

INTERNATIONAL INDIAN SCHOOL-DAMMAM

First Terminal Examination – 2013

Subject: Chemistry

Time : 3 h

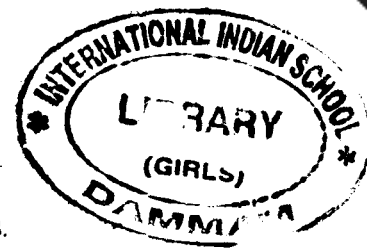
CLASS: XI

Set – A

Max.Marks: 70

General Instructions:

1. All questions are compulsory.
2. Questions 1 to 8 is very short answer questions and carry one mark.
3. Questions 9 to 18 are short answer questions and carry two marks.
4. Questions 19 to 27 are short answer questions and carry three marks.
5. Questions 28, 29 and 30 carry are long answer questions and carry five marks.
6. Use log table if necessary.



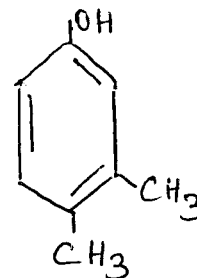
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- | | |
|--|---|
| 1) Define molarity. | 1 |
| 2) Write bond line formula of 3-Chloro-4-methyl pentene. | 1 |
| 3) How many atoms of calcium are there in 2g of calcium? (At. Mass of Ca = 40u). | 1 |
| 4) Write Lewis structure of SO_3 and NO_2 . | 1 |
| 5) 250mL of 1.5M solution of H_2SO_4 is diluted by adding 5L of water. What is the molarity of the diluted solution? | 1 |
| 6) Write the IUPAC name and symbol of the element with atomic number 111. | 1 |
| 7) Arrange them in ascending order of bond angles.
NH_3, CO_2, H_2O, CH_4 | 1 |
| 8) Derive the structure of 3-Nitrocyclohexene. | 1 |
| 9) State Heisenberg's Uncertainty principle and the significance of it. | 2 |
| 10) | |
| a) Justify the presence of 32 elements in the sixth period of periodic table. | 2 |
| b) Write the general electronic configuration of d-block elements. | |
| 11) State Law of multiple proportions with a suitable example. | 2 |
| 12) Explain the important aspects of CO_3^{2-} with respect to resonance. | 2 |
| 13) | |
| a) What are the hybridization state of carbon atoms in the following compounds:
$C_2H_2,$ $HCONHCH_3$ | 2 |
| b) Indicate the number the of sigma and pi bonds in the following molecules:
$CH_2=C=CH_2,$ C_6H_{12} | |
| 14) Distinguish between electron pair acceptor and electron-pair donor. | 2 |

15) Although both CO_2 and H_2O are triatomic molecules, the shape of H_2O molecule is bent while that of CO_2 is linear. Explain this on the basis of dipole moment.

OR

Besides tetrahedral geometry, another possible geometry of CH_4 is square planar with four H atoms along the corners of the square and C atom at the centre. Why CH_4 can't adopt square planar geometry?

16) Give IUPAC name for the followings:



2

17)

a) State Pauli's exclusion principle.

b) How many electrons in an atom can have the following quantum numbers?

$$n = 3, l = 1$$

$$n = 3, l = 2, m_l = 0$$

2

18) The first ionization enthalpy values (kJ/mole) of group 13 elements are

B	Al	Ga	In	Tl
801	577	579	558	589

2

How would you account for the deviation in the trend?

19)

a) Electrons are emitted with zero velocity from a metal surface when it is exposed to radiation of wavelength 6800 \AA . Calculate threshold frequency (ν_0) and work function (W_0) of the metal.

2

b) Write the electronic configuration of the element Chromium.

1

20)

a) Describe the hybridisation in case of PCl_5 . Why are the axial bonds longer as compared to equatorial bonds?

2

b) Write the favourable factors for the formation of an ionic bond.

1

21)

a) Describe the shape of orbitals whose "l" value = 1.

