

Mock Test

SECTION - A

Read the given passage and answer the questions 1 to 5 that follow:

All the noble gases have a stable general electronic configuration of $ns^2 np^6$ except helium which has $1s^2$ -configuration. Thus, these elements have no tendency either to lose, gain or share electrons with the atoms of other elements, i.e. their combining capacity or valency is zero. Thus, they have very high ionisation enthalpy and large positive value of electron gain enthalpy.

1. Why do noble gases have very low boiling points?
2. Why do noble gases have comparatively large atomic sizes?
3. Why are the elements of group 18 known as noble gases?
4. Which noble gas is used in filling balloons for meteorological observations?
5. Explain why no chemical compound of helium is known.

Questions 6 to 10 are one word answers:

6. Which method is used for the refining of metals when a metal is required of very high purity?
7. Write IUPAC name of $\text{CH}_3 - \text{CH} - \text{CH}_2 - \text{CH} = \text{CH}_2$.



8. Which of the following complex is more stable, $[\text{Co}(\text{NH}_3)_6]^{3+}$ or $[\text{Co}(\text{CO})_6]^{3+}$?
9. Name the method used for the refining of Zirconium metal.
10. What kind of drug is phenacitin?

Question 11 to 15 are multiple choice questions

11. How many faradays of electricity required for conversion of 1 mol Al_2O_3 to Al.
(a) 2 F (b) 3 F (c) 6 F (d) 5 F
12. Unit of k for the reaction having rate law equation, $\text{rate} = k[\text{A}]^{3/4} [\text{B}]^{1/4}$
(a) $\text{mol L}^{-1} \text{s}^{-1}$ (b) mol L^{-1} (c) s^{-1} (d) $\text{L mol}^{-1} \text{s}^{-1}$
13. The van't Hoff factor of benzoic acid solution in benzene is 0.5. In this solution benzoic acid
(a) Dissociated (b) forms dimer (c) remains as such (d) forms trimer
14. The rate law for the reaction
 $\text{RCI} + \text{NaOH} \rightarrow \text{ROH} + \text{NaCl}$
Is given as $\text{Rate} = k[\text{RC}]$. The rate of the reaction is
(a) Doubled by doubling the concentration of NaOH.
(b) Halved by reducing the concentration of RCI by half.
(c) Increased by decreasing the temperature of the reaction.
(d) Unaffected by change in concentration of any reactant.
15. Which of the following is lyophilic in nature?
(a) Gum (b) Sulphur (c) Arsenic (As_2S_3) (d) Iron ($\text{Fe}(\text{OH})_3$)

Questions 16 to 20 are assertion & Reason Type Questions.

Use the following key to select the correct answer.

- (a) If both assertion and reason are correct and reason is correct explanation for assertion
 - (b) If both assertion and reason are correct but reason is not correct explanation for assertion.
 - (c) If assertion is correct but reason is incorrect.
 - (d) If assertion and reason both are incorrect.
16. Assertion: In physisorption, adsorption decreases with increase in temperature
Reason: Physisorption is exothermic in nature
 17. Assertion: The boiling point of 0.1 M urea is less than 0.1M KCl solution
Reason: Elevation of boiling point is directly proportional to the number of species present in the solution.
 18. Assertion: Cu^{2+} iodide is not known.
Reason: Cu^{2+} oxidises I to iodine.
 19. Assertion: The highest oxidation state of osmium is +8.

Reason: Osmium is a 5d-block element.

20. Assertion: $[\text{Fe}(\text{CN})_6]^{3-}$ ion shows magnetic moment corresponding to two unpaired electrons.
Reason: Because it has d^2sp^3 type hybridisation.

SECTION: B

21. Draw the structure of following molecules:
(a) IF_4^- (b) XeF_6
22. Calculate ΔG^0 for the following cell at 298 K.
 $\text{Mg(s)} \mid \text{Mg}^{2+} \parallel \text{Cu}^{2+} \mid \text{Cu}$, $E^0_{\text{Mg}^{2+}/\text{Mg}} = -2.37 \text{ V}$ and $E^0_{\text{Cu}^{2+}/\text{Cu}} = +0.34 \text{ V}$.

OR

Can we store copper sulphate in an iron vessel? Why or why not?

$E^0_{\text{Cu}^{2+}/\text{Cu}} = +0.34 \text{ V}$, $E^0_{\text{Fe}^{2+}/\text{Fe}} = -0.44 \text{ V}$.

23. (a) What is role of desorption in process of catalysis?
(b) Write brief mechanism of enzyme catalysis.
24. 0.05 M NaOH solution offered a resistance of 31.6 ohm in a conductivity cell at 298 K. If cell constant of the cell is 0.367 cm^{-1} . Calculate the molar conductivity of NaOH solution.

OR

What advantage do the fuel cell have over primary and secondary batteries?

25. Calculate mass of glucose (molar mass 180g/mol) to be diluted in 60 g of H_2O to lower the freezing point of its solution by 0.93 K (K_f for H_2O is $1.86 \text{ K kg mol}^{-1}$)
26. Name the central metal ion present in (i) Haemoglobin, (ii) vitamin B_{12} .
27. What is the significance of vitamin C in our daily life?

