

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI-86  
(For candidates admitted during the academic year 2004 –05 & thereafter)

SUBJECT CODE: CH/MC/GC14  
B.Sc. DEGREE EXAMINATION, NOVEMBER 2007  
BRANCH IV- CHEMISTRY  
FIRST SEMESTER

REG.NO .....

COURSE : MAJOR CORE  
PAPER : GENERAL CHEMISTRY  
TIME : 30 MINUTES

MAX.MARKS : 30

SECTION – A (30x1=30)  
ANSWER ON THE QUESTION PAPER ITSELF.

Answer all the questions.

I Choose the correct answer:

- According to Uncertainty principle  
a)  $E = mc^2$       b)  $\Delta x \times \Delta p = \frac{h}{2\pi}$       c)  $\lambda = \frac{p}{h}$       d)  $\Delta s \times \Delta p = \frac{h}{6\pi}$
- The equation  $\lambda = \frac{h}{mv}$  was deduced by  
a) Heisenberg      b) de-broglie      c) Einstien      d) Plank
- The principal quantum number of an atom represents  
a) Size of the orbital      b) Spin angular momentum  
c) Orbital angular momentum      d) Space orientation of the orbital
- The ejection of electrons when the surface of metal is irradiated is called  
a) Zeeman effect      b) Stark effect      c) Photo electric effect      d) Compton effect
- $AlCl_3$  is covalent, while  $AlF_3$  is ionic. This can be explained on the basis of  
a) Lattice energy      b) Fajan's rule  
c) Valence bond theory      d) Crystal structure
- Which of the following has the highest bond energy  
a) Hydrogen bond      b) Triple bond  
c) Double bond      d) Single bond
- Which of the following is diamagnetic?  
a)  $O_2$       b)  $O_2^{+1}$       c)  $O_2^{-1}$       d)  $O_2^{2-}$
- When an ion occupies an interstitial position in the crystal lattice, it is called  
a) Crystal defect      b) Frenkel defect      c) Schoty defect      d) None of the above
- n-Butanol and diethyl ether are  
a) Chain isomers      b) Position isomers      c) Stereo isomers      d) Functional isomers

10. Nucleophiles are  
 a) Electron loving    b) Electron hating    c) Nucleus loving    d) Nucleus hating
11. Which of the following is free radical?  
 a)  $Cl^+$     b)  $Cl^-$     c)  $Cl^\bullet$     d)  $NO_2$
12. Optical isomerism is shown by  
 a) Butanol-2    b) Butanol-1    c) Butene-1    d) Butene-2
13. The correct IUPAC name of the compound with molecular formula  $(CH_3)_3C - CH_3$  is  
 a) pentane    b) 1,1,1,trimethyl ethane  
 c) 2,2,dimethyl propane    d) Neopentane
14. The +I effect (Inductive effect) is shown by  
 a)  $CH_3$     b)  $OH$     c)  $F$     d)  $C_6H_5$
15. The number of Chiral centres present in Tartaric acid is  
 a) 1    b) 2    c) 3    d) 4

## II State whether the following are true or false:

16. The shape of the 'd' orbital is spherical.
17. Sigma bond is weaker than pi bond.
18. A functional group is the reactive part of the molecule.
19. In homologous series all members have the same physical properties.
20. Dimethyl ether is an isomer of ethanol.

## III Match the following:

21.  $(CH_3)_2CH - CH_2 - CH_3$  - 2 methyl - 2 - propanol
22.  $CH_3 - CH = CH - CH_2OH$  - 2 methyl propane
23.  $(CH_3)_3 - C - OH$  - 2 methyl butane
24.  $(CH_3)_3C - CH = C - (CH_3)_2$  - 2 - Buten - 1 - ol
25.  $(CH_3)_2C = CH_2$  - 2,4,4 Trimethyl - 2 - pentene

## IV Fill in the blanks :

26. Bhor's atomic theory could not explain the spectra of \_\_\_\_\_ atoms.
27. Among the compounds NaCl, KCl and CsCl, the one with the greatest ionic character is \_\_\_\_\_.
28. Maleic and Fumaric acids are a pair of \_\_\_\_\_ isomers.
29. Resonance always gives \_\_\_\_\_ to a molecule.
30. Electrophiles are electron \_\_\_\_\_ compounds.



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SECTION – B

(5x6=30)

Answer any five questions:

1. Distinguish between MO theory and VB theory.
2. Define Geometrical isomerism with suitable examples. How it differs from optical isomerism.
3. Explain why phenol is acidic in nature whereas alcohol is neutral.
4. Draw a sketch of the Born-Haber cycle. Explain how the various terms in it are related to the Lattice energy.
5. Describe the atomic model devised by Bohr.
6. Distinguish between Heterolytic and Homolytic cleavages.
7. Explain the stability of Free Radicals with suitable examples.

SECTION – C

Answer any two questions:

(2x20=40)

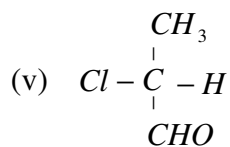
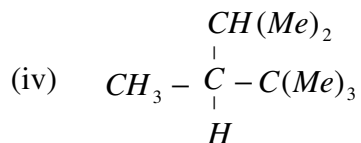
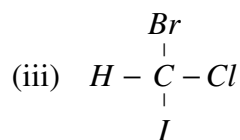
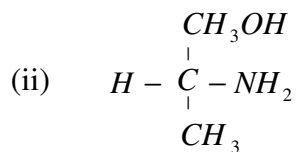
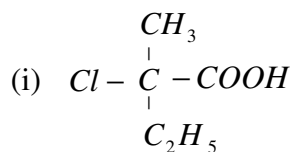
8. a) (i) Define Lattice energy and Applications of Lattice energy. (5)  
(ii) Calculate the Lattice energy of Sodium Chloride from the following data. (5)  
Sublimation energy of sodium = 26.0 k cal  
Dissociation energy of chlorine = 58.0 k cal  
Electron affinity of chlorine = 87.3 k cal  
Ionisation potential of sodium = 120.0 k cal  
Heat of Formation of sodiumchloride = -98.2 k cal
- b) Draw the *MO* diagram of  $O_2^-$  and explain the stability of  $O_2^-$ ,  $O_2$ ,  $O_2^+$ . (10)

9. a) (i) Discuss the de-Broglie's theory of wave nature of electron. (5)  
 (ii) Calculate the Momentum of a particle which has a de-Broglie wavelength of  $1\text{Å}$ . (5)
- b) Define and describe the significance of the four quantum numbers. (10)

10. Write notes on

- (i) Hyper conjugation (ii) Steric effect  
 (iii) Inductive effect (iv) Resonance effect

11. a) What is optical isomerism. Illustrate with suitable examples. (10)  
 b) Assign the configuration according to RS Nomenclature. (10)



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