Roll Number		

Code Number 43 / 2

INDIAN SCHOOL MUSCAT
THIRD PRELIMINARY EXAMINATION
CHEMISTRY

CLASS: XII Sub. Code: 043 Time Allotted: 3 Hrs

08.02.2018 Max. Marks: 70

General Instructions:

- All questions are compulsory.
- Questions 1 to 5 are very short answer type and carry one mark each.
- Questions 6 to 10 are short answer type and carry two marks each.
- Questions 11 to 22 are also short answer type and carry three marks each.
- Question 23 carries four marks.
- Questions 24 to 26 are long answer type and carry five marks each.
- Use log tables if necessary, Use of calculators is not allowed.

1. Name the type of semiconductor obtained when silicon is doped with boron. 1

2. Draw the structure of 4-tertbutyl-3-iodoheptane. 1

3. Arrange the following in decreasing order of basic strength in gas phase: 1
$C_2H_5NH_2$, $(C_2H_5)_2NH$, $(C_2H_5)_3N$, NH_3

4. Give the equation of reaction for the preparation of phenol from cumene. 1

5. Write the structure of the following: 1
4-fluoro-2-hydroxyacetophenone

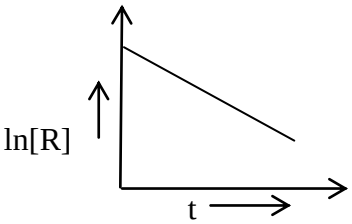
6. Explain the following: 2
   i) Henry's law about dissolution of a gas in a liquid
   ii) Boiling point elevation constant for a solvent.

7. Explain the following observations: 2
   i) Transition metals generally form coloured compounds.
   ii) The highest oxidation state of a metal is exhibited in its oxide or fluoride.

OR

What happens when KI solution is added to
   i) Alkaline solution of $KMnO_4$?
   ii) Acidified solution of $KMnO_4$?

8. For a certain reaction, variation in the concentration, ln[R] Vs time(s) plot is given below:



i) What is the order of the reaction?
ii) What are the units of rate constant k?
iii) Give the relationship between k and $t_{1/2}$?
iv) What does the slope of the above line indicate?

9. Explain the following terms: 2
i) Electrophoresis
ii) Dialysis

10. Give reasons for the following observations:
i) p-dichlorobenzene has higher melting point than those of o and m –isomers.
ii) Haloarenes are less reactive than haloalkanes towards nucleophillic substitution reaction.
iii) The treatment of alkyl chloride with aqueous KOH leads to the formation of alcohol but in the presence of alcoholic KOH, alkene is the major product.

11. The edge length of a unit cell of a metal having molecular mass 75 g/mol is 5 A^0 which crystallises in a cubic lattice. If the density is 2g/cc, then find the radius of the metal atom. 3

12. Give reasons: 3
i) d- block elements exhibit more oxidation states than f-block elements.
ii) Zirconium (Z= 40) and Hafnium (Z = 72) have almost similar atomic radii.
iii) Zn^{2+} salts are white while Cu^{2+} salts are blue.

13. i) Why is it necessary to remove CO when ammonia is obtained by Haber's process? 3
ii) Explain what is observed when a beam of light is passed through a colloidal solution?

14. Assuming complete ionization, calculate the expected freezing point of solution prepared by dissolving 7.00g of Glauber's salt, $Na_2SO_4.10H_2O$ in 100 g of water. 3
(K_f for water = 1.86 K kg mol^{-1})(RAM of Na = 23, S = 32 , O = 16, H =1 u)

15. How are the following conversions carried out? 3
i) Ethanoic acid to methanamine
ii) Nitromethane to dimethyl amine
iii) Chlorobenzene to p-chloroaniline

16. i) Name the method used for refining of zirconium. 3
ii) What is the role of CO in the extraction of iron?
iii) What is meant by the term pyrometallurgy?

