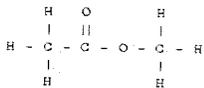


- use red to mark each correction and add up each question for a total
- use blue to correct any question requiring fixing

PART A: Multiple Choice: Answer on the scantron card provided (40)

1. The functional group present in the compound below is:



- a. Carboxyl group
b. halogen group
c. hydroxyl group
d. ester group

2. Use the following information to answer the next question.



- The IUPAC name of the given compound is
a. pentanoic acid
b. butanoic acid
c. propyl methanoate
d. 2 - oxy butan-1-ol

3. The amount of structural isomers of C_5H_{12} is

- a. 3
b. 6
c. 4
d. 7

4. Which of the following compounds has the lowest boiling point?

- a. hexane
b. pentane
c. 2, 2, - dimethylpropane
d. 2 - methylbutane

5. When compound X reacts with compound Y in an acid, a fruity odour is produced. When compound X is treated with sulfuric acid, an alkene and water are produced. Compound X is a/an:

- a. alcohol
b. carboxylic acid
c. alkyne
d. ester

6. The IUPAC name of the following organic compound is



- a. 1, 2-dichlorobenzene
b. 1, 3-dichlorobenzene
c. 1, 5-dibenzochloride
d. 1, 5-dichlorobenzene

7. In an organic compound, two methyl groups are found at the third and sixth positions and two double bonds exist at the first and fourth positions. ~~It is a compound consisting of a structure with maximum possible number of carbon atoms.~~ the IUPAC name of this compound will be

- a. 3,6-dimethylpent-1,4-diene
b. 3,6-dimethylhex-1,4-diene
c. 3,6-dimethylhept-1,4-diene
d. 3,6-dimethyloct-1,4-diene



8. Which of the following compounds is the most soluble in water?

- a. $CH_3 - CH_2 - OH$
b. $CH_3 - CH_2 - CH_2 - OH$
c. $CH_3 - OH$
d. $CH_3 - CH_2 - CH_2 - CH_2 - OH$

9. Which Alkyl halides are hydrocarbons that contain at least one halogen atom.



What is the name of this alkyl?

- a. 2,5-dichloro-1-methylcyclohexane
b. 1,3-dichloro-4-methylcyclohexane
c. 4,6-dichloro-1-methylcyclohexane
d. 1,5-dichloro-2-methylcyclohexane

10. Which of the following compounds is not an isomer of hexanoic acid?

- a. 3-methylpentanoic acid
b. 4-methylpentanoic acid
c. 3,3-dimethylbutanoic acid
d. 2,2-dimethylpentanoic acid

11. When numbering the main chain or ring of an organic compound, which functional group gets the highest priority?

- a. methyl
b. hydroxyl
c. halogen
d. amine

12. What is the shape of an alkyne molecule?

- a. bent
b. linear
c. tetrahedral
d. trigonal planar

13. What is the general formula for alkenes?

- a. C_nH_{n+2}
b. C_nH_{2n+2}
c. C_nH_{2n}
d. C_nH_{2n-2}

14. Which compound will produce the least amount of alkyl chloride when reacted with HCl?

- a. 1-butanol
b. 2-butanol
c. methanol
d. tert-butanol

15. Which of the compounds below has the highest boiling point?

- a. 2-methylpropan-1-ol
b. 2-methylpropan-2-ol
c. butan-2-ol
d. butan-1-ol

16. Which group is polar?

- a. alkanes
b. alkenes
c. cyclic hydrocarbons
d. alcohols

17. Which of these correctly orders the groups from most reactive to least reactive?

- a. alkynes, alkenes, alkanes
b. alkanes, alkynes, alkenes
c. alkanes, alkenes, alkynes
d. alkenes, alkanes, alkynes

18. Which correctly orders the compounds from highest boiling point to lowest boiling point?

- a. 2-butanol, 2-methylbutane, 2-butanone
b. 2-methylbutane, 2-butanone, 2-butanol
c. 2-butanol, 2-butanone, 2-methylbutane
d. 2-butanone, 2-butanol, 2-methylbutane

19. A student is asked to name a compound. In which order should the student perform the steps to name the compound?

Step	Procedure
A	Identify the prefix.
B	Identify the suffix.
C	Identify the root.
D	Name the compound.

