INDIAN SCHOOL AL WADI AL KABIR

Unit Test 2022-23

SUB: Chemistry (043)

Date: 24/01/2023　　　　　　　　　　　　　　Time Allowed: One hour

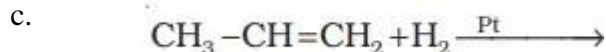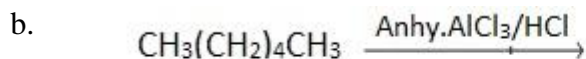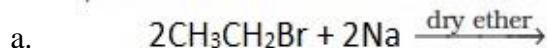Class: XI　　　　　　　　**SET 1**　　　　　Maximum Marks: 30

General Instructions
i. All questions are compulsory.
ii. Q.1 to Q.7 are multiple choice type and carry 1 mark each.
iii. Q.8 and Q.9 are Assertion Reason type and carry 1 mark each.
iv. Q.10 to Q.12 are very short answer type and carry 2 marks each.
v. Q.13 and Q.14 are short answer type and carry 3 marks each.
vi.Q.15 is Case based question and carries 4 marks.
vii. Q.16 is long answer type question and carries 5 marks.
viii. There is no overall choice. However, internal choices have been provided in few questions.
ix. Use of calculators and log table is not permitted.

1. n-Hexane can be converted into benzene in the presence of _____ (1)
   a. Cr_2O_3, 723 K, 10-20 atm
   b. Cr_2O_3, 773 K, 10-20 atm
   c. V_2O_5, 723 K, 100-200 atm
   d. Mo_2O_3, 700 K, 200 atm

2. _____ is also regarded as no bond resonance. (1)
   a. Inductive effect
   b. Resonance effect
   c. Hyperconjugation effect
   d. Electromeric effect

3. Dumas method is used for the estimation of _____ (1)
   a. Nitrogen
   b. Halogen
   c. Oxygen
   d. Phosphorus

4. Which among the following helps in the formation of free radicals? (1)
   a. Heterolytic bond fission
   b. Homolytic bond fission
   c. Inductive effect
   d. Both heterolytic and homolytic bond fission

5. Identify the number of σ and π bonds in Propene. (1)
   a. 5 σ bonds and 2 π bonds

b. 7 σ bonds and 1 π bond
c. 8 σ bonds and 1 π bond
d. 8 σ bonds and 2 π bonds

6. The carbon in carbanion is _____ hybridised. (1)
   a. sp^3
   b. sp^2
   c. sp
   d. sp^3d

7. The IUPAC name of $CH_3CH_2CH_2CH_2CN$ is (1)
   a. 1-Cyanopentane
   b. 1-Cyanobutane
   c. Pentanenitrile
   d. 1-Nitropentane

8. Given below are two statements labelled as Assertion (A) and Reason (R). (1)

   Assertion (A): Propan-1-ol and propan-2-ol are position isomers.
   Reason (R): Position isomers differ in the position of functional groups.
   a. Both A and R are true and R is the correct explanation of A.
   b. Both A and R are true but R is not the correct explanation of A.
   c. A is true but R is false.
   d. A is false but R is true.

9. Given below are two statements labelled as Assertion (A) and Reason (R). (1)

   Assertion (A): Components of a mixture of red and blue inks can be separated by chromatography.
   Reason (R): Stationary phase in chromatography is the one which does not move with the sample whereas
              mobile phase in chromatography is the one which moves with the sample.
   a. Both A and R are true and R is the correct explanation of A.
   b. Both A and R are true but R is not the correct explanation of A.
   c. A is true but R is false.
   d. A is false but R is true.

10. a. Arrange the following in the increasing order of boiling points. (2)
        n-pentane, 2-Methylbutane, 2,2-Dimethylpropane
    b. Write the complete structural formula of 3, 4, 4, 5–Tetramethylheptane.
                            OR
    Write chemical reactions to explain
    a. Decarboxylation
    b. Substitution reaction

11. Give reasons for the following statements. (2)
    a. Tertiary carbocations are more stable than secondary or primary carbocations.
    b. The inductive effect in the 3rd carbon is the least in $CH_3CH_2CH_2Br$.

12. a. Draw the chain isomers of C_4H_{10}. (2)
    b. Write the shape and state of hybridisation of carbon in CH_3Br.

13. Predict the products. (3)

a. $2CH_3CH_2Br + 2Na \xrightarrow{\text{dry ether}}$

b. $CH_3(CH_2)_4CH_3 \xrightarrow{\text{Anhy.AlCl}_3/\text{HCl}}$

c. $CH_3-CH=CH_2 + H_2 \xrightarrow{\text{Pt}}$

14. Describe the following with a suitable example. (3)
   a. Functional group
   b. Electrophile
   c. Homocyclic compounds

                              OR

   a. Give an example of a non-benzenoid aromatic compound.
   b. Write the IUPAC name of the following compounds.
   (i)

$CH_3-CH_2-CH-CH_2-CH_2-CH-CH_2-CH_3$

with substituents CH_2CH_3 and CH_3
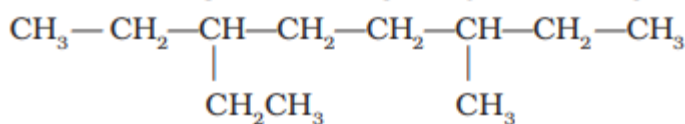
   (ii)
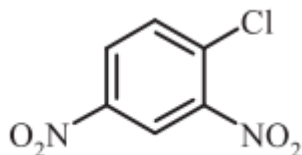
15. Read the paragraph carefully answer the following questions.

The rotation of carbon-carbon single bond (σ-bond) in alkanes results in different spatial arrangements of atoms that are interconvertible. These arrangements are called conformations. However, weak repulsive interactions are present between the adjacent bonds in alkanes so the rotation of C—C single bond is not completely free and is hindered by a small energy barriers of 1-20 kJ mol^{-1}. The repulsive interaction between the adjacent bond is due to electron cloud.

Two types of conformations are very common, i.e., staggered and eclipsed. The energy difference between the two extreme forms is of the order of 12.5 kJ mol^{-1}. Even at ordinary temperatures, the ethane molecule gains thermal or kinetic energy sufficient enough to overcome this energy barrier of 12.5 kJ mol^{-1} through intermolecular collisions.
It can be said that rotation about carbon-carbon single bond in ethane is almost free for all practical purposes. It has not been possible to separate and isolate different conformational isomers of ethane.

a. Which among the following conformers is the most stable and why? (1)
   Eclipsed, Skew or Staggered

b. Name the alkane which does not show conformation. (1)

c. Draw the eclipsed and staggered conformers of ethane in Newman projection. (2)
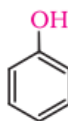   OR
c. Draw the eclipsed and staggered conformers of ethane in Sawhorse projection. (2)

16. a. Explain the technique used for purification of Naphthalene. (5)

b. Illustrate positive Resonance effect in Phenol,

c. Write the structural formula of 3-Methylbutanal.
d. Draw the bond line formula of
   i. 2-Hydroxybutanoic acid
   ii. Cyclopropane

OR

a. Write the resonance structure of CH_3COO^- ion.
b. Write the condensed formula of 2-Chlorohexane.
c. Which bond is more polar in the following molecules, H_3C-H or H_3C-Br. Why?
d. Define the terms
   i. Homologous series
   ii. Negative Electromeric effect