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Code Number 43/2



**INDIAN SCHOOL MUSCAT
SECOND TERM EXAMINATION 2017
CHEMISTRY**

CLASS: XI

Sub. Code: 043

Time Allotted: 3 Hrs

10.12.2017

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. Arrange the following in the increasing order of decreasing stabilities: 1
 CH_3CH_2^+ , CH_3^+ , $(\text{CH}_3)_3\text{C}^+$, $(\text{CH}_3)_2\text{CH}^+$
2. Out of H_2O and H_2S which has a higher boiling point and why? 1
3. Why do elements in the same group have similar physical and chemical properties? 1
4. What is a redox couple? 1
5. Arrange the following in the increasing order of their bond angle: 1
 CO_2 , SO_2 , NH_3 , H_2O
6. $2\text{KMnO}_4 + 16\text{HCl} \rightarrow 2\text{KCl} + 2\text{MnCl}_2 + 8\text{H}_2\text{O} + 5\text{Cl}_2$ 2
If 1.58g of KMnO_4 is allowed to react with excess of HCl , Calculate
 - i) Number of moles of KCl formed
 - ii) Volume of Cl_2 produced at STP
(RAM of K = 39, Mn = 55, O = 16)
7. Correct the following IUPAC names if wrong: 2
 - i) But-4-ol-1-yne
 - ii) 2-Ethylpent-2-ene

8. If an electron is moving with a velocity of 600 m/s which is accurate upto 0.005%, then calculate the uncertainty in its position. ($h = 6.63 \times 10^{-34}$ Js and mass of electron = 9.1×10^{-31} Kg) 2
9. Write the cell reaction and calculate the standard E^0 of the cell: 2
 $Zn/Zn^{2+}(1M) \parallel Ag^+(1M)/Ag$
 $E^0_{Zn^{2+}/Zn} = -0.763$ V and $E^0_{Ag^+/Ag} = +0.80$ V
- OR**
- i) Using stock notation , represent the following compounds:
a) Fe_2O_3
b) $HAuCl_4$
- ii) Can the reaction,
 $Cr_2O_7^{2-} + H_2O \rightleftharpoons 2CrO_4^{2-} + 2H^+$, be regarded as a redox reaction? Give reason.
10. i) Show by a chemical reaction with water that Na_2O is a basic oxide. 2
ii) What is the oxidation state and covalency of Al in $[AlCl(H_2O)_5]^{2+}$
11. Define the following : 3
i) Law of definite proportion
ii) Gay Lussac law
iii) Formula mass.
12. Permanganate ion (MnO_4^-) reacts with bromide ion (Br^-) in basic medium to give manganese dioxide (MnO_2) and bromate ion (BrO_3^-). Write the balanced chemical equation for the reaction. 3
13. i) Write the structural formula of 2,3- Dibromo-1-phenylpentane.
ii) A substance has boiling point 350 K, but it starts decomposing near this temperature. Which type of distillation process is suitable for its purification?
iii) Why is nitric acid added to sodium extract before adding silver nitrate for testing halogens? 3
14. i) Under what conditions do real gases tend to show ideal gas behavior?
ii) The size of weather balloon becomes larger as it ascends into higher altitude. Why?
iii) Define Boyle temperature. 3
- OR**
- i) Name the intermolecular force existing between
a) He atoms in liquid helium
b) CO_2 and H_2O
- ii) Why do real gases deviate from ideal behavior?
iii) Write the real gas equation for 'n' moles of a gas.
15. i) Give the values of all the quantum numbers for 19th electron of Cr ($Z = 24$). 3
ii) What are Balmer series?
iii) Define an orbital.

16. i) Write the IUPAC names of the following compounds: 3
- a)
-
- b) $\text{CH}_3\text{-CH}(\text{CH}_3)\text{CH} = \text{CH}\text{-CH}_2 - \text{COOH}$
- ii) What is the type of hybridization of each carbon atom in the following:
 CH_3CN
17. Define hybridization. Explain the structure of C_2H_2 with orbital diagram. 3
18. A compound contains 4.07% hydrogen, 24.27% carbon and 71.65% chlorine. Its molecular mass is 98.96. What are its empirical and molecular formulae?
(RAM of C = 12, H = 1, Cl = 35.5) 3
19. Explain the soft following: 3
- i) Temporary hard water becomes on boiling.
 - ii) Hard water is softened before being used in boilers.
 - iii) Hydrogen peroxide is stored in wax lined bottles.
20. Give reason for the following: 3
- i) Electron gain enthalpy of fluorine is less negative than that of chlorine.
 - ii) Anionic radius is always more than that of a neutral atom.
 - iii) Oxygen has lesser first ionization enthalpy than nitrogen.
21. i) At 0°C the density of a certain oxide at 2 bar is the same as that of nitrogen at 5 bar. What is the molecular mass of the oxide? (RAM of nitrogen = 14) 3
- ii) Calculate the volume occupied by 17.6 gm of CO_2 at 27°C and 2 bar pressure.
 $R = 0.083 \text{ barLK}^{-1}\text{mol}^{-1}$ (RAM of C = 12 and O = 16)
22. i) How can the production of dihydrogen, obtained from ‘coal gasification’, be increased? 3
- ii) Complete the following reactions:
- a) $\text{PbS} + \text{H}_2\text{O}_2 \rightarrow$
- b) $\text{Ca}(\text{HCO}_3)_2 + \text{Ca}(\text{OH})_2 \rightarrow$
23. American President has discussed with Mr.Modi to save environment by decreasing the use of CFC. 4
- i) What values are associated with decision to decrease the use of CFC?
 - ii) What are CFC?
 - iii) What is the harmful effect of CFC?
 - iv) Give chemical reaction involving the harmful effect of CFC.

24. i) State Aufbau principle. 5
ii) What are degenerate orbital?
iii) Calculate the kinetic energy of a moving electron which has a wavelength of 4.8 pm. (mass of an electron = 9.1×10^{-31} kg and $h = 6.63 \times 10^{-34}$ J s)

OR

- i) State Hund's rule of maximum multiplicity.
ii) Give the significance of magnetic quantum number.
iii) The energy associated with the 1st orbit in the hydrogen atom is -2.17×10^{-18} J/atom. What is the energy associated with the 5th orbit?
iv) Calculate the radius of Bohr's 5th orbit for hydrogen atom.
25. i) Write the important conditions required for the linear combinations of atomic orbitals to form molecular orbitals. 5
ii) Explain why Ne₂ molecule does not exist by using molecular orbital theory.
(Z for Ne = 10)
iii) Explain the shape of ClF₃ molecule on the basis of VSEPR theory

OR

- i) What are the two conditions for the formation of hydrogen bond?
ii) Why is a sigma bond stronger than π - bond?
iii) Even though fluorine is highly electronegative, the dipole moment of NF₃ is less than that of NH₃. Why?
iv) What is formal charge? Give any one use of calculating the formal charge on a molecule?
26. i) How will you separate a mixture of o-nitro phenol and p-nitro phenol? 5
ii) Draw the resonating structures of aniline.
iii) Define inductive effect. In which C – C bond of CH₃CH₂CH₂Br, the inductive effect is expected to be the least?

OR

- i) Which out of two: O₂NCH₂CH₂O⁻ or CH₃CH₂O⁻ is expected to be more stable and why?
ii) Define hyper conjugation. Based on hyper conjugation compare the stability of n-propyl and iso-propyl carbocation by giving an example.
iii) Write one chemical test to detect the presence of Sulphur in a given organic compound.

End of the Question Paper