AGA KHAN UNIVERSITY EXAMINATION BOARD

HIGHER SECONDARY SCHOOL CERTIFICATE

CLASS XII

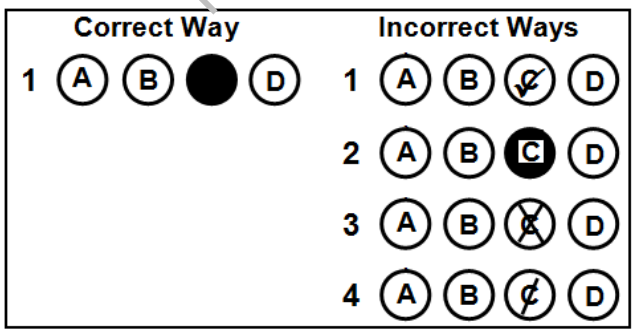
ANNUAL EXAMINATIONS (THEORY) 2025

Chemistry Paper I

Time: 1 hour 30 minutes Marks: 50

INSTRUCTIONS

1. Read each question carefully.
2. Answer the questions on the separate answer sheet provided. DO NOT write your answers on the question paper.
3. There are 100 answer numbers on the answer sheet. Use answer numbers 1 to 50 only.
4. In each question there are four choices A, B, C, D. Choose ONE. On the answer grid black out the circle for your choice with a pencil as shown below.



Candidate's Signature

5. If you want to change your answer, ERASE the first answer completely with a rubber, before blacking out a new circle.
6. DO NOT write anything in the answer grid. The computer only records what is in the circles.
7. You may use a scientific calculator if you wish.

1. An atom of caesium loses an electron more readily than an atom of lithium although they both belong to group IA. This is because caesium possesses

	Ionisation Energy	Shielding Effect
A	lower	lower
B	lower	higher
C	higher	higher
D	higher	no

2. Hydrofluoric acid (HF) is a weak acid because it has

A. large molecule with low polarisation.
B. small molecule with low polarisation.
C. large molecule with high polarisation.
D. small molecule with high polarisation.

3. Which of the following periodic trends is TRUE as we go down group VIIA?

	Electronegativity	Reactivity
A	Increases	Decreases
B	Decreases	Remains same
C	Increases	Increases
D	Decreases	Decreases

4. The given equation shows the decomposition of group IVA chloride at room temperature.

$$XCl_{4(s)} \xrightarrow{\text{room temperature}} XCl_{2(s)} + Cl_{2(g)}$$

This reaction occurs when **X** is

A. lead.
B. silicon.
C. carbon.
D. germanium.

5. An element of period 3 is heated with chlorine. The product obtained from the reaction is then added to water to form a neutral solution.

This element of period 3 must be

A. silicon.
B. sodium.
C. aluminium.
D. phosphorus.

6. Which of the following transitions of electrons is responsible for the orange-red colour of $K_2Cr_2O_7$?

I. d → d electron transition
II. π → π* electron transition
III. Metal to ligand electron transition
IV. Ligand to metal electron transition

A. I and II
B. I and IV
C. II and III
D. III and IV

7. The coordination number of Cu in $[Cu(NH_3)_4]SO_4$ is

A. zero.
B. one.
C. two.
D. four.

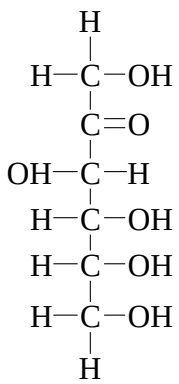
8. The systematic name of the transition metal complex $[Co(NO_2)_3(NH_3)_3]$ is

A. trinitrotriammine cobalt(III).
B. triamminetrinitro cobalt(III).
C. trinitrotriammine cobalt(VI).
D. triamminetrinitro cobalt(VI).