- a. C, B, A, D
b. C, A, B, D
c. A, B, C, D
d. A, C, B, D

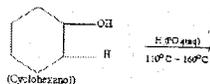
20. How many carbon atoms are in 3-methyl-4,4-diethyl-5-propyldecane?

- a. 16
b. 17
c. 18
d. 19



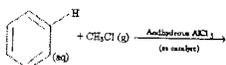
21. An unsaturated compound is passed into dilute sulfuric acid in the presence of mercury(II) sulfate as a catalyst, forming the unstable compound ethen-1-ol, $\text{CH}_2 = \text{COH}$. This process represents a/an
- addition reaction
 - substitution reaction
 - combustion reaction
 - elimination reaction

22. In an experiment, cyclohexanol is treated with phosphoric acid at a temperature of $110^\circ\text{C} - 160^\circ\text{C}$. In this process, a compound 'x' and a water molecule are produced.



The product formed in this process is

- cyclohexene
 - cyclohexanol
 - cyclopentene
 - cyclopentanol
23. A student treats benzene with chloromethane in the presence of anhydrous aluminum chloride as a catalyst. In this process, a compound 'x' is formed along with hydrogen chloride.



The above reaction is an example of

- esterification reaction
 - addition reaction
 - substitution reaction
 - elimination reaction
24. In an experiment, propan-1-ol is made to react with propanoic acid, in the presence of concentrated sulfuric acid as a catalyst. The product is:
- propyl butanoate
 - ethyl propanoate
 - propyl propanoate
 - butyl propanoate
25. Alkanes undergo combustion in the presence of oxygen. Consider the following combustion reaction of an alkane, where a is is an unknown co-efficient:
- $$\text{C}_n\text{H}_{2n+2}(\text{g}) + 7\text{O}_2(\text{g}) \rightarrow 4\text{CO}_2(\text{g}) + 6\text{H}_2\text{O}(\text{g})$$
- The alkane is
- methane
 - ethane
 - propane
 - butane
26. Which statement describes an esterification reaction?
- It involves a carboxylic acid and an alkane.
 - It is a type of hydrolysis reaction.
 - It is a reduction reaction.
 - It is a type of condensation reaction.

27. Which pair of reactions cannot be used together to describe an organic reaction?

- addition and reduction
- addition and oxidation
- reduction and elimination
- substitution and oxidation

28. While performing a chemical experiment, Dr. Huff added two compounds "x" and "y" in the presence of concentrated $\text{H}_2\text{SO}_4(\text{aq})$, which resulted in compound "z" that had the following functional group:

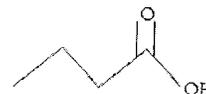


The compounds "x" and "y" were:

- alkyl halide and alcohol
 - alcohol and ester
 - alcohol and carboxylic acid
 - carboxylic acid and ester
29. Which group of molecules frequently undergoes addition reactions?
- esters
 - alkynes
 - carboxylic acids
 - alcohols
30. Which is true of Markovnikov's rule?
- It can be used to predict the isomer that will be most plentiful in some addition reactions.
 - It states that the small molecule will attach to the carbon of the double bond that is already bonded to the most hydrogen atoms.
 - It states that a maximum of four bonding electrons can be rearranged to form bonds.
 - a and b are true.

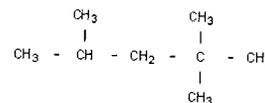
31. The correct IUPAC name for the compound given is which of the following?

- a. pentanoic acid
 b. butanoic acid
 c. propyl methanoate
 d. 2-oxybutan-1-ol
 e. 3-methylbutanol



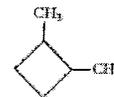
32. What is the correct IUPAC name for the compound?

- a. 2,3-dimethylbutane
 b. 2,2,4-trimethylpentane
 c. 2,4,4-trimethylpentane
 d. 2,2-dimethylbutane
 e. isohexane



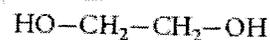
33. What is the correct IUPAC name for the compound?

