Reg. No. : .....

Name : .....

Code No. 2016

Second Year – JUNE 2016
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 ആശയവിനിമയം നടത്താനോ പാടില്ല.
- ഉത്തരങ്ങൾ എഴുതുന്നതിന് മുമ്പ് ചോദ്യങ്ങൾ ശ്രദ്ധാപൂർവ്വം വായിക്കണം.
- എല്ലാ ചോദ്യങ്ങൾക്കും ഉത്തരം എഴുതണം.
- ഒരു ചോദ്യനമ്പർ ഉത്തരമെഴുതാൻ തെരഞ്ഞെടുത്തു കഴിഞ്ഞാൽ ഉപ ചോദ്യങ്ങളും അതേ ചോദ്യനമ്പരിൽ നിന്ന് തന്നെ തെരഞ്ഞെടുക്കേണ്ടതാണ്.
- കണക്ക് കൂട്ടലുകൾ, ചിത്രങ്ങൾ, ഗ്രാഫുകൾ എന്നിവ ഉത്തരപേപ്പറിൽ തന്നെ ഉണ്ടായിരിക്കണം.
- ആവശ്യമുള്ള സ്ഥലത്ത് സമവാക്യങ്ങൾ കൊടുക്കണം.
- ചോദ്യങ്ങൾ മലയാളത്തിലും നൽകിയിട്ടുണ്ട്.
- പ്രോഗ്രാമുകൾ ചെയ്യാനാകാത്ത കാൽക്കുലേറ്ററുകൾ ഒഴികെയുള്ള ഒരു ഇലക്ട്രോണിക് ഉപകരണവും പരീക്ഷാഹാളിൽ ഉപയോഗിക്കുവാൻ പാടില്ല.

1. A unit cell is a term related to crystal structure.

(a) What do you mean by unit cell ? **(Score : 1)**

(b) Name any two types of cubic unit cells. **(Score : 1)**

(c) Calculate the number of atoms in each of the above mentioned cubic unit cells. **(Score : 1)**

(d) Identify the substance which shows Frenkel defect :

(i) NaC*l* (ii) KC*l*

(iii) ZnS (iv) AgBr **(Score : 1)**

2. Osmotic pressure is a colligative property.

(a) What is osmotic pressure ? **(Score : 1)**

(b) 1.00 g of a non-electrolyte solute dissolved in 50 g of benzene lowered the freezing point of benzene by 0.40 k. The freezing point depression constant of benzene is 5.12 K kg/mol. Find the molar mass of solute. **(Scores : 3)**

3. Galvanic cells are classified into primary and secondary cells

(a) Write any two differences between primary cell and secondary cell. **(Scores : 2)**

(b) (i) What is a fuel cell ? **(Score : 1)**

(ii) Write the overall cell reaction in $H_2 - O_2$ fuel cell. **(Score : 1)**

4. Rate of a reaction is the change in concentration of any one of the reactants or any one of the products in unit time

(a) Express the rate of the following reaction in terms of reactants and products

$$2NO_{(g)} + O_{2(g)} \longrightarrow 2NO_{2(g)}$$

(Score : 1)

(b) (i) $N_2O_{5(g)} \longrightarrow 2NO_{2(g)} + \frac{1}{2}O_{2(g)}$ is a first order reaction. Find the unit of K.

(Score : 1)

(ii) Calculate the time required for the completion of 90% of a first order reaction. ($K = 0.2303\ s^{-1}$)

(Scores : 2)

5. Dispersed phase and dispersion medium are two phases of colloidal system

(a) Name the colloid in which dispersed phase is liquid and dispersion medium is solid.

(i) Sol (ii) foam

(iii) Emulsion (iv) Gel

(Score : 1)

(b) Physisorption and Chemisorption are two types of adsorption. Write any four differences between them.

(Scores : 2)

6. Metals are extracted from their ores

(a) Among the following which metal is extracted from bauxite :

(i) Zinc (ii) Iron

(iii) Aluminium (iv) Copper

(Score : 1)

(b) Sulphide ores are subjected to roasting while carbonate ores are subjected to calcinations. Comment on the statement.

