Reg. No. : .....

Name : .....HSSLIVE

Code No. 7016

Second Year – JUNE 2017
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 question itself.
- Calculations, figures and graphs should 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 ആശയ വിനിമയം നടത്താനോ പാടില്ല.
- ഉത്തരങ്ങൾ എഴുതുന്നതിന് മുമ്പ് ചോദ്യങ്ങൾ ശ്രദ്ധാപൂർവ്വം വായിക്കണം.
- എല്ലാ ചോദ്യങ്ങൾക്കും ഉത്തരം എഴുതണം.
- ഒരു ചോദ്യനമ്പർ ഉത്തരമെഴുതാൻ തെരഞ്ഞെടുത്തു കഴിഞ്ഞാൽ ഉപചോദ്യങ്ങളും അതേ ചോദ്യ നമ്പരിൽ നിന്ന് തന്നെ തെരഞ്ഞെടുക്കേണ്ടതാണ്.
- കണക്ക് കൂട്ടലുകൾ, ചിത്രങ്ങൾ, ഗ്രാഫുകൾ, എന്നിവ ഉത്തരപേപ്പറിൽ തന്നെ ഉണ്ടായിരിക്കണം.
- ചോദ്യങ്ങൾ മലയാളത്തിലും നല്കിയിട്ടുണ്ട്.
- ആവശ്യമുള്ള സ്ഥലത്ത് സമവാക്യങ്ങൾ കൊടുക്കണം.
- പ്രോഗ്രാമുകൾ ചെയ്യാനാകാത്ത കാൽക്കുലേറ്ററുകൾ ഒഴികെയുള്ള ഒരു ഇലക്ട്രോണിക് ഉപകരണവും പരീക്ഷാഹാളിൽ ഉപയോഗിക്കുവാൻ പാടില്ല.

1. (a) From the following choose the incorrect statement about crystalline solids.

(i) Melt at sharp temperature.

(ii) They have definite heat of fusion.

(iii) They are isotropic.

(iv) They have long range order. **(Score : 1)**

(b) Cubic unit cells are divided into primitive, bcc and fcc.

(i) Calculate the number of atoms in a unit cell of each of the following :

* bcc

* fcc **(Scores : 2)**

(ii) Write two examples for covalent solids. **(Score : 1)**

2. (a) The mole fraction of water in a mixture containing equal number of moles of water and ethanol is

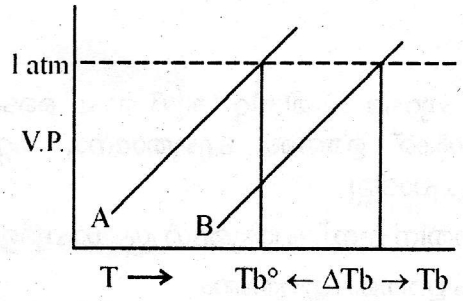
(i) 1

(ii) 0.5

(iii) 2

(iv) 0.25 **(Score : 1)**

(b) The following are the vapour pressure curves of a pure solvent and a solution of a non-volatile solute in it.



Based on the above curves answer the following questions :

(i) What do the curves A and B indicate ? **(Score : 1)**

(ii) Explain why the value of Tb is greater than that of Tb°. **(Scores : 2)**

3. (a) Identify the weak electrolyte from the following :

(i) KC*l*

(ii) NaC*l*

(iii) KBr

(iv) CH_3COOH **(Score : 1)**

(b) Kohlrausch's law helps to determine the degree of dissociation of a weak electrolyte at a given concentration.

(i) State Kohlrausch's law. **(Score : 1)**

(ii) The molar conductivity $\wedge_m$ of .001M acetic acid is 4.95×10^{-5} S cm^2 mol^{-1}.

Calculate the degree of dissociation (α) at this concentration if limiting molar conductivity $\wedge_m^\circ$ for H+ is 340×10^{-5} S cm^2 mol^{-1} and for CH_3COO^- is 50.5×10^{-5} S cm^2 mol^{-1}. **(Scores : 2)**

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4. The effect of temperature on rate of reaction is given by Arrhenius equation.

(i) Write Arrhenius equation. **(Score : 1)**

(ii) Define activation energy (Ea). **(Score : 1)**

(iii) Rate constant K_2 of a reaction at 310 K is two times of its rate constant K_1 at 300 K. Calculate activation energy of the reaction.
(log 2 = 0.3010, log 1 = 0) **(Scores : 2)**

5. (a) Which among the following is not an electrical property of colloids ?

(i) Electrophoresis

(ii) Electro osmosis

(iii) Coagulation

(iv) Tyndal effect **(Score : 1)**

(b) Freundlich adsorption isotherm is

$x/m = k\ p^{1/n}$ where $n > 1$

Answer the following questions based on Freundlich adsorption isotherm :

(i) What is adsorption isotherm ? **(Score : 1)**

(ii) Explain the terms in the above equation. **(Score : 1)**

6. (a) Which of the following is not an Ore of Iron ?