9. The type of ligand in $[Ni(NH_2CH_2CH_2NH_2)_3]^{2+}$ is

A. monodentate.
B. bidentate.
C. tridentate.
D. hexadentate.

10. How many chiral centres are present in the given compound?

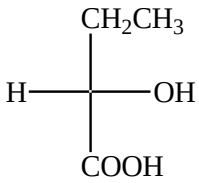


A. 3
B. 4
C. 5
D. 6

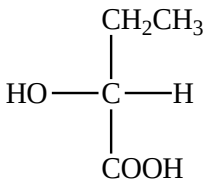
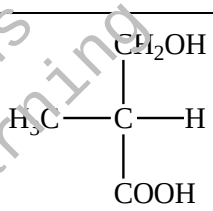
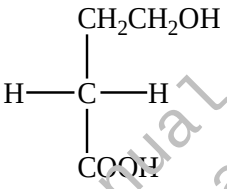
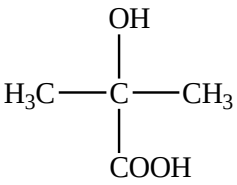
11. The functional group present in the formula $(C_6H_5)_2SO_2$ is

A. thiol.
B. sulphide.
C. sulphone.
D. sulphoxide.

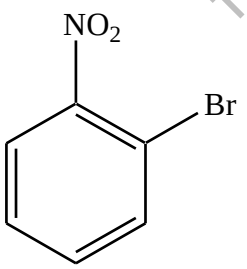
12. 2-hydroxybutyric acid has two enantiomers D-2-hydroxybutyric acid and L-2-hydroxybutyric acid. The structure of D-2-hydroxybutyric acid is as follows.



The structure of L-2-hydroxybutyric acid is

	
A	B
	
C	D

13. The name of the given aromatic hydrocarbon is

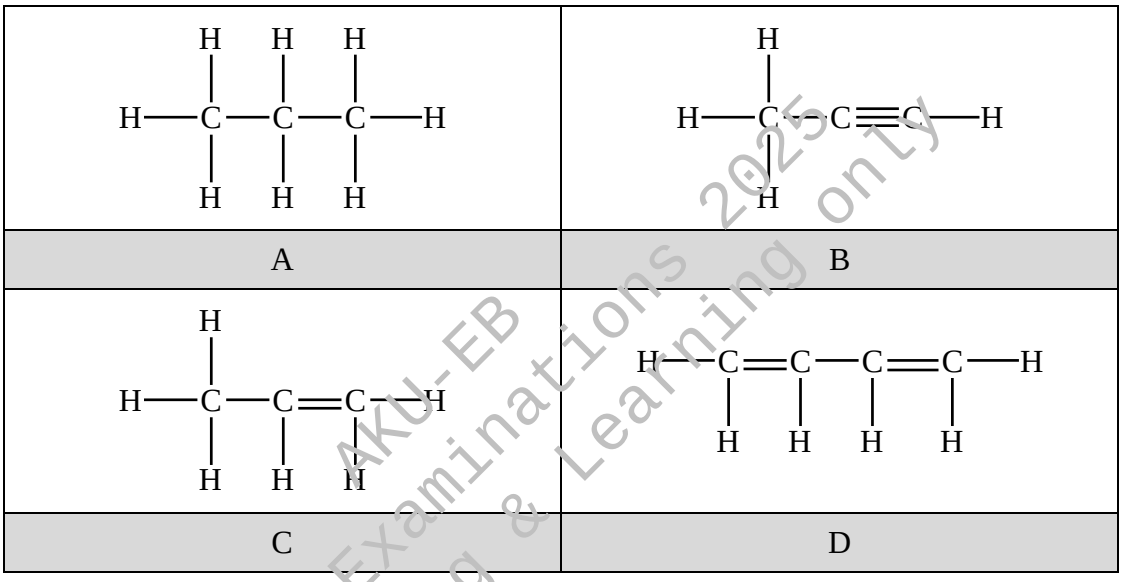


A. o-bromoaniline.
B. m-bromoaniline.
C. o-bromonitrobenzene.
D. m-bromonitrobenzene.

14. Polymerisation of ethene results in the formation of polyethene. In this process, the feature that remains the same is

    A. density.
    B. molecular mass.
    C. empirical formula.
    D. type of covalent bonding.

15. In which of the following compounds, do carbon atoms use only sp^3 hybrid orbitals for the formation of bonds?



16. In reaction of benzene with the chloromethane molecule, the role of anhydrous aluminium chloride as a catalyst is to

    A. participate as an electron-rich molecule.
    B. generate methyl group as an electrophile.
    C. increase the activation energy of the benzene ring.
    D. facilitate the attachment of a chlorine atom on the benzene ring.