(Scores : 2)

Nitrogen shows different oxidation states in different oxides.

(a) In which of the following oxides, nitrogen is in +4 oxidation state ?

(i) NO (ii) N_2O

(iii) N_2O_3 (iv) NO_2

(Score : 1)

(b) Prepare a short write up on Nitric acid highlighting its structure, manufacture and any two properties.

(Scores : 4)

OR

Phosphorous forms oxoacids

(a) In which of the following phosphorous is in +1 oxidation state ?

(i) H_3PO_2 (ii) H_3PO_3

(iii) $H_4P_2O_7$ (iv) H_3PO_4

(Score : 1)

(b) Prepare a short write up on Ammonia highlighting its structure, manufacture and properties.

(Scores : 4)

8. Transition elements are d-block elements and inner transition elements are f-block elements.

(i) Write any two properties of transition elements. **(Score : 1)**

(ii) Name a transition metal compound and write one use of it. **(Score : 1)**

(iii) What is Lanthanoid Contraction ? **(Score : 1)**

(iv) Write any two consequences of Lanthanoid Contraction. **(Score : 1)**

9. Consider the co-ordination compound $[Co(NH_3)_5\ Cl]Cl_2$

(a) Write the IUPAC name of the above co-ordination compound. **(Score : 1)**

(b) (i) What is the primary valency and secondary valency of the central metal ion in the above co-ordination compound ? **(Score : 1)**

(ii) Write the name of isomerism exhibited by the complex $[Pt(NH_3)_2Cl_2]$. Represent the possible isomers. **(Scores : 2)**

10. Haloalkanes and haloarenes are compounds containing halogen atom. They undergo many types of reactions.

(a) Identify the product formed in the following reaction :

$$CH_3 - CH_2 - CH_2Cl \xrightarrow{alc\ KOH}$$

(i) $CH_3 - CH_2 - CH_2 - OH$

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

(iii) $CH_3\ CH = CH_2$

(iv) $CH_3\ C \equiv CH$ **(Score : 1)**

(b) (i) Chloroform is stored in closed, dark coloured bottles completely filled up to the neck. Give reason. **(Score : 1)**

(ii) Write any two differences between SN^1 and SN^2 reactions. **(Scores : 2)**

11. (a) Phenol when treated with Con.HNO_3 gives,

(i) o-Nitrophenol

(ii) p-Nitrophenol

(iii) 2, 4, 6-Trinitro phenol

(iv) a mixture of o-nitrophenol and p-nitrophenol **(Score : 1)**

(b) Methanol and ethanol are two commercially important alcohols. Write one method each for the preparation of methanol and ethanol. **(Scores : 3)**

12. Aldehydes and ketones are the compounds having > C = O group

(a) Choose the IUPAC name of the compound $CH_3CH = CH - CHO$

(i) propen-1-al (ii) But-2-en-1-al

(iii) Butanal (iv) But-2-en-2-al **(Score : 1)**

(b) Complete the following reaction :

(i) $HCHO + \text{Conc KOH} \xrightarrow{\Delta}$

(ii) $CH_3CHO \xrightarrow{\text{dil NaOH}}$

(iii) $CH_3CHO + H_2N - NH_2 \longrightarrow$

(iv) $C_6H_5COCH_3 \xrightarrow[HCl]{Zn/Hg}$ **(Scores : 4)**

OR

Aldehydes, Ketones and acids contain > C = O group.

(a) Choose the IUPAC name of the compound $(CH_3)_2$ CHCOOH

(i) Butanoic acid

(ii) Ethanoic acid

(iii) 2-methyl propanoic acid

(iv) Propanoic acid **(Score : 1)**

(b) Complete the following reaction :

(i) $CH_3CH_2COOH \xrightarrow{Li\ AlH_4/Ether}$

(ii) $CH_3CH_2COOH + SOCl_2 \longrightarrow$

(iii) $CH_3CH_2COOH \xrightarrow{Br_2/Red\ P}$

(iv) $CH_3CH_2COOH + CH_3OH \overset{H^+}{\rightleftharpoons}$ **(Scores : 4)**

13. Amines are basic in nature.

(a) Arrange the following compounds in the increasing order of their basic strength