(i) Haematite

(ii) Magnetite

(iii) Malachite

(iv) Siderite **(Score : 1)**

(b) Explain froth floatation process for the concentration of Ore. **(Scores : 2)**

7. (a) Identify the most acidic compound from the following :

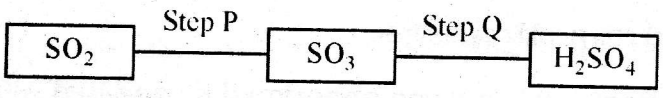
(i) H_2O

(ii) H_2S

(iii) H_2Se

(iv) H_2Te **(Score : 1)**

(b)



(i) Explain the step P and Q. **(Scores : 2)**

(ii) Give a reaction which indicates dehydration property of conc. H_2SO_4. **(Score : 1)**

(iii) Write any two uses of sulphuric acid. **(Score : 1)**

OR

(a) Identify the least basic compound among the following :

(i) NH_3

(ii) PH_3

(iii) AsH_3

(iv) SbH_3 **(Score : 1)**

(b) (i) Halogens have maximum negative electron gain enthalpy in the respective periods. Give reason. **(Scores : 2)**

(ii) Draw the structure of Perchloric acid ($HClO_4$) **(Score : 1)**

(iii) Write the formulae of any two interhalogen compounds. **(Score : 1)**

8. (a) Zr and Hf are having similar chemical properties. This is due to _____.

(Score : 1)

(b) 'Magnetic moments arise due to the presence of unpaired electrons'.

Calculated magnetic moments of two transition metal ions are given below.

Ion	Calculated Magnetic moment
Sc^{3+}	0
Ti^{3+}	1.73

Justify these observations on the basis of spin only formula. **(Scores : 2)**

(c) Transition metal ions are generally coloured. Why ? **(Score : 1)**

9. (a) In which of the following, the central atom/ion is in zero oxidation state.

(i) $[Ni(CN)_4]^{2-}$

(ii) $[NiCl_4]^{2-}$

(iii) $[Ni(CO)_4]$

(iv) $[Ni(NH_3)_6]^{2+}$ **(Score : 1)**

(b) $[Ni(CN)_4]^{2-}$ has square planar structure and it is diamagnetic.

(i) On the basis of valence bond theory explain why $[Ni(CN)_4]^{2-}$ exhibit these properties. **(Scores : 2)**

(ii) Identify the ligand in the above mentioned complex. **(Score : 1)**

10. On kinetic consideration nucleophilic substitution in aryl/alkyl halides may be SN^1 or SN^2 mechanisms.

(a) Briefly explain SN^2 mechanism with an example. **(Scores : 2)**

(b) In dehydrohalogenation of 2-Bromopentane why Pent-2-ene is major product and Pent-1-ene is minor product. **(Scores : 2)**

11. (a) Identify the product

$$HCHO \xrightarrow[H_2O]{CH_3MgX} \text{\_\_\_\_\_}.$$

(i) CH_3OH

(ii) CH_3CH_2OH

(iii) $CH_3-\underset{\underset{OH}{|}}{CH}-CH_3$

(iv) $CH_3-\underset{\underset{OH}{|}}{CH}-CH_2-CH_3$ **(Score : 1)**

(b) Complete the following :

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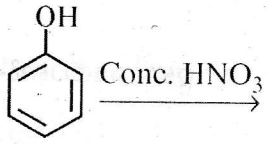
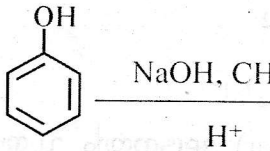
(i)  $\xrightarrow{\text{Conc. } HNO_3}$

(ii)  $\xrightarrow[H^+]{NaOH,\ CHCl_3}$

(iii) $C_6H_5-O-CH_3 + HI \longrightarrow$ **(Scores : 3)**

12. (a) Which among the following reduces Tollen's reagent ?

(i) Methanal

(ii) Propanone

(iii) Benzophenone

(iv) Acetophenone **(Score : 1)**

(b) Since both aldehydes and ketones possess carbonyl functional group, they undergo similar chemical reactions.

(i) Explain the structure of carbonyl group. **(Scores : 2)**

(ii) Explain Aldol condensation with an example. **(Scores : 2)**

OR

(a) Which among the following does not give red precipitate with Fehling's solution ?

(i) Ethanal

(ii) Propanal

(iii) Butanal

(iv) Benzaldehyde **(Score : 1)**

(b) How will you bring about the following conversions ?

(i) Toluene into Benzaldehyde

(ii) Benzoic Acid to Benzamide **(Scores : 2)**

(c) Explain Cannizaro reaction with an example. **(Scores : 2)**

13. (a) The most basic compound among the following is

(i) $C_2H_5NH_2$

(ii) $C_6H_5NH_2$

(iii) NH_3

(iv) $(C_2H_5)_2NH$ **(Score : 1)**

(b) Compound A is treated with Ethanolic NaCN to give the compound C_2H_5CN(B). Compound B on reduction gives compound C. Identify compounds A and C.

(Scores : 2)

14. (a) α–D–(+) glucose and β–D–(+) glucose are

(i) Metameres

(ii) Anomers

(iii) Geometrical Isomers

(iv) Functional group isomers **(Score : 1)**

(b) What is denaturation of proteins ? **(Score : 1)**

(c) Differentiate between nucleoside and nucleotide. **(Score : 1)**

15. (a) Distinguish between thermoplastic polymers and thermosetting polymers. **(Score : 1)**

(b) Name the monomers in the following two polymers.

(i) Nylon 6, 6

(ii) Buna – N **(Scores : 2)**

16. Match the following :

	Column A		**Column B**
(i)	Equanil	(a)	Antacid
(ii)	Morphine	(b)	Antiseptic
(iii)	Tetracycline	(c)	Disinfectant
(iv)	Bithionol	(d)	Antibiotic
(v)	1% phenol solution	(e)	Tranquilizer
(vi)	Ranitidine	(f)	Analgesic

(Scores : 3)

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