

INTERNATIONAL INDIAN SCHOOL DAMMAM
MODEL EXAMINATION JANUARY 2018

CLASS : XI

TIME : 3 HOURS

CHEMISTRY

SET – A

MAX MARKS: 70

General Instructions:

1. All questions are compulsory
2. Question numbers 1 to 5 are very short answer type carrying 1 mark each.
3. Question numbers 6 to 10 are short answer type carrying 2 marks each.
4. Question numbers 11 to 22 are short answer type carrying 3 marks each.
5. Question 23 is a value based question, carrying 4 marks.
6. Question numbers 24 to 26 are long answer questions, carrying 5 marks each.
7. Calculators are not permitted. Use log tables if necessary.

1. Draw the resonance structures of phenol. 1
2. Write balanced chemical equation for the reaction of chlorine with slaked lime. 1
3. The two O-O bond distances in ozone molecule are equal. Justify. 1
4. Which of the following ion is smallest and why ? 1
 N^{3-} , O^{2-} , F^{-}
5. Predict with reason if the reaction between $Fe^{3+}_{(aq)}$ and $I^{-}_{(aq)}$ ions feasible. 1
Given standard electrode potential for $Fe^{3+}/Fe^{2+} = 0.77V$ and $I_2/I^{-} = 0.54V$
6. a) State law of multiple proportion. 2
b) 10g of Ag reacts with 1g of S to form Ag_2S . Identify the limiting reagent.
(Atomic mass of Ag = 108u , S = 32u)
7. a) Write the conjugate base of NH_4^{+} and HSO_4^{-} . 2
b) Define buffer solution. Give an example for an acidic buffer.
8. a) Give a chemical test to distinguish between ethane and ethene. 2
b) Explain why an organic liquid vaporizes at a temperature below its boiling point in its steam distillation.
9. Account for the following 2
a) BF_3 molecule has zero dipole moment although B-F bonds are polar.
b) The structure of NH_3 molecule is pyramidal.

10. a) In terms of Charles' law explain why -273°C is the lowest possible temperature. 2
 b) What is the effect of temperature on viscosity?
- Or
- a) How is molar mass of an ideal gas calculated from ideal gas equation?
 b) State Dalton's law of partial pressures.
11. a) Write chemical equations for the following reactions: 3
 i) Sodium salt of benzoic acid on heating with sodalime.
 ii) Isomerisation of n-hexane.
 b) With proper justification arrange the following compounds in the decreasing order of reactivity with an electrophile .
 Benzene , m – dinitrobenzene , nitrobenzene , toluene .
12. a) Define molarity. 3
 b) Concentrated H_2SO_4 is 93 % acid by mass and has density 1.84 g/cm^3 .
 What volume of concentrated acid is required to make 5L of 0.50 M H_2SO_4 ?
 (Molar mass of sulphuric acid = 98 u).
13. a) State first law of thermodynamics and write its mathematical expression. 3
 b) Derive the relationship between C_p and C_v .
14. a) Why do gases deviate from ideal behaviour? 3
 b) Calculate the total pressure in a 10L cylinder which contains 0.4 g of helium, 1.6 g of oxygen and 1.4 g of nitrogen at 27°C . Also calculate the partial pressure of helium gas in the cylinder. Assume ideal gas behaviour for gases.
 ($R = 0.082 \text{ LatmK}^{-1} \text{ mol}^{-1}$) Atomic masses: He – 4u , O – 16u , N – 14u
15. What do you understand by the following terms? 3
 a) Photochemical smog
 b) BOD
 c) Greenhouse effect
16. a) Write all the four quantum numbers for the unpaired electron in Cu atom. 3
 ($Z = 29$)
 b) Write any two differences between orbit and orbital.
 c) State Heisenberg's uncertainty principle.
17. a) Balance the following redox reaction by ion- electron method. 3
 $\text{MnO}_4^- (\text{aq}) + \text{I}^- (\text{aq}) \longrightarrow \text{MnO}_2 (\text{s}) + \text{I}_2 (\text{s})$ (in basic medium)
 b) What are the functions of salt bridge in an electrochemical cell?