NH_3, $C_2H_5NH_2$, $C_6H_5NH_2$, $(C_2H_5)_2NH$ **(Score : 1)**

(b) How will you convert aniline to chlorobenzene ? **(Scores : 2)**

14. Proteins are biomolecules

(a) What is denaturation of protein ? **(Score : 1)**

(b) Match the following :

Vitamin A	Glucose
Starch	Zymase
Aldohexose	Night blindness
Enzyme	Amylose
	Fructose

(Scores : 2)

15. Polymers are of different types

(a) Indentify the thermoplastic polymer from the following :

(i) Bakelite (ii) Nylon-6,6

(iii) Neoprene (iv) PVC **(Score : 1)**

(b) What is biodegradable polymers ? Write an example. **(Scores : 2)**

16. Different drugs have different therapeutic action in our body. Write the therapeutic action of the following drugs in our body.

(i) Analgesics

(ii) Antibiotics

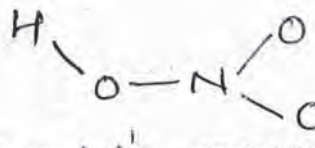
(iii) Tranquilizers **(Scores : 3)**

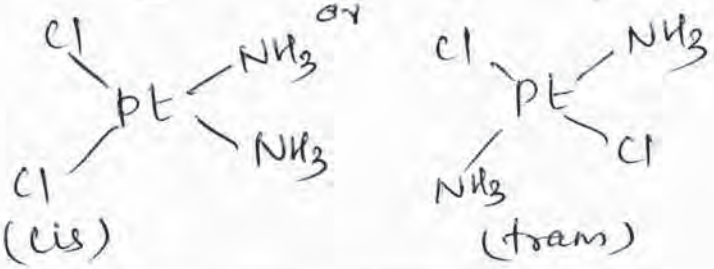
Chemistry

SECOND YEAR HIGHER SECONDARY SAY/IMP. EXAMINATION, JUNE 2016.
(Finalised Scheme of Valuation)

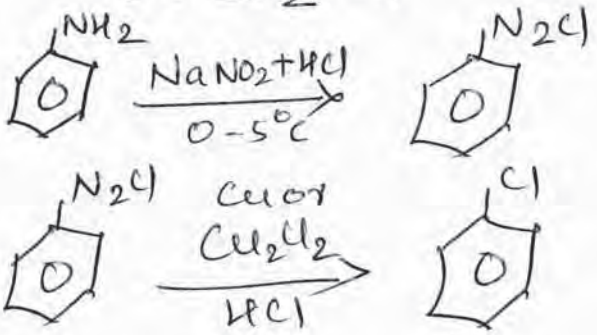
Subject: Part III Chemistry Code No: 2016

Qn.No	Scoring Indicators	Split Score	Total Score
1a.	Smallest repeating unit of a crystal	1	
b.	Simple cubic, Body centered cubic (B.C.C) or face centered cubic (fcc) (any two)	1	4
c.	Calculation of no. of particles of any one cubic unit cell	1	
d.	ZnS or AgBr	1	
2. a.	definition or any equation of osmotic pressure	1	
b.	$M_2 = \frac{K_b \times W_2 \times 1000}{\Delta T_b \times W_1}$		4
	$= \frac{5.12\ K\ kg\ mol^{-1} \times 1.00g \times 1000}{0.40K \times 50\ g.}$		
	$= 256\ g\ mol^{-1}$ Equation	1½	
	Substitution	1½	
3. a)	any one difference or Eg of each	2	4
b) (i)	definition of fuel cell or diagm.	1	
ii)	$2H_2(g) + O_2(g) \rightarrow 2H_2O(l)$	1	
4. (a)	Rate $= -\frac{1}{2}\frac{\Delta[NO]}{\Delta t}$ or $-\frac{\Delta[O_2]}{\Delta t}$ or $+\frac{1}{2}\frac{\Delta[NO_2]}{\Delta t}$	1	
(b) (i)	S^{-1}	1	
(ii)	$t = \frac{2.303}{K}\log\frac{a}{a-x}$ or $\frac{2.303}{K}\log\frac{[R]_0}{[R]}$ or any correct equn.	1	