17. If the atmosphere contains excessive quantity of CO_2, then its impact on greenhouse effect and Earth's temperature would be

	Greenhouse Effect	**Earth's Temperature**
A	decreased	decreased
B	increased	decreased
C	increased	increased
D	decreased	increased

18. The parameter which measures the overall mineral content in water is termed as

A. total dissolved solids.
B. total suspended solids.
C. chemical oxygen demand.
D. biological oxygen demand.

19. The significance of using the zeolite process in water treatment is that it

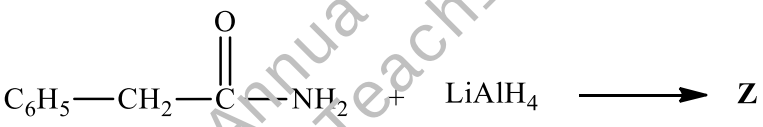
A. precipitates out impurities as sludge.
B. converts heavy water into soft water.
C. is carried out in a single operational step.
D. removes permanent hardness from water.

20. The production of HNO_3 highly depends on the concentrations of **X** and **Y** in the atmosphere.

The **X** and **Y** can be identified as

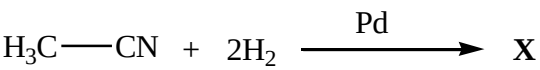
	X	**Y**
A	NO_x	volatile organic compounds
B	NO_x	peroxyacetyl nitrate
C	HO_x	volatile organic compounds
D	HO_x	peroxyacetyl nitrate

21. The product **Z** in the given chemical reaction is



A. $C_6H_5 - CH_3$
B. $C_6H_5 - CH_2 - CH_3$
C. $C_6H_5 - CH_2 - NH_2$
D. $C_6H_5 - CH_2 - CH_2 - NH_2$

22. The product **X** formed by the reduction of ethane nitrile in the given reaction is



A. CH_4
B. $CH_3–CH_3$
C. $CH_3–NH_2$
D. $CH_3–CH_2–NH_2$

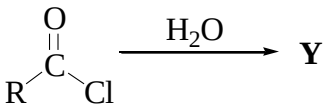
23. Grignard reagents (R–MgX) are more reactive because

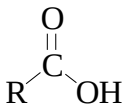
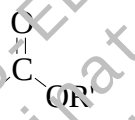
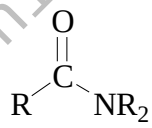
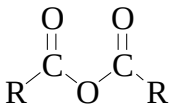
A. the C–Mg bond is non-polar.
B. the C–Mg bond is highly polar.
C. it has a reactive electrophilic carbon.
D. magnesium is less electropositive than carbon.

24. How many hydrogen atoms are bonded to the tertiary carbon atom in tertiary butyl chloride?

A. 0
B. 1
C. 2
D. 3

25. The product **Y** in the given reaction would be



			
A	B	C	D

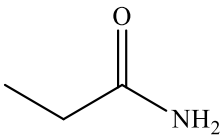
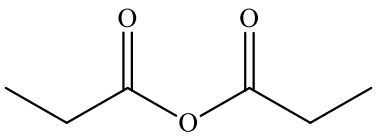
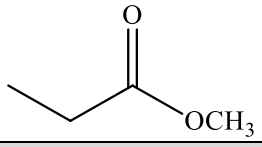
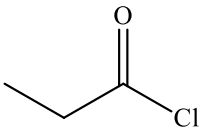
26. Based on the given properties, which of the following compounds is ethanoic acid?

