

Most Important Questions(Chemistry)

Class 12 CBSE Board 2021-22(Term II)

- Write short note on Gabriel phthalimide synthesis. [Ask Filo](#)
- Explain why the first ionization energies of the elements of the first transition series do not vary much with increasing atomic number? [Ask Filo](#)
- Write balanced ionic equation for what happens when:
 - Acidified potassium permanganate solution is treated with an oxalate ion in solution.
 - An iodide ion is treated with an acidified dichromate ion in solution.[Ask Filo](#)
- How charge develop on colloidal particles? Explain. [Ask Filo](#)
- What are lyophilic and lyophobic sols? Give example of each type. Why are hydrophobic sols easily coagulated? [Ask Filo](#)
- Mechanism for a reaction is given below. Write its overall reaction.

$$A_2 \rightleftharpoons 2A; \quad k_f = 10^{10} \text{ s}^{-1}; k_b = 10^{10} \text{ s}^{-1}$$

$$A + C \rightarrow AC; k = 10^{-4} \text{ s}^{-1} \text{ (slow)}$$
 Calculate:
 - Value of equilibrium constant for the first step.
 - Rate law equation for the overall reaction in terms of initial concentrations.[Ask Filo](#)
- The rate constant for the reaction, $2N_2O_5 \rightarrow 4NO_2 + O_2$ is $3.0 \times 10^{-5} \text{ s}^{-1}$. If the rate is $2.40 \times 10^{-5} \text{ mol L}^{-1} \text{ s}^{-1}$, then calculate the initial concentration of N_2O_5 (in mol L^{-1}). [Ask Filo](#)
- The rate constant for the decomposition of hydrocarbons is $2.418 \times 10^{-5} \text{ s}^{-1}$ at 546 K . If the energy of activation is $179.9 \text{ kJ mol}^{-1}$, what will be the value of pre-exponential factor? [Ask Filo](#)
- Why on dilution the Λ_m of CH_3COOH increases drastically, while that of CH_3COONa increases gradually? [Ask Filo](#)
- Conductivity of 0.00241 M acetic acid is $7.896 \times 10^{-5} \text{ S cm}^{-1}$. Calculate its molar conductivity and if Λ_m° for acetic acid is $390.5 \text{ S cm}^2 \text{ mol}^{-1}$, what is its dissociation constant? [Ask Filo](#)
- The molar conductivities of acetic acid at 298 K at the concentrations of 0.1 M and 0.001 M are 5.20 and $49.2 \text{ S cm}^2 \text{ mol}^{-1}$ respectively. Calculate the degree dissociation of acetic acid at these concentrations. Given that, $\lambda^\circ(H^+)$ and $\lambda^\circ(CH_3COO^-)$ are 349.8 and $40.9 \text{ ohm}^{-1} \text{ cm}^2 \text{ mol}^{-1}$ respectively. [Ask Filo](#)
- The value of Λ_m° of $Al_2(SO_4)_3$ is $858 \text{ S cm}^2 \text{ mol}^{-1}$, while $\lambda_{SO_4^{2-}}^\circ$ is $160 \text{ S cm}^2 \text{ mol}^{-1}$. Calculate the limiting ionic conductivity of Al^{3+} . [Ask Filo](#)
- Calculate the cell emf and ΔG for the cell reaction at $25^\circ C$ for the cell:

$$Zn|Zn^{2+}(1 \text{ M})||Cd^{2+}(1 \text{ M})|Cd$$
 Given : E° values at $25^\circ C$: $E_{Zn^{2+}|Zn}^\circ = -0.76 \text{ V}$ and $E_{Cd^{2+}|Cd}^\circ = -0.403 \text{ V}$; $1 \text{ F} = 96500 \text{ C mol}^{-1}$, $R =$
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$$8.314 \text{ J K}^{-1} \text{ mol}^{-1}.$$

14. Discuss chromyl chloride test.

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15. Why Transition elements form (a) Interstitial compounds (b) Alloys?

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16. Write all the geometrical isomers of $[Pt(NH_3)(Br)(Cl)(Py)]$ and how many of these will exhibit optical isomerism?

