

INTERNATIONAL INDIAN SCHOOL DAMMAM
SECOND TERMINAL EXAMINATION 2015-2016

GRADE : XI

CHEMISTRY

TIME : 3 HOURS

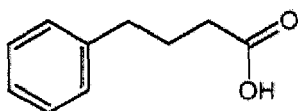
SET -A

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 24 is a value based question, carrying 4 marks.
6. Question numbers 25 to 26 are long answer questions, carrying 5 marks each.
7. Calculators are not permitted. Use log tables if necessary.


1. Write van der Waals equation of state for 'n' moles of gas.
2. What are the values of n, l, m_l and m_s value for an unpaired electron in Na (Z= 11) ?
3. Write the conjugate acid and base of NH₃.
4. Why BeH₂ molecules has zero dipole although the Be-H bonds are polar ?
5. Write the IUPAC name of the following compound.



6. In Carius method of estimation of halogen, 0.30 g of an organic compound gave 0.24g of AgBr. Find out the percentage of bromine in the organic compound. (Ag-108 u, Br-80 u)
7. Bond angle in NH₃ is more than in H₂O. Justify.
8. Write chemical equation for the following.
 - a) Decarboxylation of sodium benzoate with sodalime.
 - b) Reaction of water on ethyne in presence of HgSO₄ and H₂SO₄.
9. a) Depict the Galvanic cell in which the following reaction takes place and also write the individual reaction at each electrode.
$$\text{Zn(s)} + 2 \text{Ag}^+ (\text{aq}) \rightarrow \text{Zn}^{2+} (\text{aq}) + 2\text{Ag(s)}$$
 - b) Given the standard electrode potentials :
$$\text{Cr}^{3+}/\text{Cr} = - 0.74 \text{ V}, \text{Fe}^{2+}/\text{Fe} = - 0.44\text{V}, \text{Ag}^+/\text{Ag} = 0.80 \text{ V}, \text{Zn}^{2+}/\text{Zn} = - 0.76\text{V}$$
Arrange these metals in increasing order of reducing power.
10. a) Will a precipitate of AgCl is formed on treating CCl₄ with AgNO₃ ? Why ?
 - b) Define nucleophile with examples.

OR

a) State Huckel rule.

b) Is this compound aromatic?  If not, why?

11. a) When electromagnetic radiation of wavelength 256.7 nm falls on the surface of silver metal, photons are ejected with a kinetic energy of 5.6×10^{-18} J. Calculate the work function for silver metal. ($h = 6.626 \times 10^{-34}$ Js)

b) Why is 4s orbital filled before 3d orbital?

12. a) Derive the relation between K_p and K_c .

b) For the reaction $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$

The value of K_p is 3.6×10^{-2} at 500K. Calculate the value of K_c for the reaction at the same temperature. ($R = 0.0821$ L bar K^{-1} mol $^{-1}$)

13. a) Terminal alkynes are acidic in nature. Explain.

b) Write the structure and IUPAC name of the products obtained by the ozonolysis of 2-ethyl but-1-ene

14. a) Describe water gas shift reaction with equation.

b) What do you understand by the term hydrogen economy?

c) Among NH_3 , H_2O and HF , which has highest magnitude of hydrogen bonding and why?

15. a) Balance the following redox reaction in basic medium.



b) Define disproportionation reaction with an example.

16) a) What is hyper conjugation effect? How does it differ from resonance effect?

b) Which method can you choose for the purification of a liquid compound which decomposes at its boiling point?

17. Account for the following.

a) Be and Mg do not impart colour to flame.

b) LiI is more soluble than KI in ethanol.

c) BeO is insoluble but $BeSO_4$ is soluble in water.

18. a) What is photoelectric effect?

b) Draw the orientation of dx^2-y^2 and dxz .

c) State Pauli's Exclusion Principle.

19. a) Critical temperature of CO_2 and CH_4 are 31.1°C and -81.9°C respectively. Which of these has strong intermolecular force and why ?
b) What is the effect of temperature on viscosity ?
c) How is density of a gas related to its molar mass ?