Compound	Degree of Dissociation in Water	Reaction with Magnesium
A	High	No reaction
B	Low	No reaction
C	High	Evolution of hydrogen gas
D	Low	Evolution of hydrogen gas

27. All of the following are straight-chain saturated fatty acids EXCEPT

A. $CH_3(CH)_2CH_2COOH$
B. $CH_3(CH_2)_2COOH$
C. CH_3CH_2COOH
D. CH_3COOH

28. The MOST reactive carboxylic acid derivative is

	
A	B
	
C	D

29. Boiling points of consecutive alcohols in the homologous series generally increase with the

A. increasing number of branches.
B. decreasing polarity of O-H bond.
C. decreasing Van der Waals forces.
D. increasing number of carbon atoms.

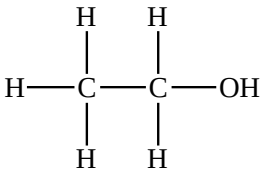
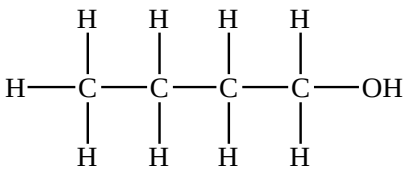
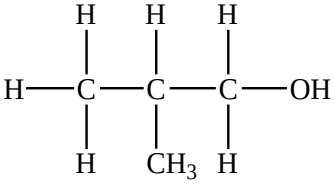
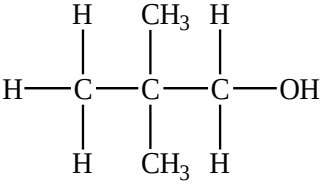
30. CH_3CH_2COOH can be converted into $CH_3CH_2CH_2OH$ by using

A. H_2/Ni
B. H_2O/H^+
C. CH_3OH/H^+
D. $LiAlH_4/H_3O^+$

31. The CORRECT order of acidic strength of alcohols, phenols and carboxylic acids is

A. carboxylic acids > phenols > alcohols.
B. alcohols > phenols > carboxylic acids.
C. phenols > carboxylic acids > alcohols.
D. carboxylic acids > alcohols > phenols.

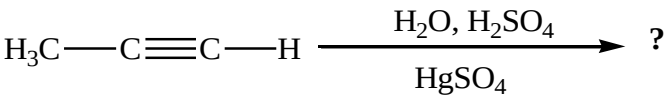
32. Which of the following alcohols will have the HIGHEST boiling point?

	
A	B
	
C	D

33. Which of the following statements is FALSE about phenols?

A. Phenols form a pink solution in water at room temperature.
B. Phenols occur either as colourless liquids or white solids at room temperature.
C. Phenols have lower boiling points than hydrocarbons having same molecular masses.
D. Phenols show good resistance to weak acids and bases but poor resistance to strong acids and bases.

34. Consider the given reaction.



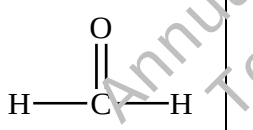
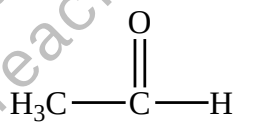
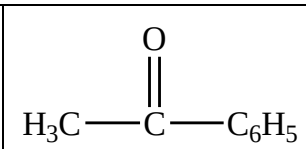
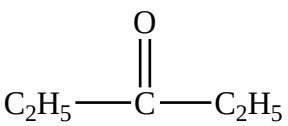
The result of this reaction will always be a/ an

A. acetone.
B. acetaldehyde.
C. mixture of ketones.
D. mixture of aldehydes.

35. The TRUE statement about the solubility of aldehydes in water is that

A. only branched aldehydes are readily soluble in water.
B. only the first four members of aldehydes are highly miscible in water.
C. the solubility increases with the increasing number of carbon atoms in the chain.
D. the solubility increases due to hydrogen bonding between two aldehyde molecules.