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17. Give simple chemical tests to distinguish between the following pairs of compounds: (a) Propanal and Propanone (b) Acetophenone and Benzophenone (c) Phenol and Benzoic acid

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18. How will you convert

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(a) Methyl chloride to chloroacetic acid?

(b) Toluene to *m*-Bromobenzoic acid?

19. A compound *A* on oxidation gives $B(C_2H_4O_2)$. *A* reacts with dil. *NaOH* and on subsequent heating forms *C*. *C* on catalytic hydrogenation gives *D*. Identify *A*, *B*, *C* and *D* and write down the reactions involved.

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20. Give the different products obtained when but-1-yne undergoes.

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(a) Hydroboration oxidation reaction

(b) Hydrolysis in the presence of Hg^{2+} and H^+ .

21. Write the limitations of valence bond theory.

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22. Using valence bond approach, predict the shape and magnetic character of:

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(a) $[Ni(CO)_4]$

(b) $[NiCl_4]^{2-}$

Atomic number of Ni is 28.

23. Explain the following:

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(a) $[Co(NH_3)_6]^{3+}$ is diamagnetic, whereas $[CoF_6]^{3-}$ is paramagnetic.

(b) $[Fe(H_2O)_6]^{+3}$ is more paramagnetic than $[Fe(CN)_6]^{3-}$.

24. Deduce the shape and magnetic behaviour of the complex ion $[Co(NH_3)_5NO_2]^{2+}$.
[Atomic number of Co = 27]

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25. Using the valence bond approach, predict the shape and magnetic behaviour of $[CoCl_4]^{2-}$.
[Given atomic number of Co = 27]

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26. Draw a sketch to show the splitting of *d*-orbitals in an octahedral crystal field. State for a d^6 ion how the actual configuration of the splitting *d*-orbitals in an octahedral crystal field is decided by the relative values of Δ_0 and *P*.

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27. Give evidence that $[Co(NH_3)_5Cl]SO_4$ and $[Co(NH_3)_5SO_4]Cl$ are ionization isomers.

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28. If E_{red}^o for copper electrode is + 0.34 V. How will you calculate its electrode potential when it is in contact with 0.1 M Co^{2+} ions? How does electrode potential change if concentration of Co^{2+} in solution is decreased?

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29. The half-life period of a first order reaction is 30 minutes. Calculate the specific reaction rate of the reaction. What fraction of the reactant remains after 70 minutes? [Ask Filo](#)
30. First order reaction is 15% complete in 20 minutes. How long will it take to be 60% complete? [Ask Filo](#)
31. How will you carry out the following conversions?
(a) Benzoic acid to *p*-nitro benzoic acid
(b) Propanoic acid to propenoic acid [Ask Filo](#)
32. An organic compound (A), $C_8H_4O_3$ in dry benzene in the presence of anhydrous $AlCl_3$ gives compound (B). The compound (B) on treatment with PCl_5 followed by reaction with $H_2/Pd(BaSO_4)$ gives compound (C) which on reaction with hydrazine gives a cyclised compound (D) ($C_{14}H_{10}N_2$). Identify (A), (B), (C), and (D). Explain the formation of (D) from (C). [Ask Filo](#)
33. A first order reaction is 20% complete in 10 minutes. Calculate the time for 75% completion of the reaction. [Ask Filo](#)
34. Describe the following types of colloids, giving an example for each:
(a) Multimolecular colloids
(b) Macromolecular colloids [Ask Filo](#)
35. Explain the following terms:
(a) Peptization
(b) Dialysis
(c) Hardy-Schulze rule. [Ask Filo](#)
36. (a) Give balanced chemical equations of two reactions in which $KMnO_4$ acts as an oxidising agent in the acidic medium.
(b) Give reasons:
(i) Cr^{2+} is a strong reducing agent whereas Mn^{2+} is not. [$Cr = 24, Mn = 25$]
(ii) The transition metal ions such as Cu^+ , Ag^+ and Sc^{3+} are colourless.
(iii) Chemistry of the actinoids is much more complicated than that of the lanthanoids. [Ask Filo](#)
37. Compare the chemistry of actinoids with that of the lanthanoids with special reference to:
(a) Electronic configuration
(b) Oxidation state
(c) Atomic and ionic sizes [Ask Filo](#)
38. Why are the ionization energies of *5d* elements greater than those of *3d* and *4d* elements? [Ask Filo](#)
39. Assign reason for each of the following:
(a) Ce^{3+} can be easily oxidised to Ce^{4+} .
(b) E° for $Mn^{3+}|Mn^{2+}$ couple is more positive than for $Fe^{3+}|Fe^{2+}$ couple.
(c) $Lu(OH)_3$ is a weaker base than $La(OH)_3$. [Ask Filo](#)
40. The standard reduction potential for the half cell:
 $NO_3^- + 2H^+ + e^- \longrightarrow NO_2(g) + H_2O$ is 0.78 V
(a) Calculate the reduction potential in 8 M H^+ solution.
(b) What will be the reduction potential of the half cell in a neutral solution? [Ask Filo](#)

