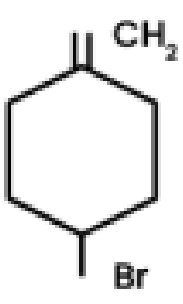
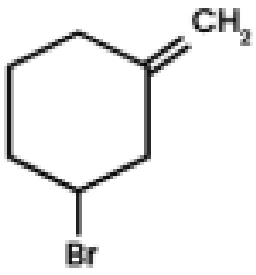
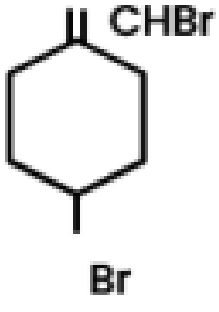
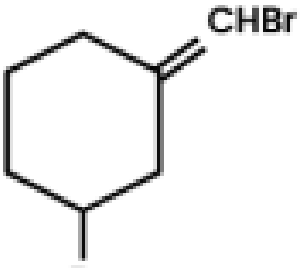
JEE Main 2024 Chemistry Question Paper Jan 29 Shift 2

1. Which of the following compounds can show geometrical isomerism (G.I.)?

(a) 

(b) 

(c) 

(d) 

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2. What is the oxidation number of iron in the complex formed during the brown ring test of nitrate ion?

(1) +1
(2) +2
(3) +3
(4) -1

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3. Which reagent is used to obtain a red colour with Ni^{2+} ions?

(1) EDTA
(2) Dimethylglyoxime
(3) α-nitroso-β-naphthol
(4) None of the above

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4. Phenol is reacted with chloroform in the presence of NaOH and the obtained product is hydrolyzed with acid. The final product formed is:

(1) Benzene-1,2-diol
(2) Benzene-1,3-diol
(3) Salicylaldehyde
(4) Hydroxybenzaldehyde

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5. Which ion gives a brownish colour with Nessler's reagent?

(1) Sulphate ion
(2) Nitrate ion
(3) Bromide ion
(4) Ammonium ion

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6. Arrange the following compounds according to increasing pKa value:
a. Phenol
b. Meta-nitrophenol
c. Para-nitrophenol
d. Ethanol

(1) d ¿ a ¿ b ¿ c
(2) a ¿ b ¿ c ¿ d
(3) b ¿ c ¿ d ¿ a
(4) c ¿ d ¿ b ¿ a

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7. Which among the following ions is the best reducing agent?

(1) Ce^{4+}
(2) Gd^{2+}
(3) Lu^{3+}
(4) Nd^{3+}

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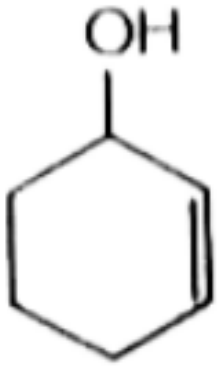
8. IUPAC Name of the compound is



(1) Hex-2-en-1-ol
(2) Cyclohex-2-en-1-ol
(3) 3-Hydroxycyclohexane
(4) Cyclohex-1-en-3-ol

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9. Why does oxygen show anomalous behaviour in group 16 of the periodic table?

(1) Large size, high electronegativity
(2) Small size, small electronegativity
(3) Small size, high electronegativity, absence of vacant d-orbitals
(4) Large size, high electronegativity, presence of vacant orbitals

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10. How many of the following compounds have zero dipole moment: NH_3, H_2O, HF, CO_2, SO_2, BF_3, CH_4?

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11. Statement 1 (S_1): Fluorine (F) has the highest electron gain enthalpy (EGE) in its group.
Statement 2 (S_2): Oxygen (O) has the second most electron gain enthalpy in its group.

(1) Both statements I and II are false
(2) Statement I is true but Statement II is false
(3) Statement I is false but Statement II is true
(4) Both statements I and II are true

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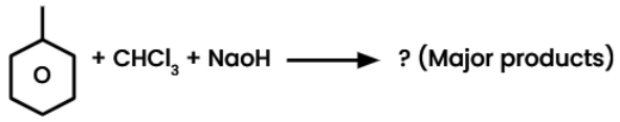
12. 

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13. S_1: Rutherford said that mass is concentrated at the centre and charge is distributed.
S_2: Electrons are clustered around the nucleus.

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14. How many antibonding electrons are present in the 1s and 2p orbitals of a diatomic α molecule?

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15. Find the total number of σ and π bonds in 2-formylhex-4-enoic acid.

(1) $\sigma = 18$, $\pi = 3$
(2) $\sigma = 16$, $\pi = 2$
(3) $\sigma = 16$, $\pi = 3$
(4) $\sigma = 18$, $\pi = 2$

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16. A radioactive substance has a half-life of 36 hours. How much of it remains after 1 day?

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17. Give the IUPAC name of $K_2[MnO_4]$ according to coordination chemistry.

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18. Which of the following is a strong reducing agent?

(1) Ce^{4+}
(2) Ga^{3+}
(3) Tb^{3+}
(4) Ho^{2+}

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19. How many antibonding electrons are present in the 1s and 2p orbitals of a diatomic α molecule?

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20. Find the molality of 0.8 M H_2SO_4 solution (density = 1.06 g/cm^3). Give the answer in $\times 10^{-3}$ units.

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21. Which of the following elements has the highest first ionization energy?

(1) N
(2) C
(3) Si
(4) Al

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22. Match the following:

(A) Lyman	(I) IR
(B) Balmer	(II) IR
(C) Paschen	(III) Visible
(D) Pfund	(IV) UV

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23. If standard enthalpy of vaporization of CCl_4 is 30.5 kJ/mol, find the heat absorbed for vaporization of 294 g of CCl_4. (Nearest integer) [Answer in kJ]

24. 50 mL of 0.5 M oxalic acid is completely neutralized by 25 mL of a NaOH solution. Find the amount of NaOH (in grams) present in 25 mL of this NaOH solution.

25. Match the following:

(A) Starch	(I) Peptide linkage
(B) Cellulose	(II) α-D-glycosidic linkage
(C) Proteins	(III) β-D-glycosidic linkage
(D) Nucleic acids	(IV) Nucleotide