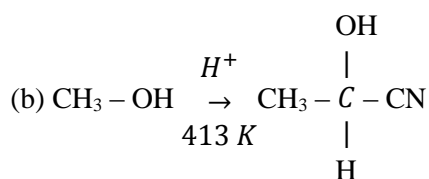
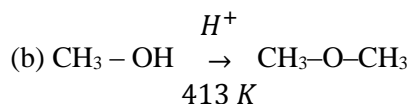
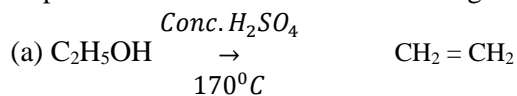
SECTION: C

28. (a) Which solution is used for the leaching of gold metal in the presence of air in the metallurgy of gold?
(b) Out of C and CO, which is better reducing agent at lower temperature for extraction of iron from its oxide ore.
(c) Write the principle involved in zone refining.
29. (a) Chlorobenzene is less soluble in water as compared to chloroethane. Explain.
(b) Which will show faster $\text{S}_{\text{N}}1$ reaction and why?
 $\text{C}_6\text{H}_5\text{CH}_2\text{Cl}$ or $\text{C}_6\text{H}_5\text{CH}(\text{Cl})\text{C}_6\text{H}_5$.



(c) Which of the following will be optically active: 2-chlorobutane or 1-chlorobutane?

30. Explain the mechanism of the following reactions:

**OR**

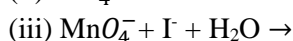
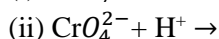
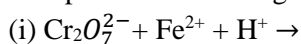
Give one chemical test to distinguish between the following compounds:

- (i) Methanol and ethanol
(ii) tert. butyl alcohol and n-butyl alcohol

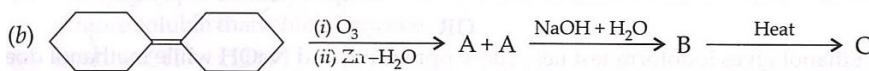
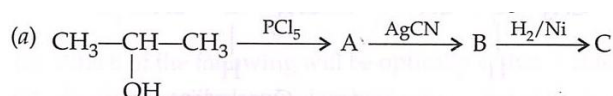
- (iii) Ethanol and Isopropyl alcohol
31. (a) Define the limiting molar conductivity.
(b) State Kohlrausch's law.
(c) Define corrosion.
32. How would you account for the following?
(i) Transition metal exhibits variable oxidation state.
(ii) Zr ($Z = 40$) and Hf ($Z = 72$) have almost identical radii.
(iii) Transition metals and their compounds act as complexing agents.

OR

Complete the following chemical equations:



33. Give the structure of A, B and C in the following reactions:



34. Write the name and structure of the monomers of the following polymers
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- (a) Buna - N (b) Nylon-2,6 (c) Dacron

SECTION - D

35. Account for the following:
(a) pK_b of aniline is more than that of methylamine.
(b) Methylamine in water reacts with FeCl_3 to form hydrated ferric oxide.
(c) Primary amines have higher boiling point than tertiary amines.
(d) Complete the following equations:
(i) $\text{C}_6\text{H}_5\text{N}_2\text{Cl} + \text{C}_2\text{H}_5\text{OH} \rightarrow$
(ii) $\text{C}_6\text{H}_5\text{NH}_2 + (\text{CH}_3\text{CO})_2\text{O} \rightarrow$
- OR
- (a) Give one chemical test to distinguish between:
(i) Methylamine and dimethylamine
(ii) Aniline and Benzylamine
- (b) How will you convert:
(i) Ethanoic acid to Methanamine
(ii) Aniline to p - bromoaniline
- (c) Arrange according to increasing basic strength: $\text{C}_6\text{H}_5\text{NH}_2$, $\text{C}_6\text{H}_5\text{N}(\text{CH}_3)_2$, $(\text{C}_2\text{H}_5)_2\text{NH}$, CH_3NH_2
36. (a) The rate constant for a first order reaction is 60 s^{-1} . How much time will it take to reduce the initial concentration of the reactant to its $1/16^{\text{th}}$ value?
(b) Differentiate between order and molecularity of reaction.
(c) Write unit of rate constant (k) for
(i) First order reaction
(ii) Second order reaction

OR

- (a) The rate of a reaction quadruples when the temperature changes from 290 K to 310 K, calculate the activation energy for this reaction.
(b) A reaction is first order with respect to P and second order with respect to Q, write the differential rate equation for it.
(c) Write factors (any two) that affect the rate of a chemical reaction.
(d) Define specific rate constant.

37. (a) Phenol is more acidic than cyclohexanol. How?
(b) Which is steam volatile, 2-nitrophenol or 4-nitrophenol and why?
(c) Explain following name reactions with a suitable chemical reaction.
(i) Sandmeyer's reaction
(ii) Cannizzaro's reaction

OR

- (a) Write the reaction of glucose with HI.
(b) Name the force responsible for stabilisation of secondary structure of protein.
(c) Arrange according to the given instructions in increasing order:
(i) Phenol, Methoxyphenol, 2, 4-Dinitrophenol (acidic strength)

