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W—58—2018

FACULTY OF SCIENCE

B.Sc. (Second Year) (Third Semester) EXAMINATION

OCTOBER/NOVEMBER, 2018

(CBCS/CGPA Pattern)

CHEMISTRY

Paper VII

(Physical and Inorganic Chemistry)

(MCQ+Theory)

(Monday, 15-10-2018) **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) Attempt *All* questions.

(*ii*) *All* questions carry equal marks.

(*iii*) Use of logarithmic table and calculator is allowed.

(*iv*) Use separate answer sheet (OMR sheet) for MCQ (Q. No. **1**).

(MCQ)

1. Select the *correct* answer for each of the following multiple choice questions :

(*i*) First experimental support to de Broglie concept of matter waves was provided by :

(A) Albert Einstein (B) Davisson and Germer

(C) Heisenberg (D) J.J. Thomson

(*ii*) In photoelectric effect, the kinetic energy of the photoelectron is proportional to :

(A) Frequency of the incident light

(B) Intensity of incident light

(C) Velocity of the incident light

(D) All of the above

P.T.O.

(*iii*) In phase diagram of phenol-water system, the area enclosed by curve is ..... system.

(A) one phase (B) two phase

(C) three phase (D) four phase

(*iv*) At a triple point :

(A) there are three components in equilibrium

(B) there are three points co-exist

(C) there are three degrees of freedom

(D) there are three phases co-exist in equilibrium

(*v*) The change in entropy of a reaction is given by :

(A) $\Delta S = \Sigma S_{product} - \Sigma S_{reactant}$

(B) $\Delta S = \Sigma S_{reactant} - \Sigma S_{product}$

(C) $\Delta S = \Sigma S_{reactant} + \Sigma S_{product}$

(D) $\Delta S = \Sigma S_{product} + \Sigma S_{reactant}$

(*vi*) Every perfect engine working reversible between same temperature limits has the .....

(A) efficiency equal to one

(B) efficiency greater than one

(C) efficiency less than one

(D) same efficiency

(*vii*) The inversion temperature of H_2 gas is :

(A) + 80°C (B) – 80°C

(C) – 240°C (D) + 240°C

(*viii*) Stable nuclei have :

(A) low mass defect

(B) low binding energy

(C) high binding energy

(D) high positive packing fraction value

(*ix*) Lowest velocity is observed in :

(A) α-particle (B) β-particle

(C) γ-rays (D) all have equal velocity

(*x*) During ignition and incineration, PPt is converted into :

(A) its hygroscopic form

(B) its volatile form

(C) compound of definite composition

(D) compound of variable composition

(Theory)

Section A : Physical Chemistry

2. Attempt any *two* of the following :

(*a*) A photon of wavelength 6000 Å strikes a metal surface. The work function is 1.7 eV. Calculate the kinetic energy of photoelectron. (1 eV = 1.602×10^{-19} J) ($h = 6.626 \times 10^{-34}$ Js)

(*b*) Discuss the application of phase rule to sulphur system.

(*c*) State de Broglie's hypothesis. Derive de Broglie's equation.

(*d*) Derive an expression of entropy change for an ideal gas as a function of temperature and pressure.

3. Answer any *two* of the following :

(*a*) (*i*) Explain physical significance of ψ and ψ^2.

(*ii*) Draw well-labelled diagram of Ag-Pb system.

(*b*) What is phase rule equation ? Explain the terms phase, degree of freedom and component with suitable examples.

(*c*) State Joule's law and Joule-Thomson effect. Give any *three* statements of second law of thermodynamics.

(*d*) (*i*) Calculate entropy change in transformation of 24 g of ice into water at 0°C. Molar heat of fusion = 6009 J mol^{-1}.

(*ii*) Calculate entropy change when one mole of an ideal gas is allowed to expand isothermally at 300 K from pressure 40 atmosphere to 4 atmosphere. (R = 8.314 JK^{-1} mol^{-1})

P.T.O.

Section B : Inorganic Chemistry

4. Solve any *two* of the following :

(*a*) (*i*) Define Isotones and Isobars with suitable examples.

(*ii*) Write a short note on Digestion of Precipitate.

(*b*) Explain different types of precipitates with suitable examples.

(*c*) What is packing fraction ? Calculate packing fraction of $_{18}Ar^{40}$ which has isotopic mass 39.96238 amu.

(*d*) Define radioactivity. Give the characteristics of β-particles.