18. a) What happens when 3
i) Lithium nitrate is heated.
ii) Alkali metals are dissolved in ammonia.
b) Explain why Be and Mg do not impart colour to the flame.

OR

- a) Write the chemical equation for the preparation of BeCl_2 and draw its structure in solid state.
b) List two properties showing similarities between Lithium and Magnesium.
c) Arrange the following in the increasing order of thermal stability . Justify.
 BeCO_3 , MgCO_3 , CaCO_3 , BaCO_3
19. a) How can you detect the presence of nitrogen in an organic compound? 3
b) Define hyper conjugation effect with an example.
c) Draw the structures of all the isomers of molecular formula $\text{C}_4\text{H}_8\text{O}$.
20. a) H_2O_2 is used to restore the colour of old paintings containing PbS . Write a 3
balanced equation for the reaction that takes place in this process.
b) What do you understand by the following ?
i) Hydrogen economy
ii) Water gas shift reaction.
21. a) Use molecular orbital diagram to show that N_2 would be expected to have a 3
triple bond.
b) Write the state of hybridisation and geometry in SF_6 molecule.
22. a) The work function of caesium metal is 3.04×10^{-19} J. If the caesium metal is 3
irradiated with a wavelength 500nm , calculate the velocity of the ejected
electron. ($h = 6.626 \times 10^{-34}$ Js)
b) Write any two drawbacks of Bohr model of atom.
23. Vimla was taught in chemistry class about electron gain enthalpy. In general, 4
the electron gain enthalpy for some third period elements (eg.P,S,Cl) are more
negative than the corresponding second period members (eg.N,O,F). Vimla was
totally confused and wanted to know the reason for the same. She discussed
with her teacher. The teacher explained the phenomenon which makes Vimla
satisfied.
i) What do you mean by electron gain enthalpy ?
ii) Out of F and Cl which has less negative electron gain enthalpy and why?
iii) How would you justify the presence of 32 elements in sixth period of the
periodic table?
iv) What values are shown by Vimla?

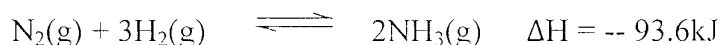
24. a) An alkene on ozonolysis gives 2-butanone and 2-methyl propanal. 5
What products will be obtained when this alkene is treated with acidic KMnO_4 ?
b) State Huckels' rule of aromaticity.
c) Draw the geometrical isomers of hex-3-ene. Which isomer has zero dipole moment?
d) What effect does branching of an alkane chain has on its boiling point?

OR

- a) Explain nitration of benzene with mechanism.
b) State Markovnikov's rule with an example.
c) How do you account for the acidic nature of terminal alkynes?
d) Convert hexane to toluene.
25. a) Account for the following: 5
i) CCl_4 is resistant to hydrolysis but SiCl_4 is readily hydrolysed.
ii) A mixture of dilute NaOH and aluminium pieces is used to open drain.
iii) B-F bond lengths in BF_3 is shorter than that in BF_4^- .
b) How can you prepare diborane in laboratory? Explain its structure with diagram.

OR

- a) Write balanced equations for the following:
i) Diborane is reacted with ammonia.
ii) Amphoteric nature of aluminium.
iii) Silicon dioxide is treated with sodium hydroxide.
b) Write any two differences between graphite and diamond.
c) What are silicones? Mention its one use.
26. a) On the basis of Le Chatelier's principle explain the effect of pressure and 5
temperature for the formation of ammonia.



- b) Derive the relationship between dissociation constant of weak acid and its degree of dissociation.
c) Calculate the pH of 0.01M solution of acetic acid. K_a for CH_3COOH at 298K is 1.8×10^{-5} .

OR

- a) Define common ion effect.
b) A solution of NH_4Cl in water has p^{H} less than 7. Explain.
c) When 0.06 moles solid NH_4HS is introduced in a 2L evacuated flask at 27°C , it decomposes to produce gaseous ammonia and hydrogen sulphide and 0.018 moles of ammonia is formed at equilibrium. Calculate K_c and K_p for the reaction.