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R—56—2017

FACULTY OF SCIENCE

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

MARCH/APRIL, 2017

CHEMISTRY

Paper VII

(Physical and Inorganic Chemistry)

(MCQ + Theory)

(Thursday, 30-3-2017) **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**).

MCQs

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

(1) According to de-Broglie's equation, the momentum of a particle in motion is ..... proportional to wavelength.

(*a*) directly (*b*) inversely

(*c*) not (*d*) none of these

(2) In Schrodinger's wave equation, the symbol ψ represents the ..... .

(*a*) Frequency of the spherical wave

(*b*) Wavelength of the spherical wave

(*c*) Probability of finding electrons around the nucleus

(*d*) Amplitude of the spherical wave

(3) Entropy is a measure of ..... of molecules of the system.

(*a*) Velocity (*b*) Rate

(*c*) Randomness (*d*) Concentration

P.T.O.

(4) The efficiency of heat engine is maximum when :

(*a*) Temperature of source is maximum and that of sink is minimum

(*b*) Temperature of source and sink are maximum

(*c*) Temperature of source is minimum and that of sink is maximum

(*d*) Temperature of source and sink are minimum

(5) "No temperature change occurs when the gas is allowed to expand in vacuum without doing any external work" is statement of ..... .

(*a*) Joule-Thomson effect

(*b*) Joule's law

(*c*) Second law of thermodynamics

(*d*) Carnot's theorem

(6) The sulphur system has four phases; it is ..... .

(*a*) One component system (*b*) Two component system

(*c*) Three component system (*d*) Four component system

(7) When a single phase is present in a two component system, the degree of freedom is ..... .

(*a*) Zero (*b*) One

(*c*) Two (*d*) Three

(8) Which of the following pair is an example of isobar ?

(*a*) $_{7}N^{15}$ and $_{7}N^{14}$ (*b*) $_{1}H^{1}$ and $_{1}H^{2}$

(*c*) $_{8}O^{16}$ and $_{8}O^{17}$ (*d*) $_{6}C^{14}$ and $_{7}N^{14}$

(9) Which of the following is thermonuclear reaction ?

(*a*) Nuclear fission (*b*) Nuclear fusion

(*c*) Both (*a*) and (*b*) (*d*) None of these

(10) During ignition and incineration process, precipitate is converted into ..... .

(*a*) Definite composition (*b*) Varying composition

(*c*) Both (*a*) and (*b*) (*d*) None of these

Theory

Section 'A'

(Physical Chemistry)

2. Attempt any *two* of the following :

(*a*) Describe the Davison and Germer experiment for the verification of wave nature of electrons.

(*b*) Discuss the application of phase rule to the Silver-Lead System.

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

(*d*) (*i*) Explain Planck's quantum theory.

(*ii*) Calculate the uncertainty in position of an electron, if the uncertainty in velocity is 5.7×10^5 m s^{-1} [$h = 6.626 \times 10^{-34}$ JS, Mass of electron = 9.1×10^{-31} kg.].

3. Attempt any *two* of the following :

(*a*) Discuss the need for second law of thermodynamics. Give any *three* statements of second law of thermodynamics.

(*b*) (*i*) Derive de-Broglie's equation.

(*ii*) Draw neatly the phase diagram of Phenol-Water system.

(*c*) (*i*) Calculate the entropy change when two moles of an ideal gas is allowed to expand isothermally at 300 K from a pressure of 20 atmosphere to a pressure of 4 atmosphere.

($R = 8.314$ Jk^{-1} mol^{-1}).

(*ii*) Calculate entropy change when one mole of liquid is evaporated at 315 K. The molar heat of vaporization of liquid is 33507 Jk^{-1} mol^{-1}.

(*d*) What is phase rule equation ? Explain the terms involved in it with suitable examples.

P.T.O.

Section 'B'

(Inorganic Chemistry)

4. Attempt any *two* of the following :

(*a*) What is nuclear fission reaction ? Explain with examples.

(*b*) Give characteristics of alpha particles.

(*c*) (*i*) Explain in brief group displacement law.

(*ii*) What is precipitation ? Explain the effect of pH on precipitation.

(*d*) Explain the following steps involved in gravimetric analysis :

(*i*) Filtration and Washing

(*ii*) Drying

(*iii*) Ignition and incineration.