

**STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI-86**  
**(For candidates admitted during the academic year 2019 – 20 and thereafter)**  
**SUBJECT CODE: 19CH/MC/IC34**  
**B.Sc. DEGREE EXAMINATION, NOVEMBER 2021**  
**BRANCH IV- CHEMISTRY**  
**THIRD SEMESTER**

REG.NO .....

**COURSE: MAJOR CORE**  
**PAPER: INORGANIC CHEMISTRY-I**  
**TIME: 3 HOURS**

**MAX.MARKS: 100**

**SECTION – A**

**Answer all the questions**

**(15x2=30 marks)**

**I Choose the correct answer**

1. Distillation of sodium azide with 50% sulphuric acid gives \_\_\_\_\_  
a) hydrazine            b) hydrazoic acid    c) hydroxylamine    d) ammonia
2. An element belongs to 3rd period and group-13 of the periodic table. Which of the following properties will be shown by the element?  
a) Good conductor of electricity    b) Liquid, metallic    c) Solid, metallic    d) Solid, non-metallic
3. These elements impart colour to the flame on heating, the atoms of which require low energy for the ionisation (i.e., absorb energy in the visible region of spectrum). The elements of which of the following groups will impart colour to the flame?  
a) 2            b) 13            c) 1            d) 17
4. The bond present in  $N_2O_5$  are  
a) Only ionic    b) Covalent and coordinate    c) Only covalent    d) Covalent ionic
5. The acid strength of oxyacids of halogens increases in the order  
a)  $HClO_4 > HClO_3 > HClO_2 > HClO$             b)  $HClO_3 > HClO_4 > HClO_2 > HClO$   
c)  $HClO > HClO_2 > HClO_3 > HClO_4$             d)  $HClO_2 > HClO_3 > HClO_4 > HClO$

**II. Fill in the blanks**

6. The solubility of iodine in water is increased by the addition of KI, because of the formation of \_\_\_\_\_
7. A colourless gas when passed through  $CuSO_4$  solution gives blue colour due the formation of \_\_\_\_\_
8.  $P_4O_{10}$  is not used to dry  $NH_3$  gas because \_\_\_\_\_
9. The ascending order of ionisation energies of C, N and O is \_\_\_\_\_
10. The structure of  $XeO_3$  is \_\_\_\_\_

**III. State whether true or false**

11. Tl (III) is a good oxidising agent
12. Alkali metal superoxides are diamagnetic
13. Chlorophyll contains  $Mg^{2+}$  coordinated to porphyrin

14. Krypton do not form clathrate compounds  
 15. Phosphonitrilic polymers have a general molecular formula  $(\text{PNCl}_2)_n$

## SECTION – B

Answer any five questions

(5x8=40 marks)

16. Explain the extraction of lithium from spodumene  
 17. a) Explain the occurrence and position of noble gases in the periodic table  
 b) Match List I with List II.
- | I                           | II           |       |
|-----------------------------|--------------|-------|
| i. $\text{BeH}_2$           | Complex      |       |
| ii. $\text{AsH}_3$          | Lewis acid   |       |
| iii. $\text{B}_2\text{H}_6$ | Interstitial |       |
| iv. $\text{LaH}_3$          | Covalent     |       |
| v. $\text{LiAlH}_4$         | Intermediate |       |
|                             | Ionic        | (3+5) |
18. a) Explain one method of preparation, two characteristic properties and uses of silicones  
 b) Arrange the following in the increasing order of base strength  
 $\text{NH}_3, \text{PH}_3, \text{SbH}_3, \text{AsH}_3, \text{BiH}_3$  (5+3)
19. a) Calculate the  $\sigma$  and  $Z_{\text{eff}}$  for 4s electron in Mn  
 b) Discuss the structure of diborane (4+4)
20. a) The Lewis acidity of boron trihalides is found to follow the following trend  
 $\text{BI}_3 > \text{BBr}_3 > \text{BCl}_3 > \text{BF}_3$ . Explain  
 b) According to Pearson's rule distinguish between a) Hard acid and soft acid b) Hard base and soft base (4+4)
21. Discuss the preparation, properties and structure of peracids of sulphur  
 22. Explain the following  
 i)  $\text{AgI}(\text{s})$  water-insoluble, but  $\text{LiI}$  water-soluble?  
 ii)  $\text{Cu}, \text{Hg}, \text{Pb}$  and  $\text{Ni}$  are precipitated as their respective sulphides from their aqueous solution.  
 iii)  $\text{Li}^+$  is far smaller than the other alkali metal ions; however it moves through a solution less rapidly than the others  
 iv)  $\text{KO}_2 + \text{H}_2\text{O} \rightarrow$  (4x2 =8)

## SECTION – C

Answer any two questions

(2x15=30 marks)

23. a) Discuss the any one method preparation, two characteristic properties and structure of i)  $\text{HNO}_2$  ii).  $\text{H}_3\text{PO}_4$  iii)  $\text{H}_2\text{SO}_3$   
 b) Discuss the structures of pyro, chain and sheet silicates. (9+6)
24. a) Describe the shape, highlighting the type of hybridization in each of the following compounds.  
 i)  $\text{XeOF}_2$  ii)  $\text{Cl}_2\text{O}$  iii)  $\text{XeF}_2$  iv)  $\text{BrF}_3$  /3/

- b) How is hydrazine prepared? Explain its reaction with balanced equation  
i)  $\text{HNO}_2$       ii)  $\text{AgNO}_3$       iii)  $\text{CuSO}_4$       (8+7)
25. a) Give a comparative account of nitrogen group elements with respect to oxides, hydrides and halides.
- b) What are Clathrate compounds? Give its applications      (9+6)

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