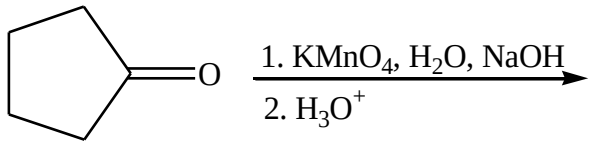
36. The carbonyl compound that does NOT react with $NaHSO_3$ is

			
A	B	C	D

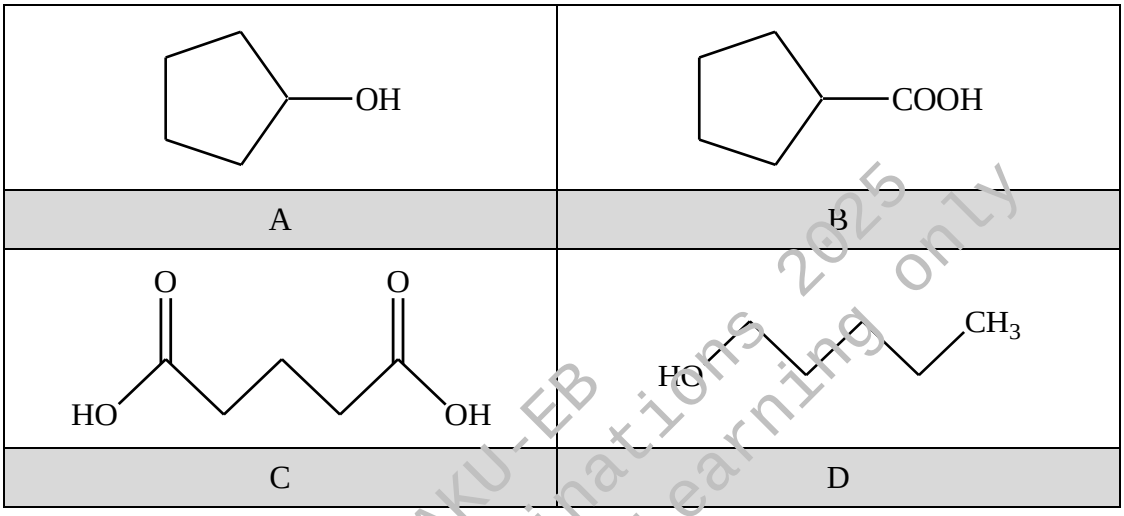
37. Which class of alcohol is produced when an aldehyde or a ketone is hydrolysed after reaction with $LiAlH_4$?

	Alcohol Produced by	
	Aldehyde	**Ketone**
A	1°	1°
B	1°	2°
C	2°	2°
D	2°	3°

38. Consider the following reaction.



Oxidation of the given ketone will result in



39. At high pH, solubility of casein protein increases because of the

A. presence of net positive charge.
B. ionisation of its acidic side chains.
C. protonation of its basic side chains.
D. presence of equal number of charged groups.

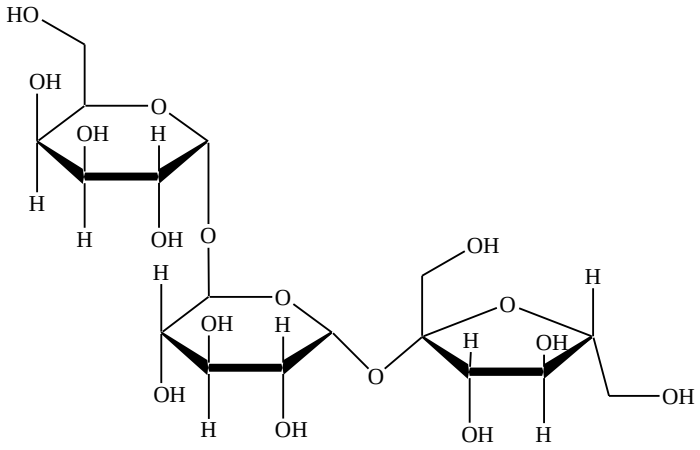
40. Compounds that are formed by combining glycerol with three molecules of fatty acids are called

A. lipids.
B. proteins.
C. nucleic acids.
D. carbohydrates.

41. An INCORRECT statement about enzymes in the human body is that they

A. catalyse biological reactions.
B. are made up of large protein molecules.
C. remain intact at extremely high temperatures.
D. are highly specific in their choice of reactants.

