Reg. No. : .....

Name : .....

Code No. 8016

For Scheme-I Candidates only

Second Year – 2015

SAY / IMPROVEMENT

Time : 2 Hours
Cool-off time : 15 Minutes

Part – III

CHEMISTRY

Maximum : 60 Scores

General Instructions to Candidates :

- There is a 'cool-off time' of 15 minutes in addition to the writing time of 2 hrs.
- You are not allowed to write your answers nor to discuss anything with others during the 'cool-off time'.
- Use the 'cool-off time' to get familiar with questions and to plan your answers.
- Read questions carefully before answering.
- All questions are compulsory and only internal choice is allowed.
- When you select a question, all the sub-questions must be answered from the same

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- Calculations, figures ... be shown in the answer sheet itself.
- Malayalam version of the questions is also provided.
- Give equations wherever necessary.
- Electronic devices except non–programmable calculators are not allowed in the Examination Hall.

നിർദ്ദേശങ്ങൾ :

- നിർദ്ദിഷ്ട സമയത്തിന് പുറമെ 15 മിനിറ്റ് 'കൂൾ ഓഫ് ടൈം' ഉണ്ടായിരിക്കും. ഈ സമയത്ത് ചോദ്യങ്ങൾക്ക് ഉത്തരം എഴുതാനോ, മറ്റുള്ളവരുമായി ആശയവിനിമയം നടത്താനോ പാടില്ല.
- ഉത്തരങ്ങൾ എഴുതുന്നതിന് മുമ്പ് ചോദ്യങ്ങൾ ശ്രദ്ധാപൂർവ്വം വായിക്കണം.
- എല്ലാ ചോദ്യങ്ങൾക്കും ഉത്തരം എഴുതണം.
- ഒരു ചോദ്യനമ്പർ ഉത്തരമെഴുതാൻ തെരഞ്ഞെടുത്തു കഴിഞ്ഞാൽ ഉപചോദ്യങ്ങളും അതേ ചോദ്യനമ്പരിൽ നിന്ന് തന്നെ തെരഞ്ഞെടുക്കേണ്ടതാണ്.
- കണക്ക് കൂട്ടലുകൾ, ചിത്രങ്ങൾ, ഗ്രാഫുകൾ എന്നിവ ഉത്തരപേപ്പറിൽ തന്നെ ഉണ്ടായിരിക്കണം.
- ചോദ്യങ്ങൾ മലയാളത്തിലും നൽകിയിട്ടുണ്ട്.
- ആവശ്യമുള്ള സ്ഥലത്ത് സമവാക്യങ്ങൾ കൊടുക്കണം.
- പ്രോഗ്രാമുകൾ ചെയ്യാനാകാത്ത കാൽക്കുലേറ്ററുകൾ ഒഴികെയുള്ള ഒരു ഇലക്ട്രോണിക് ഉപകരണവും പരീക്ഷാഹാളിൽ ഉപയോഗിക്കുവാൻ പാടില്ല.

1. (a) Which of the following is not a characteristic of a crystalline solid ?

(i) Definite heat of fusion

(ii) Isotropic nature

(iii) A regular ordered arrangement of constituent particles

(iv) A true solid

(Score : 1)

(b) Frenkel defect and Shottky defects are two stoichiometric defects found in crystalline solids.

(Score : 1)

(i) What are stoichiometric defects ?

(ii) Write any two differences between Frenkel defect and Schottky defect.

(Scores : 2)

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2. (a) Draw a vapour pressure curve, by plotting vapour pressure against mole fraction of an ideal solution of two volatile components A and B (not to scale). Indicate partial vapour pressure of A and B (P_A and P_B) and total vapour pressure (P_{Total}).

(Scores : 2)

(b) What is an ideal solution ?

(Score : 1)

(c) Modify the above plot for non-ideal solution showing positive deviation. (Draw the above plot once again and modify.)

(Score : 1)

3. (a) Conductance (G), conductivity (K) and molar conductivity ($\wedge_m$) are terms used in electrolytic conduction.

(i) Write any two factors on which conductivity depends on. **(Score : 1)**

(ii) How do conductivity and molar conductivity vary with concentration of electrolytic solution ?

(Scores : 2)

(b) Write any one difference between primary cell and secondary cell. **(Score : 1)**

4. Integrated rate expression for rate constant of first order reaction is given by

$K = \frac{2.303}{t} \log \frac{[R]_0}{[R]}$, for a general reaction $R \rightarrow P$

(i) Derive an expression for half life period of first order reaction. **(Scores : 2)**

(ii) A first order reaction has a rate constant $1.15 \times 10^{-3}\ s^{-1}$. How long will 5 g of the reactant take to reduce 3 g ?

(Scores : 2)

5. The question has choice. Answer only **one**.

(a) Which of the following is an example of absorption ?

(i) Water on silica gel

(ii) Water on $CaCl_2$

(iii) Hydrogen on finely divided Nickel

(iv) Oxygen on metal surface

(Score : 1)

(b) Write any two differences between absorption and adsorption. **(Scores : 2)**

OR

Based on particles of dispersed phase, colloidal systems are classified into multimolecular, macro molecular and associated colloids.

(a) Which of the following colloidal system is an example for multimolecular colloidal system ?

(i) Starch in water

(ii) Soap solution

(iii) Ferric hydroxide in water

(iv) Polyvinyl alcohol in water.

