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V—54—2017

FACULTY OF SCIENCE

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

OCTOBER/NOVEMBER, 2017

(CBCS/CGPA Pattern)

CHEMISTRY

Paper VII (CCC-III) (B)

(Physical and Inorganic Chemistry)

(Saturday, 14-10-2017) **Time : 2.00 p.m. to 4.00 p.m.**

Time—Two 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 of separate answer sheet (OMR sheet) for MCQ (Q. No. 1).

MCQ 10

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

(*i*) Which of the following equations gives the de-Broglie's relationship ?

(*a*) $\lambda = \frac{h}{mp}$ (*b*) $p = \frac{h}{mv}$

(*c*) $\lambda = \frac{h}{p}$ (*d*) all of these

(*ii*) The phenomenon of lowering of temperature when is allowed expand adiabatically from region of high pressure to a region of low pressure is known as :

(*a*) Joule's law (*b*) Compton effect

(*c*) Law of conservation (*d*) Joule-Thomson effect

P.T.O.

(*iii*) First experimental support to de-Broglie's hypothesis, wave nature of matter was provided by :

(*a*) Albert Einstein (*b*) J.J. Thomson

(*c*) Davisson and Germer (*d*) Max Planck

(*iv*) The maximum efficiency of a heat engine operating between 600K and 300K is :

(*a*) 0.20 (*b*) 0.30

(*c*) 0.40 (*d*) 0.50

(*v*) For natural process, the entropy of universe :

(*a*) increases (*b*) decreases

(*c*) either (*a*) or (*b*) (*d*) remains constant

(*vi*) A pair of partially miscible liquids becomes miscible in all proportion by lowering temperature is called :

(*a*) lower critical temperature (*b*) critical solution temperature

(*c*) upper critical temperature (*d*) none of these

(*vii*) The reduced phase rule is given by an expression :

(*a*) $F = C - P + 2$ (*b*) $F = P - C + 2$

(*c*) $F = C - P + 1$ (*d*) $F = C + P - 1$

(*viii*) When neutron to proton ratio is high then parent element emits :

(*a*) α-particle (*b*) β-particle

(*c*) γ-radiation (*d*) none of these

(*ix*) The highest ionising power is shown by :

(*a*) α-particle (*b*) β-particle

(*c*) γ-rays (*d*) All have same power

(*x*) Precipitation is carried out in hot condition as it ..... .

(*a*) Favours peptisation

(*b*) Favours coagulation

(*c*) Decreases the size of crystal

(*d*) Decreases velocity of crystallisation

Theory

(Section A : Physical Chemistry)

2. Attempt any *two* of the following :

(*a*) Derive Schrodinger's wave equation.

(*b*) Discuss the application of phase rule to Ag-Pb system.

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

(*d*) Calculate de-Broglie's wavelength of an electron travelling with a speed of 10% of light (h = 6.626 × 10^{-34} Js,

Me = 9.1 × 10^{-31} kg)

3. Answer any *two* of the following :

(*a*) (*i*) Explain Planck's quantum theory of radiation.

(*ii*) Define :

(*a*) Component

(*b*) Phase.

(*b*) What is critical solution temperature ? Explain phenol-water system.

(*c*) What is need for second law of thermodynamics ? Give any *two* statements of second law of thermodynamics.

(*d*) (*i*) Calculate the entropy when one mole of ethanol is evaporated at 303 K. The molar heat of vaporisation of ethanol is 38.7 kJ mol^{-1}.

P.T.O.

(*ii*) Calculate entropy change when 2.5 moles of an ideal gas is allowed to expand isothermally at 301K from pressure of 60 atmosphere to 6 atmosphere.

($R = 8.314\ JK^{-1}\ mol^{-1}$)

(Section B : Inorgamic Chemistry)

4. Solve any *two* of the following :

(*a*) What is Group Displacement Law ? Explain.

(*b*) (*i*) Give the applications of radio isotopes in medicine.

(*ii*) Explain the importance of washing in Gravimetric analysis.

(*c*) Discuss in detail the following steps in Gravimetric analysis :

(*i*) Digestion

(*ii*) Drying

(*iii*) Ignition.

(*d*) Explain the effect of Neutron to Proton ratio on the stability of nuclei.