Assume other species to be at unit concentration.

41. Draw the structures of

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- (a) mer-triamminetrichloridocobalt (III)
- (b) fac-triaquatrininitro-N-cobalt (III)
- (c) cis-dichloridotetracyanochromate (III)

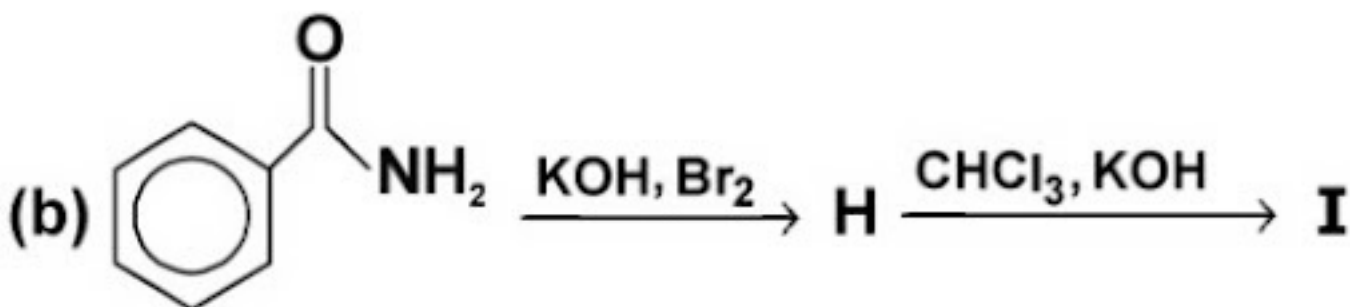
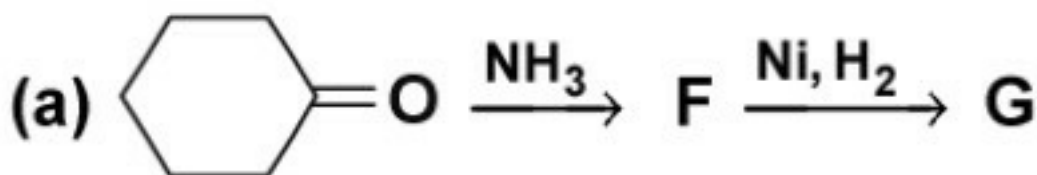
42. Arrange the following compounds in increasing order of their reactivity in nucleophilic addition reactions. Explain.

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- (a) Ethanal, Propanal, Propanone, Butanone
- (b) Benzaldehyde, *p*-Tolualdehyde, *p*-Nitrobenzaldehyde, Acetophenone

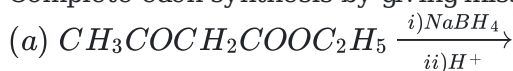
43. Complete the given reactions:

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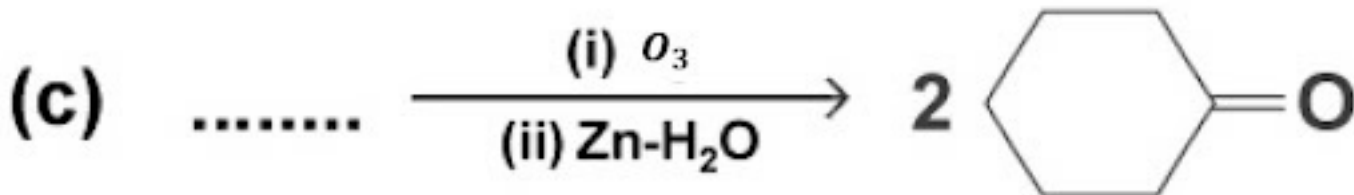
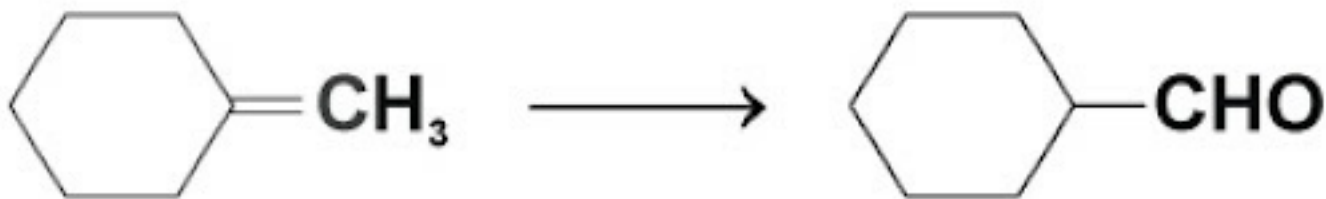


44. Complete each synthesis by giving missing starting material, reagent, products given below:

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(b)



45. An organic compound (A) with molecular formula C_8H_8O forms an orange red precipitate with 2, 4-DNP reagent and gives yellow precipitate on heating with iodine in the presence of sodium hydroxide. It neither reduces Tollen's reagent or Fehling solution, nor does it decolourise bromine water or Baeyer's reagent. On drastic oxidation with chromic acid, it gives a carboxylic acid (B) having

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molecular formula $C_7H_6O_2$. Identify the compound (A) and (B) and explain the reactions involved

46. What is meant by the following terms? Give an example of preparation.

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- (a) Cyanohydrin
- (b) Ketal
- (c) 2,4-DNP-derivative

47. Explain the following:

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- (a) Mercuric chloride is called corrosive sublimate.
- (b) The colour of mercurous chloride changes from white to black when treated with ammonia solution.
- (c) Excess of carbon is added in the zinc metallurgy.
- (d) Zinc readily liberates hydrogen from cold dilute H_2SO_4 but not from cold concentrated H_2SO_4 .
- (e) The compounds of Zn, Cd and Hg are usually white.

48. Give possible explanation for each of the following:

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- (a) Cyclohexanone forms cyanohydrin in good yield but 2,2,6-trimethylcyclohexanone does not.
- (b) There are two $-NH_2$ groups in semicarbazide. However, only one is involved in the formation of semicarbazones.
- (c) During the preparation of esters from a carboxylic acid and an alcohol in the presence of an acid catalyst, the water or the ester should be removed as fast as it is formed.

49. Explain the following:

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- (a) Magnesium oxide is used for lining of steel making furnace.
- (b) Cast iron is hard but pure iron is soft in nature.
- (c) Fe^{3+} is more stable than Fe^{2+} .
- (d) Anhydrous $FeCl_3$ cannot be obtained by heating hydrated ferric chloride.
- (e) The compounds of iron are colored and paramagnetic.

50. (a) An organic compound (A) has molecular formula ($C_5H_{10}O$). It does not reduce Tollens reagent but forms an orange precipitate with 2, 4-DNP reagent. Give yellow precipitate on treatment with $NaOH$ and I_2 . Under vigorous conditions on oxidation it gives carboxylic acid (B) and ethanoic acid. Sodium salt of (B) gave a hydrocarbon (C) in Kolbe's electrolytic reduction. Identify (A), (B) and (C) and write the reactions involved.

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(b) Predict the products forms in the following cases:

- (i) (A) reacts with $PhMgBr$ and is then hydrolysed.
- (ii) (A) reacts with hydrazine and is then heated with KOH and ethylene glycol.

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