Qn.No	Scoring Indicators	Split Score	Total Score
	$= \frac{2.303}{0.2303} \log \frac{100}{100-90}$ (Substitution) $= \frac{2.303}{0.2303} \log 10$ $= 10$ Seconds	1	4
5(a)	gel	1	3
(b)	Any two differences	2	
6.(a)	Aluminium	1	3
(b)	definition of calcination and roasting or eg. for both or equation for both. OR correct explanation.	1+1	
7 (a)	NO_2	1	
(b)		1	
	Ostwald's process $4NH_3(g) + 5O_2(g) \xrightarrow[500K,\ 9\ bar]{Pt/Rh} 4NO_{(g)} + 6H_2O_{(g)}$ $2NO_{(g)} + O_2(g) \rightleftharpoons 2NO_2(g)$ $3NO_2(g) + H_2O(l) \rightarrow 2HNO_3 + NO\uparrow$ OR explanation	1 1 1 1 2	
	Any one property of nitric acid	1	
	OR		

Qn.No	Scoring Indicators	Split Score	Total Score
9) (i)	~~HPO_2~~ H_3PO_2	1	
(b)		1	
	Haber process	1	
	$N_2(g) + 3H_2(g) \underset{700K,\ Fe\ (K_2O, Al_2O_3)}{\overset{200atm}{\rightleftharpoons}} 2NH_3(g)$	2	2
	or explanation		5
	Any one property of NH_3	1	
8 (i)	any ~~one~~ properties of transition elements	1	
(ii)	any one transition metal compound OR one use	1	4
(iii)	definition of lanthanide contraction	1	
(iv)	any one consequence	1	
9 (a)	Pentaammine chlorido Cobalt(III) Chloride	1	
b. (i)	primary valency +3	½	
	Secondary valency 6	½	
(ii)	geometrical isomerism or cis-trans isomerism		4
		2	
	(cis) (trans)		

Qn.No	Scoring Indicators	Split Score	Total Score
10. (a)	$CH_3-CH=CH_2$	1	
(b) (i)	Correct explanation or equation of formation of phosgene $2CHCl_3 + O_2 \rightarrow 2COCl_2 + 2HCl$	1	4
(ii)	any one difference	2	
11 (a)	2,4,6-Trinitrophenol	1	4
(b)	Any one, method of preparation of methanol " " of Ethanol	1½ 1½	
12 (a)	But-2-en-1-al	1	5
(b)	(i) $CH_3OH + HCOOK$ (ii) $CH_3-\underset{\underset{CH}{|}}{CH}-CH_2-CHO$ or $CH_3-CH=CH-CHO$ (iii) $CH_3-CH=N-NH_2$ (iv) $C_6H_5CH_2CH_3$ formulae or name of products (2×2) of any two reactions	4	
a)	2-Methyl propanoic acid	1	
b)	i) $CH_3CH_2CH_2OH$ ii) $CH_3CH_2COCl + SO_2 + HCl$ iii) $CH_3-\underset{\underset{Br}{|}}{CH}-COOH$ iv) $CH_3-CH_2-COOCH_3$ formulae or name of products of any two reaction (2×2)	4	

Qn.No	Scoring Indicators	Split Score	Total Score
13. a)	$C_6H_5NH_2 < NH_3 < C_2H_5NH_2 < (C_2H_5)_2NH$	1	
b)		1 + 1	3
	or explanation (diazotisation followed by Sand Meyer's reaction)	2	
14 a)	definition or Explanation or example	1	
b)	Vitamin A – Nightblindness Starch – Amylose Aldohexose – glucose Enzyme – Zymase (2×1)	2	3
15 a)	PVC	1	
b)	explanation or example of Biodegradable polymers	2	3
16. (i)	definition or eg.	1	
(ii)	definition or eg.	1	3
(iii)	definition or eg	1	
	×		