OR

- a) Why do gases deviate from ideal behaviour ?
b) What do you mean by the term compressibility factor and what is its value for an ideal gas ?
c) What is Boyle Temperature ?
20. a) Write molecular orbital configuration of O_2 . Predict its magnetic behaviour and calculate its bond order.
b) Give two differences between sigma and pi bond.
21. a) Write Lassaigne's test for the detection of nitrogen in an organic compound.
b) Identify and define the isomerism shown by CH_3COCH_3 and $\text{CH}_3\text{CH}_2\text{CHO}$
c) Draw the resonance structures of $\text{C}_6\text{H}_5\text{OH}$.
22. a) State Dalton's law of partial pressure.
b) What will be the pressure exerted by a mixture of 3.2 g of methane and 4.4 g of carbon dioxide contained in a 9 dm^3 flask at 27°C ? ($R = 0.0821\text{ LbarK}^{-1}\text{mol}^{-1}$)
23. During the educational trip, a group of students visited a village having a beautiful lake. The students collected some plants samples and noticed that some villagers are washing clothes around the lake. They also observed the dumping of waste material from the houses into the lake at certain points. After few years, the students happened to visit the same village again. They were shocked to find the green cover over the lake water which was unusable and badly stinking.
- a) What is the name of green cover over lake water?
b) Why the lake water had developed bad smell?
c) Define Eutrophication.
d) How this situation could have been avoided ? Give your views.
24. a) How will you carry out the following conversions ?
i) Ethyne to acetophenone.
ii) Benzene to p-nitrochlorobenzene.
b) Why does neo-pentane have lower boiling point than n-pentane ?
c) What happens when benzene reacts with conc. HNO_3 and conc. H_2SO_4 at 333 K ?
Write the mechanism of this reaction.

OR

a) Describe the following with chemical equations.

i) Aromatisation

ii) Kolbe's electrolysis

b) Draw the cis and trans structures of hex-2-ene. Which isomer will have higher dipole moment ?

c) Addition of HBr to propene yields 2-bromo propane. Explain the rule that governs this reaction with suitable mechanism.

25) a) Explain the preparation of Na_2CO_3 by Solvay process.

b) Write balanced chemical equation for the following.

i) Lithium nitrate is heated.

ii) Sodium peroxide dissolves in water.

c) Write two similarities between lithium and magnesium.

OR

a) What is dead burnt plaster ? How is it prepared ?

b) Draw the structure of BeCl_2 in solid state.

c) What happens when

i) Chlorine reacts with slaked lime.

ii) Alkali metals are dissolved in ammonia.

d) Which alkaline earth metal carbonate is thermally most stable and why ?

26) a) State Le Chatelier's principle.

b) At 473 K, equilibrium constant K_c for decomposition of PCl_5 is 8.3×10^{-3} . If decomposition is depicted as



i) Write an expression for K_c for the reaction.

ii) What is the value of K_c for the reverse reaction at the same temperature ?

iii) In which direction will the above reaction proceed if

a) pressure is increased

b) temperature is increased

OR

a) Derive an expression for the dissociation constant of a weak acid.

b) The ionisation constant of acetic acid is 1.74×10^{-5} . Calculate the degree of dissociation of acetic acid in its 0.05 M solution. Calculate the concentration of acetate ion in the solution and its p^{H} .

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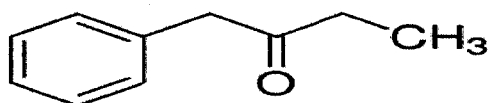
SET -B

MAX MARKS: 70

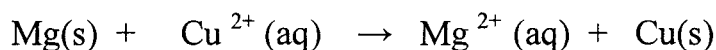
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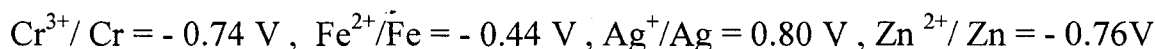
1. Write the conjugate acid and base of HSO_4^-
2. Write van der Waals equation of state for one mole of gas.
3. Write the IUPAC name of the following compound.



4. What are the values of n , l , m_l and m_s for an electron present in 3p orbital?
5. Why BeH_2 molecule has zero dipole although the Be-H bonds are polar?
6. a) Depict the Galvanic cell in which the following reaction takes place and also write the individual reaction at each electrode.



- b) Given the standard electrode potentials :



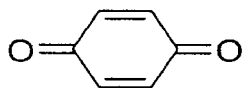
Arrange these metals in increasing order of reducing power.

7. a) Will a precipitate of AgCl is formed on treating CCl_4 with AgNO_3 ? Why?
b) Define electrophile with examples.

OR

- a) State Huckel rule.

- b) Is this compound aromatic?



If not, why?

