

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

SUBJECT CODE: CH/MC/PC54
B.Sc. DEGREE EXAMINATION, NOVEMBER 2008
BRANCH IV- CHEMISTRY
FIFTH SEMESTER

REG.NO

COURSE : MAJOR CORE
PAPER : PHYSICAL CHEMISTRY-II
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:

1. A cube does not possess one of the following
a) σ_h b) C_6 c) C_4 d) σ_d
2. Which of the following has a diamond like structure.
a) CaF_2 b) ZnS c) $LiCl$ d) $NaCl$
3. In calcium fluoride crystal, the co-ordination number of calcium ion is
a) 8 b) 6 c) 4 d) 3
4. The number of degree of freedom for the system
 $NH_4Cl(s) \rightleftharpoons NH_4Cl(g) \rightleftharpoons NH_3(g) + HCl(g)$
5. An eutectic is a
a) solution b) binary mixture c) compound d) ternary mixture
6. Which of the following pairs of liquids forms an azeotropic mixture
a) benzene and toluene b) benzene and xylene
c) water & HCl d) toluene & xylene
7. Which of the following will have the highest B.P at one atm. Pressure.
a) 0.1M solution of common salt b) 0.1M solution of Potassium chloride
c) 0.1M solution of Sucrose d) 0.1M solution of Barium chloride
8. Which of the following effects is not observed when a non-volatile solute is added to a solvent.
a) decrease in vapour pressure b) elevation of B.P
c) lowering of F.P. d) Increase of F.P.
9. The number of Bravais lattices possible are
a) 7 b) 32 c) 14 d) 230
10. With increase of pressure, the M.P of ice is
a) Lowered b) Increased c) unaltered d) None of the above

II Fill in the blanks :

11. $CsCl$ belongs to _____ lattice.
12. In the phase diagram of sulphur there are _____ true triple points.
13. A regular array of species in the dimension is called a _____.
14. A semi permeable membrane allows only _____. Molecules to pass through it.
15. The lowest temperature which can be obtained using NaCl and Ice is _____

III State true or false:

16. Presence of atoms in pairs definitely means the presence of centre of symmetry.
17. A cubic crystal has no centre of symmetry.
18. All crystals of the same substance possess the same elements of symmetry.
19. All solutions have azoetrope behaviour.
20. The colligative effect of an electrolyte solution is always lesser than that of a non electrolyte of the same molal concentration.

IV Match the following :

- | | | |
|----------------------------|---|---|
| 21. Deliquescent substance | - | KI-H ₂ O |
| 22. Body centred cubic | - | CaCl ₂ |
| 23. Efflorescence | - | CsBr |
| 24. Freezing mixture | - | ZnS |
| 25. Tetrahedral | - | Na ₂ CO ₃ .10H ₂ O |

V Answer in one or two sentences:

26. Draw the (110) plane in cube

27. What is reduced phase rule.

28. Calculate the number of atoms that belongs to a fcc.

29. What is reverse osmosis?

30. Give the number of components present in the following system
 - (i) a solution of common salt
 - (ii) $MgCO_3(s) \rightleftharpoons MgO(s) + CO_2(g)$ in a closed vessel.



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TIME : 2½ HOURS

MAX.MARKS : 70

SECTION – B

(5x6=30)

Answer any five questions:

1. Define plane and axis of symmetry with examples. (3+3)
2. Compose the structures of diamond and graphite. (3+3)
3. a) Derive Gibb's phase rule from thermodynamic combinations.
b) Draw phase diagram of water system & give its main features.
4. What are liquid crystals? Write notes on its classification. (3+3)
5. By X ray diffraction it is found the Nickel crystals are face centered cubic. The edge of the unit cell is 3.52 \AA . The atomic mass of nickel is 58.7 and its density is 8.94 g/m^3 . Calculate Avogadro's number from the data.
6. Draw the unit cell of sodium chloride and explain its crystal structure.
7. a) What are colligative properties and give examples of each property.
b) State Raoult's law of relative lowering of vapour pressure? Explain the limitations. (3+3)

SECTION – C

(2x20=40)

Answer any two questions:

8. a) State the law of Indices and derive the characteristic ratios of a BCC.
b) Derive Avogadro number from unit edge length of a crystal?
9. a) Derive Bragg's law of X ray diffraction. (10)
b) Write short notes on i) Polymorphism ii) Neutron diffraction studies. (5+5)

10. a) Define i) phase ii) component iii) Degrees Freedom with example. (6)
b) Discuss Pattinson's process with the help of the phase diagram. (7)
c) Draw labelled phase diagram of $FeCl_3 - H_2O$ system. Mention the various stable hydrates. (7)
11. a) Define molal depression constant. Derive an expression relating the freezing point depression of a solution with the molality of dissolved solute. (10)
b) Write a short notes on Fractional distillation. (10)