1 1/2

b) Which orbitals get filled first 3d or 4s and why?

1 1/2

22)

a) What is meant by bond order? Draw molecular orbital energy diagram for N_2 . Calculate the bond order and compare its stability with N_2^+ .

3

OR

b) Compare the relative stability of the following species and indicate their magnetic Properties: O_2 , O_2^+ , O_2^- (superoxide), O_2^{2-} (peroxide).

- 23) a) The density of 3 M solution of NaCl is 1.25 g mL^{-1} . Calculate the molality of the solution.
 b) What is the mole fraction of the solute in 2.5m aqueous solution?
- 24) a) A golf ball has a mass of 40g, and a speed of 45 m/s. If the speed can be measured within accuracy of 2%, calculate the uncertainty in the position.
 b) Write Rydberg equation for Balmer series.
- 25) a) Predict the shapes of the molecules using VSEPR theory
 ClF_3 , SF_4 , PH_3 , XeF_4
 b) Arrange the bonds in order of increasing ionic character in the molecules:
 LiF , K_2O , N_2 , SO_2 and ClF_3 .
- 26) a) What is limiting reagent?
 b) Calcium carbonate reacts with aqueous HCl to give CaCl_2 and CO_2 according to the reaction,
 $\text{CaCO}_3 (\text{s}) + 2 \text{HCl} (\text{aq}) \rightarrow \text{CaCl}_2 (\text{aq}) + \text{CO}_2 (\text{g}) + \text{H}_2\text{O} (\text{l})$
 What mass of CaCO_3 is required to react completely with 25 mL of 0.75 M HCl?
- 27) a) Ar , K^+ , S^{2-} , Ca^{2+} , Cl^-
 What is common in them? Arrange them in ascending order of their size.
 b) Would you expect the first ionization enthalpies for two isotopes of the same element to be the same or different? Justify your answer.
- 28) a) How would you explain the fact that the first ionization enthalpy of sodium is lower than that of magnesium but its second ionization enthalpy is higher than that of magnesium?
 b) Why do elements in the same group have similar physical and chemical properties?
 c) Explain why chlorine has more negative electron gain enthalpy value than fluorine?
 d) Place the following elements in the correct order of their nonmetallic characters
 B , N , C , F and Si .

OR

- a) Describe the theory associated with the radius of an atom as it
 i) Gains an electron ii) loses an electron
 b) Identify the element which is likely to be
 i) a non metal ii) an alkaline earth metal iii) an alkali metal
 Justify your answer with reason from the ionization enthalpy values given below:

KJ/mol	A	B	C
I.E(1)	408	550	1140
I.E (2)	2640	1060	2080

29)

- a) Explain the shape of the ethyne molecule on the basis of hybridization.
- b) Write any two differences between sigma and pi bonds.
- c) What is hydrogen bonding? Give an example.

OR

- a) Using molecular orbital theory explain why He₂ molecule does not exist? 1
- b) Which out of NF₃ and NH₃ has higher dipole moment and why? 2
- c) Explain the formation of H₂ molecule on the basis of valence bond theory. 2

30)

- a) Write any two properties of cathode rays. 1
- b) Why are Bohr's orbits called stationary states? 1
- c) The electron energy in hydrogen atom is given by $E_n = (-2.18 \times 10^{-18})/n^2$ J. Calculate the energy required to remove an electron from the $n = 2$ orbit. What should be the wavelength that can be used to cause this transition? ($h = 6.626 \times 10^{-34}$ Js, $c = 3 \times 10^8$ m/s.) 2
- d) What is an orbital? 1

OR

- a) Show that the circumference of the Bohr orbit for the hydrogen atom is an integral multiple of the de – Broglie wave length associated with the electron revolving around it. 2
- b) Why half-filled and completely filled orbitals are highly stable? 1
- c) Define Photo electric effect. 1
- d) How many nodal surfaces are in (i) "1s" orbital (ii) "2s" orbital? 1