42. Consider the structure of raffinose, a carbohydrate molecule.



The number of glycosidic bonds present in the given structure is

A. two.
B. three.
C. four.
D. five.

43. Which of the following types of polymerisation reaction and di-functional monomers (containing equal parts of functional groups) are involved in the formation of Nylon 6,6?

	Type of Polymerisation	Di-functional Monomers
A	Addition	Glycol + Glyoxal
B	Condensation	Diamine + Dicarboxylic Acid
C	Addition	Diamine + Dicarboxylic Acid
D	Condensation	Glycol + Glyoxal

44. Consider the given characteristics.

I. Deforms easily
II. Applicable on wet surfaces
III. Durable for heavy load application
IV. Requires addition of resin and hardener

Which of the given characteristics stands CORRECT for pressure-sensitive adhesives?

A. I and II
B. I and III
C. II and IV
D. III and IV

45. The dye that contains azo group in its structure is

A. alizarin.
B. indigo white.
C. methyl orange.
D. phenolphthalein.

46. Polyvinyl chloride (PVC) is an example of

A. copolymer.
B. biopolymer.
C. addition polymer.
D. condensation polymer.

47. The synthetic adhesive that is used to fix the structure of broken objects made of metal or ceramic are

A. teflon.
B. epoxy.
C. polyurethane.
D. polypropylene.

48. An infrared spectrum shows an absorption band in the range of 1680 - 1750 cm^{-1} and produces a very broad trough in the range of 2500 - 3300 cm^{-1}.

Which of the following set of groups is indicated by these two ranges?

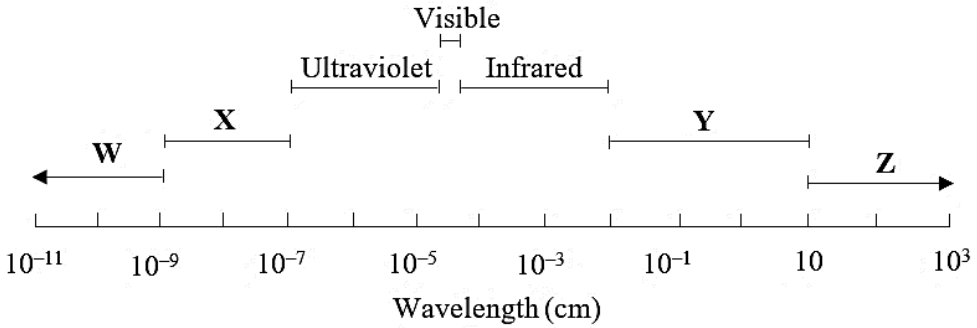
	1680 - 1750 cm^{-1}	**2500 - 3300 cm^{-1}**
A	O−H	C=O
B	C=O	O−H
C	C=C	C−H
D	C−H	C=C

49. An organic dye **X**, dissolved in water, shows a blue colour with a strong absorption peak at 668 nm in its UV-Visible spectrum.

The colour absorbed by dye **X** at this wavelength is

A. yellow.
B. indigo.
C. violet.
D. red.

50. Given is the electromagnetic spectrum.



(Source: http://www.pas.rochester.edu/~blackman/ast104/spectrum.html)

The regions represented as **W**, **X**, **Y** and **Z** in the given spectrum are

	W	**X**	**Y**	**Z**
A	radio waves	microwave	X-rays	gamma rays
B	gamma rays	X-rays	microwave	radio waves
C	microwave	gamma rays	radio waves	X-rays
D	X-rays	radio waves	gamma rays	microwave

END OF PAPER

Please use this page for rough work

Please use this page for rough work

Please use this page for rough work