- a. 1,2-dimethylbutane
 b. 3,4-dimethylcyclobutane
 c. 1,2-dimethylcyclohexane
 d. 1,2-dimethylcyclobutane
 e. 3,4-dimethylcyclobutane



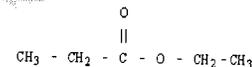
34. The correct IUPAC name for compound is which of the following?

- a. diethanol
 b. dihydroxyethane
 c. ethanediol
 d. ethane-1,2-diol



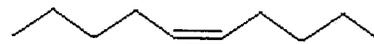
35. The correct IUPAC name for the compound given is which of the following?

- a. propylethanoate
 b. propylethanoic acid
 c. ethylpropanoate
 d. 1-ethoxypropanoate



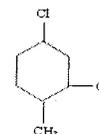
36. The correct IUPAC name for the compound given is which of the following?

- a. non-5-yne
 b. hept-3-yne
 c. oct-4-yne
 d. dec-5-yne



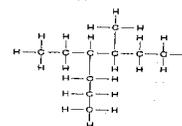
37. The correct IUPAC name for the compound given is which of the following?

- a. 2,5-dichloro-1-methylcyclohexane
 b. 1,3-dichloro-4-methylcyclohexane
 c. 4,6-dichloro-1-methylcyclohexane
 d. 1,5-dichloro-2-methylcyclohexane



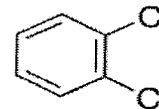
38. The correct IUPAC name for compound is which of the following?

- a. 4-ethyl-3-methylheptane
 b. 4-methyl-3-propylhexane
 c. 3-propyl-4-methylhexane
 d. 4-ethyl-3-methylhexene



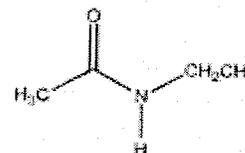
39. The correct IUPAC name of the structure is which of the following?

- a. meta dichlorobenzene
 b. 5,6-dichlorobenzene
 c. ortho dichlorobenzene
 d. para dichlorobenzene



40. The correct IUPAC name for the compound is which of the following?

- a. ethanamine ethanal
 b. N-ethylmethanamide
 c. pentanamine
 d. N-ethylethanamide



PART C: Short Answer: Choose a combination of questions so that the **total number** of marks equal **15 marks**.
The mark value of the question is provided after each question. You cannot break up questions.
CLEARLY NUMBER AND ANSWER ON FOOLSCAP. The first 15 marks will count!

[/15 MARKS]

42. How is an oxidation reaction different from a reduction reaction?

[/2 MARKS]

oxidation means to make more bonds with C
reduction means to make more bonds with H

43. Rank the following alcohols in terms of increasing boiling point: methanol, ethanol, propane-1-ol, butane-1-ol

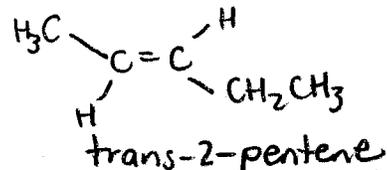
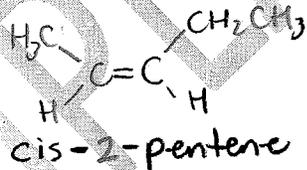
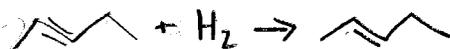
[/2 MARKS]

44. Draw a complete structural diagram butanone. Explain why it CANNOT undergo oxidation.

[/2 MARKS]

45. Why does the hydrogenation of 2-pentyne with 1.0 mole of hydrogen produce 2 cis-trans isomers? Draw and name them

[/3 MARKS]



46. Complete the following table. YOU MUST RE-DRAW THE TABLE ON FOOLSCAP!!!!

[/4 MARKS]

Name	Complete Structural Diagram	Class of Organic Compound
ortho-fluoro-nitrobenzene		aromatic
methyl-3,3,4,4-tetramethylbutanoic acid		carboxylic acid
N-methyl-N-ethyl-3,3-dimethyl-2-chlorobutanamide		amide
sodium propanoate		ester

47. Using complete structural diagrams, draw and name ALL the structural isomers of C_6H_{14}

[/5 MARKS]

PART B: Reactions: Answer in the space provided. [/10 MARKS]

41. Draw **CONDENSED structural** diagrams of the major products from the following reactions.

