

100 Practice Numerical Problems with Answers

Section A: Basic Concepts (1–20)

1. Calculate EMF if $E^\circ_{\text{cell}} = 1.10 \text{ V}$ → **Answer: 1.10 V**
2. Convert 2 Faraday into charge → **Answer: 193000 C**
3. Charge required for 1 mole electrons → **Answer: 96500 C**
4. EMF when cathode = 0.34 V, anode = -0.76 V → **Answer: 1.10 V**
5. ΔG° for $n=2$, $E^\circ=1.1 \text{ V}$ → **Answer: -212.3 kJ**
6. Oxidation number change in Zn → **Answer: +2**
7. Faradays for 2 mol electrons → **Answer: 2 F**
8. Voltage of Daniell cell → **Answer: 1.10 V**
9. Standard hydrogen electrode potential → **Answer: 0 V**
10. Cell potential if both electrodes equal → **Answer: 0 V**
11. Unit of EMF → **Answer: Volt**
12. Charge of 0.5 mol electrons → **Answer: 48250 C**
13. n-factor of $\text{Cu}^{2+} \rightarrow \text{Cu}$ → **Answer: 2**
14. Number of electrons in $\text{Fe}^{3+} \rightarrow \text{Fe}^{2+}$ → **Answer: 1**
15. Faraday constant → **Answer: 96500 C/mol**
16. Cathode reaction in Daniell cell → **Answer: $\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}$**
17. Anode reaction → **Answer: $\text{Zn} \rightarrow \text{Zn}^{2+} + 2\text{e}^-$**
18. Sign of ΔG for spontaneous → **Answer: Negative**
19. Relation ΔG and E → **Answer: $\Delta G = -nFE$**
20. Units of ΔG → **Answer: Joules**

Section B: Nernst Equation (21–40)

21. EMF at 298K, $n=1$, $Q=10$ → **Answer: $E = E^\circ - 0.059$**
22. $\log(1)$ → **Answer: 0**
23. If $Q=1$, $E=$ → **Answer: E°**
24. EMF when $Q=100$ → **Answer: $E^\circ - 0.118 \text{ V}$**
25. If $E^\circ=1\text{V}$, $Q=10$ → **Answer: 0.941 V**
26. Temperature constant (298K) → **Answer: 0.0591**
27. If $n=2$, constant → **Answer: 0.0295**
28. EMF decreases when Q → **Answer: Increases**
29. Equilibrium EMF → **Answer: 0**
30. If $Q=K$ → **Answer: $E=0$**
31. $\log 10 =$ → **Answer: 1**
32. $\log 100 =$ → **Answer: 2**
33. Effect of concentration increase → **Answer: EMF changes**
34. Nernst equation unit → **Answer: Volt**
35. E when Q very small → **Answer: High**
36. E when Q large → **Answer: Low**

37. n increases \rightarrow effect \rightarrow **Answer: Smaller change**
 38. Temperature increases \rightarrow **Answer: EMF changes**
 39. Standard condition temp \rightarrow **Answer: 298K**
 40. Gas constant value \rightarrow **Answer: 8.314 J/mol·K**

Section C: Electrolysis (41–70)

41. Charge for 1 mol Ag deposition \rightarrow **Answer: 96500 C**
 42. $\text{Ag}^+ + \text{e}^- \rightarrow \text{Ag}$, $n =$ \rightarrow **Answer: 1**
 43. Cu^{2+} needs electrons \rightarrow **Answer: 2**
 44. Mass deposited formula \rightarrow **Answer: $m = ZIt$**
 45. Z unit \rightarrow **Answer: g/C**
 46. Current unit \rightarrow **Answer: Ampere**
 47. 1 A for 1 sec \rightarrow charge \rightarrow **Answer: 1 C**
 48. 2 A for 10 s \rightarrow **Answer: 20 C**
 49. 96500 C deposits Ag \rightarrow **Answer: 108 g**
 50. 48250 C deposits Ag \rightarrow **Answer: 54 g**
 51. Equivalent weight of Cu \rightarrow **Answer: 31.75**
 52. $m \propto Q$ \rightarrow **Answer: True**
 53. $m \propto I$ \rightarrow **Answer: True**
 54. $m \propto t$ \rightarrow **Answer: True**
 55. Faraday law number \rightarrow **Answer: 2**
 56. Electrolysis is \rightarrow **Answer: Non-spontaneous**
 57. Cathode reaction \rightarrow **Answer: Reduction**
 58. Anode reaction \rightarrow **Answer: Oxidation**
 59. Gas evolved depends on \rightarrow **Answer: Electrolyte**
 60. H_2 formed requires \rightarrow **Answer: 2 electrons**
 61. O_2 formation electrons \rightarrow **Answer: 4**
 62. Charge for O_2 (1 mol) \rightarrow **Answer: 386000 C**
 63. 1F deposits \rightarrow **Answer: 1 equivalent**
 64. Electroplating uses \rightarrow **Answer: Electrolysis**
 65. Unit of Z \rightarrow **Answer: g/C**
 66. Efficiency formula \rightarrow **Answer: Actual/Theoretical $\times 100$**
 67. Current density unit \rightarrow **Answer: A/m²**
 68. Time unit \rightarrow **Answer: sec**
 69. Coulomb definition \rightarrow **Answer: Charge unit**
 70. Electrolyte conducts via \rightarrow **Answer: Ions**

Section D: Advanced Numericals (71–100)

71. $\Delta G = -nFE$, $n=1$, $E=1$ \rightarrow **Answer: -96500 J**
 72. ΔG for $n=2$, $E=1.5$ \rightarrow **Answer: -289500 J**
 73. K from $E^\circ=1$ \rightarrow **Answer: $\sim 10^{17}$**
 74. logK relation \rightarrow **Answer: $nE^\circ/0.059$**
 75. If $E^\circ=0$ \rightarrow **Answer: $K=1$**

76. E° positive → **Answer: $K > 1$**
77. E° negative → **Answer: $K < 1$**
78. Corrosion is → **Answer: Electrochemical**
79. Rusting involves → **Answer: Fe oxidation**
80. Fuel cell converts → **Answer: Chemical to electrical**
81. Battery stores → **Answer: Electrical energy**
82. Lead-acid battery voltage → **Answer: 2 V**
83. Dry cell voltage → **Answer: 1.5 V**
84. Lithium battery voltage → **Answer: ~3.7 V**
85. EMF unit → **Answer: Volt**
86. Internal resistance unit → **Answer: Ohm**
87. Ohm's law → **Answer: $V = IR$**
88. Conductivity unit → **Answer: S/m**
89. Resistivity unit → **Answer: $\Omega \cdot m$**
90. Specific conductance symbol → **Answer: κ**
91. Molar conductance unit → **Answer: $S \cdot cm^2/mol$**
92. Kohlrausch law applies → **Answer: Strong electrolytes**
93. Degree of dissociation → **Answer: α**
94. Weak electrolyte α increases with → **Answer: Dilution**
95. Conductance increases with → **Answer: Temperature**
96. Ionic mobility unit → **Answer: $cm^2/V \cdot s$**
97. Transference number sum → **Answer: 1**
98. Cathode gain mass → **Answer: Positive**
99. Anode loses mass → **Answer: True**
100. EMF independent of → **Answer: Size of electrodes**