(Score : 1)

(b) Associated colloids are also known as micelles. How are they formed ?

(Scores : 2)

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6. The process involved in metallurgy are concentration of the ore, isolation of the metal from its concentrated ore and purification of the metal.

(a) Froth floatation method is an ore concentration method. What is the principle behind the process ? **(Score : 1)**

(b) What is the role of limestone ($CaCO_3$) in the extraction of iron ? **(Score : 1)**

(c) Monds process is used for refining of Ni and Van Arkel method is used for refining Zr (Zirconium). Write one similarity between these processes. **(Score : 1)**

7. (a) What are interhalogen compounds ? Write any two examples. **(Scores : 2)**

(b) Write a method of preparation of phosphine from white phosphorus. **(Score : 1)**

(c) Write the name or formula of oxo acid of chlorine, in which chlo possess oxidation number +7. **(Score : 1)**

(d) Draw the structures of XeO_3 and XeF_6. **(Score : 1)**

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8. (a) Which of the following oxidation state is common for lanthanides ?

(i) +2 (ii) + 3

(iii) +4 (iv) +5 **(Score : 1)**

(b) Draw the structures of chromate and dichromate ions. **(Score : 1)**

(c) Zirconium (Zr) belongs to '4d' and Hafnium (Hf) belongs to '5d' transition series. It is difficult to separate them. Explain. **(Scores : 2)**

9. (a) Write the IUPAC name of the complex $K_3[Cr(C_2O_4)_3]$. **(Score : 1)**

(b) Draw the figure to show the splitting of 'd' orbitals in octahedral crystal field. **(Score : 1)**

(c) $[Fe(H_2O)_6]^{3+}$ is strongly paramagnetic, whereas $[Fe(CN)_6]^{3-}$ is weakly paramagnetic. Write the reason. **(Scores : 2)**

10. (i) State Saytzeff Rule.

(ii) Identify the major and minor products obtained by the reaction between 2-bromo butane and alcoholic KOH. **(Score : 1)**

(iii) Write the product obtained by the reaction between 2-bromo butane and aqueous KOH. **(Score : 1)**

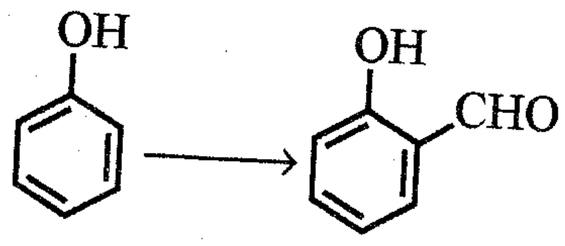
(iv) 2-bromo butane exhibit optical isomerism. What is optical isomerism ? **(Score : 1)**

11. (a) Write a test to distinguish between phenol and alcohol. **(Score : 1)**

(b) Write suitable reagent or reagents used for the following conversions :

(i) $CH_3 - CH_2 - Cl \longrightarrow CH_3 - CH_2 - OH$

(ii) $CH_3 - CH_2 - OH \longrightarrow CH_3 - CH_2 - O - CH_2 - CH_3$

(iii) 

(Scores : 3)

12. (a) Explain aldol condensation taking $CH_3 - CHO$ as example. **(Scores : 2)**

(b) Write the named reactions involved in the following conversions :

(i) $CH_3 - CO - Cl \xrightarrow{H_2/Pd - BaSO_4} CH_3 - CHO$

(ii) $2HCHO \xrightarrow{NaOH} HCOONa + CH_3 - OH$

(Score : 1)

(c) How are the following conversions achieved ?

(i) $CH_3 - CN \longrightarrow CH_3 - COOH$

(ii) $CH_3 - COOH \longrightarrow \underset{\underset{Cl}{|}}{CH_2} - COOH$

(Scores : 2)

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13. (a) Aromatic and aliphatic amines are basic in nature like ammonia. Arrange the following compounds in the increasing order of their basic strength :
CH_3NH_2, $(CH_3)_2NH$, NH_3, $C_6H_5 - NH_2$ **(Score : 1)**

(b) How will you carry out the following reactions ?

(i) Hoffmann bromamide reaction

(ii) Carbylamine reaction

(Chemical equations not required) **(Scores : 2)**

14. (a) Match the following structures of proteins in Column I with their characteristic features in Column II

Column I		Column II	
(i)	Primary structure	(a)	Special arrangement of polypeptide sub units
(ii)	Secondary structure	(b)	Structure of amino acids
(iii)	Tertiary structure	(c)	Folding of peptide chains
(iv)	Quaternary Structure	(d)	Sequence of amino acids
		(e)	Fibrous or globular nature

(Scores : 2)

(b) What is denaturation of proteins ?

(Score : 1)

15. Polymers are classified into elastomers, fibres, thermoplastics and thermosetting plastics, depending upon the intermolecular forces. Fill in the vacant boxes given below :

Types of Polymer	Polymer	Monomer
Thermosetting Plastic	(i)	Phenol and Formaldehyde
(ii)	Natural Rubber	(iii)
(iv)	(v)	Caprolactam
(vi)	Polystyrene	Styrene

(Scores : 3)

16. Write therapeutic actions of the following drugs :

(i) Antipyretic

(ii) Antiseptic

(iii) Antibiotic

(Scores : 3)

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