

PM SHRI KENDRIYA VIDYALAYA SITAPUR SHIFT-1

PT-1 SESSION 2025-26

TIME-90 MIN

SUBJECT- CHEMISTRY

M.M.-40

1. Which of the following is a colligative property?
a) Ph b) Boiling point elevation c) Refractive index
d) Surface tension
2. The van't Hoff factor for K_2SO_4 in aqueous solution is:
a) 1 b) 2 c) 3
d) 4
3. Which law relates molar conductivity to concentration?
a) Raoult's law b) Faraday's law c) Kohlrausch's law
d) Henry's law
4. Which of the following metals shows the maximum number of oxidation states?
a) Fe b) Mn c) Cu
d) Zn
5. The colour of transition metal compounds is mainly due to:
a) d-d transitions b) s-s transitions c) p-p transitions
d) f-f transitions
6. Which of the following is used to make a salt bridge in electrochemical cells?
a) NaCl b) KNO_3 c) $CuSO_4$
d) HCl
7. Which of the following is an ideal solution?
a) Benzene + Toluene b) Acetone + Water c) Ethanol + Water
d) HCl + Water
8. Faraday's first law of electrolysis states that:
a) Mass deposited \propto current b) Mass deposited \propto time
c) Mass deposited \propto charge d) Mass deposited \propto voltage

These questions consist of two statements, each printed as Assertion and Reason. While answering these questions, you are required to choose any one of the following four responses.

(a) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.

(b) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.

(c) If the Assertion is correct but Reason is incorrect.

(d) If both the Assertion and Reason are incorrect.

9.Assertion : Cuprous ion (Cu^+) has unpaired electrons while cupric ion (Cu^{++}) does not.

Reason : Cuprous ion (Cu^+) is colourless whereas cupric ion (Cu^{++}) is blue in the aqueous solution

10.Assertion: On increasing dilution, the specific conductance keeps on increasing.

Reason: On increasing dilution, the degree of ionisation of weak electrolyte increases, and molality of ions also increases

Section A – Very Short Answer (1 mark each)

11. Define osmotic pressure.

12. State Henry's law?

13. Write the cell reaction and cell notation for the Daniell cell.

14. Why is Mn^{2+} more stable than Fe^{2+} towards oxidation to +3 state?

15. What is semi permeable membrane ? give one example.

Section B – Short Answer I (2 marks each)

16. Calculate the boiling point elevation when 0.2 mol of NaCl is dissolved in 1 kg of water. ($K_b = 0.52 \text{ K kg/mol}$)

17. State Kohlrausch's law and give one application.

18. Write the electronic configuration of Cu^+ and explain why it is not stable in aqueous solution.

19. What is lanthanoid contraction? Mention two consequences.

20. Differentiate positive and negative deviation from ideal solution with suitable example.

Section C – Short Answer II (3 marks each)

21. X and Y are two electrolytes, on dilution, molar conductivity of X increases 2.5 times while that of Y increases 25 times. Which of the two is a weak electrolyte and why?

22. Calculate the EMF of the cell:



Given: $E^\circ(\text{Zn}^{2+}/\text{Zn}) = -0.76 \text{ V}$, $E^\circ(\text{Cu}^{2+}/\text{Cu}) = +0.34$

Or

Define a) Cell constant b) Conductivity c) Standard hydrogen electrode

23. Account for the following

a) Zn, Cd and Hg are volatile metals.

b) Cr has highest melting point.

c) Sc salts are colourless.

24.a) 100 grams of ethylene glycol is added to 500 grams of water. Find the depression in freezing point, given that the cryoscopic constant (K_f) of water is $1.86^\circ\text{C}/\text{m}$.

b) Why do azeotropes form? Give an example of maximum boiling azeotrope.

25.a) State Faraday's first law of electrolysis.

b) Calculate the mass of copper deposited when a current of 2 A is passed through CuSO_4 solution for 30 minutes. ($M = 63.5 \text{ g/mol}$, $n = 2$, $F = 96500 \text{ C/mol}$)