorem

C Rotational Partition function

D Types of Statistics

Q.2 Explain in detail (attempt any four -7 marks each) **(28)**

A Fugacity

B The concept of Activity and activity coefficient.

C Explain a) Partition function and Thermodynamic Function b) Ensembles.

D Explain Bose-Einstein and Fermi-Dirac statistics distribution laws for crystal and metal respectively.

E Explain a) Standard State b) Lewis –Randall Rule