17. Write the mechanism of the following reaction : 3

$$2CH_3CH_2OH \xrightarrow{H^+} CH_3CH_2\text{-}O\text{-}CH_2CH_3$$

18. A first order reaction takes 40 minutes for 30% decomposition. Calculate $t_{1/2}$ for this reaction. 3

OR

Consider the reaction : 2A + B → C + D

Following results were obtained in experiments designed to study the rate of reaction:

Exp No:	Initial conc		Initial rate formation
	[A]	[B]	[D] (M/min)
1	0.10	0.10	1.5×10^{-3}
2	0.20	0.20	3.0×10^{-3}
3	0.20	0.40	6.0×10^{-3}

i) Write the rate law for the reaction.
ii) Calculate the value for the rate constant for the reaction.

19. i) Name the common types of secondary structure of proteins and give one point of difference. 3
ii) Give one structural difference between amylose and amylopectin

20. i) Write the formula for the following coordination compound: 3
Diamminechlorido(methanamine)platinum(II) chloride
ii) The two complexes of nickel, $[Ni(CN)_4]^{2-}$ and $[Ni(CO)_4]$, have different structures but possess same magnetic behaviour. Explain.

21. Assign reasons for the following : 3
i) H_2S is more acidic than H_2O.
ii) NH_3 is more basic than PH_3.
iii) Sulphur has a greater tendency for catenation than oxygen.

22. i) Classify the following as addition and condensation polymers: Terylene, Bakelite, Polyvinyl chloride, Polythene. 3
ii) Explain the difference between Buna – N and Buna – S.

23. Natural sweeteners, eg; sucrose add to calorie intake and therefore, cannot be used by diabetic patients. Such people use saccharin, alitame, aspartame as artificial sweeteners. These are boon for people who want to control their calorie intake. 4
i) Why is the use of aspartame limited to cold food and soft drinks?
ii) What is the drawback of alitame?
iii) Which is a better artificial sweetener than alitame and why?
iv) What are the values possessed by people taking less sugar?

24. i) Draw the structure of the following compounds: 5
a) XeF_4
b) H_3PO_4
ii) Assign reasons for the following :
a) SF_6 is kinetically inert.
b) NF_3 is an exothermic compound whereas NCl_3 is not.
c) HCl is a stronger acid than HF though fluorine is more electronegative than

chlorine.

OR

i) How is ammonia prepared on a large scale? Name the process and mention the optimum conditions for the production of ammonia by this process.

ii) Complete the following chemical equations :

a) NH_4Cl (aq.)+ $NaNO_2$ (aq.) $\rightarrow$

b) $P_4 + 3NaOH + 3H_2O \rightarrow$

iii) Why is $Ka_2 << Ka_1$ for H_2SO_4 in water?

25. i) State the following laws : 5

a) Faraday first law of electrolysis

b) Kohlrausch's law of independent migration of ions.

ii) The resistance of 0.01 M NaCl solution at 25° C is 200Ω. The cell constant of the conductivity cell used is unity. Calculate the molar conductivity of the solution.

OR

i) Define the following terms :

a) Molar conductivity (λ_m)

b) Secondary batteries

ii) Calculate the potential of the following cell reaction at 298K:

$Sn^{4+}(1.50M) + Zn(s) \rightarrow Sn^{2+}(0.50M) + Zn^{2+}(2.0M)$

The standard potential E^0 of the cell is 0.89 V. Whether the potential of the cell will increase or decrease, if the concentration of Sn^{4+} is increased in the cell? Calculate EMF of the cell.

26. i) A compound 'A' with molecular formula $C_5H_{12}O$ on oxidation forms compound 'B' with molecular formula $C_5H_{10}O$. The compound 'B' gives iodoform test but does not reduce ammoniacal silver nitrate solution. The compound 'B' on reduction with Zn-Hg/ HCl gives compound 'C' with molecular formula C_5H_{12}. Identify A, B, C and give the chemical reactions involved. 5

ii) Account for the following:

a) $Cl\text{-}CH_2COOH$ is a stronger acid than acetic acid.

b) Carboxylic acids do not give the reactions of carbonyl group.

OR

i) Arrange the following compounds in increasing order of their reactivity towards HCN: Acetaldehyde, Di-tert-butyl ketone,Acetone .

ii) Give simple chemical tests to distinguish between the following pairs of compounds:

a) Benzoic acid and phenol

b) Benzaldehyde and acetaldehyde

iii) Write the chemical equations to illustrate the following name reactions:

a) Rosenmund reduction

b) Cannizzaro's reaction

End of the Question Paper