8. Write chemical equation for the following.

- a) Decarboxylation of sodium acetate with sodalime.
- b) Reaction of water on ethyne in presence of HgSO_4 and H_2SO_4 .

9. Bond angle in NH_3 is more than in H_2O . Justify.
10. In Carius method of estimation of halogen, 0.15 g of an organic compound gave 0.12 g of AgBr . Find out the percentage of bromine in the organic compound. ($\text{Ag} = 108 \text{ u}$, $\text{Br} = 80 \text{ u}$)
11. a) Terminal alkynes are acidic in nature. Explain.
 b) Write the structure and IUPAC name of the products obtained by the ozonolysis of pent-2-ene.
12. a) State Dalton's law of partial pressure.
 b) What will be the pressure exerted by a mixture of 3.2 g of methane and 4.4 g of carbon dioxide contained in a 9 dm^3 flask at 27°C ? ($R = 0.0821 \text{ L bar K}^{-1} \text{ mol}^{-1}$)
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 b) For the reaction $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$
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16. a) Balance the following redox reaction in basic medium.

$$\text{MnO}_4^-(\text{aq}) + \text{I}^-(\text{aq}) \rightarrow \text{MnO}_2(\text{s}) + \text{I}_2(\text{s})$$

 b) Define disproportionation reaction with an example.
17. a) What is photoelectric effect?
 b) Draw the orientation of dz^2 and dxy .
 c) State Hund's Rule of Maximum Multiplicity.
18. a) Critical temperature of CO_2 and CH_4 are 31.1°C and -81.9°C respectively. Which of these has strong intermolecular force and why?
 b) What is the effect of temperature on surface tension?
 c) How is density of a gas related to its molar mass?

OR

- a) According to Charles' law – 273⁰C is the lowest possible temperature. Comment.
- b) What do you mean by the term compressibility factor and what is its value for an ideal gas ?
- c) What is Boyle Temperature ?
19. a) What is hyper conjugation effect ? How does it differ from resonance effect?
b) Which method can be used to separate a mixture of chloroform and aniline ?
20. Account for the following
a) Be and Mg do not impart colour to flame.
b) Lithium salts are commonly hydrated.
c) BeO is insoluble but BeSO₄ is soluble in water.
21. a) Write Lassaigne's test for the detection of sulphur in an organic compound.
b) Identify and define the isomerism shown by CH₃OC₃H₇ and C₂H₅OC₂H₅
c) Draw the resonance structures of C₆H₅NH₂.
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23. During the educational trip, a group of students visited a village having a beautiful lake. The students collected some plants samples and noticed that some villagers are washing clothes around the lake. They also observed the dumping of waste material from the houses into the lake at certain points. After few years, the students happened to visit the same village again. They were shocked to find the green cover over the lake water which was unusable and badly stinking.
a) What is the name of green cover over lake water?
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24. a) State Le Chatelier's principle.
b) At 473 K, equilibrium constant K_c for decomposition of PCl₅ is 8.3 x 10⁻³. If decomposition is depicted as
- $$\text{PCl}_5 (\text{g}) \rightleftharpoons \text{PCl}_3 (\text{g}) + \text{Cl}_2 (\text{g}) \quad \Delta_r H^0 = 124 \text{ kJ}$$
- i) Write an expression for K_c for the reaction.
ii) What is the value of K_c for the reverse reaction at the same temperature ?
iii) In which direction will the above reaction proceed if
a) pressure is increased b) temperature is increased

OR

- a) Derive an expression for the dissociation constant of a weak acid.
- b) The ionisation constant of acetic acid is 1.74×10^{-5} . Calculate the degree of dissociation of acetic acid in its 0.05 M solution. Calculate the concentration of acetate ion in the solution and its P^H .
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OR

- a) Describe the following with chemical equations.
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 - Wurtz reaction
- b) Draw the cis and trans structures of hex-2-ene. Which isomer will have higher dipole moment.
- c) Addition of HBr to propene yields 1-bromo propane. Explain the rule that governs this reaction with suitable mechanism.
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- b) Write balanced chemical equation for the following.
- Lithium nitrate is heated.
 - Sodium peroxide dissolves in water.
- c) Write two similarities between beryllium and aluminium.

OR

- a) What is Plaster of Paris ? How is it prepared ?
- b) Draw the structure of $BeCl_2$ in vapour phase.
- c) What happens when
- Quick lime is heated with silica
 - Alkali metals are dissolved in ammonia.
- d) Which alkaline earth metal carbonate is thermally least stable and why ?
