Class 12 Chemistry · Chapter 2: Electrochemistry

Worksheet · 20 marks · about 40 minutes · based on NCERT

Name _____ Class and section _____ Date _____

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1. Given E°/V: $Na^+|Na$ −2.71, $Mg^{2+}|Mg$ −2.36, $Al^{3+}|Al$ −1.66, $Zn^{2+}|Zn$ −0.76. The strongest reducing agent among the four metals in aqueous solution is [1]

(a) Zn (b) Na
(c) Mg (d) Al

2. Given E°/V: $Ag^+|Ag$ 0.80, $Cu^{2+}|Cu$ 0.34, $Ni^{2+}|Ni$ −0.25, $Au^{3+}|Au$ 1.40. Which metal can liberate hydrogen from 1 M HCl under standard conditions? [1]

(a) Ag (b) Cu
(c) Au (d) Ni

3. Two hydrogen electrodes, each with H_2 at 1 bar, dip in buffer solutions of pH 2 and pH 5 and are joined by a salt bridge. At 298 K (2.303RT/F = 0.059 V) the emf of the cell is [1]

(a) 0.413 V (b) 0.177 V
(c) 0.295 V (d) 0.118 V

4. At 298 K, the electrode potential of a copper rod in 0.010 M $CuSO_4$ is ($E°(Cu^{2+}|Cu)$ = 0.34 V; take 2.303RT/F = 0.059 V) [1]

(a) 0.222 V (b) 0.399 V
(c) 0.311 V (d) 0.281 V

5. Given $E°(Al^{3+}|Al)$ = −1.66 V and $E°(Ni^{2+}|Ni)$ = −0.25 V, the standard emf of the cell Al(s) | Al^{3+}(aq) || Ni^{2+}(aq) | Ni(s) is [1]

(a) −1.41 V (b) 1.41 V
(c) 1.91 V (d) 2.82 V

6. Sodium metal cannot be obtained by electrolysing aqueous NaCl. Give the reason, and state how sodium is obtained by electrolysis. [2]

7. State the two conditions iron needs in order to rust, and write the formula of rust. [2]

8. Distinguish a primary battery from a secondary battery, naming one example of each. [2]

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9. For the lead storage battery while it is being discharged, write (i) the anode reaction, (ii) the cathode reaction, and (iii) explain why the density of the electrolyte can be used to tell how far the battery has run down. [3]

10. Using E°/V: MnO_4^-/Mn^{2+} 1.51, Cl_2/Cl^- 1.36, Pb^{2+}/Pb −0.13, Ni^{2+}/Ni −0.25, Fe^{2+}/Fe −0.44, Zn^{2+}/Zn −0.76, answer with a reason from E°cell: (i) Why is dilute HCl not used to acidify the solution in a titration with $KMnO_4$? (ii) A nickel-plated stirrer is left in $Pb(NO_3)_2$ solution. What forms on its surface? (iii) Can zinc be recovered from a $ZnSO_4$ effluent by adding scrap iron? [3]

11. Chloroacetic acid, $ClCH_2COOH$, has $K_a = 1.29 \times 10^{-3}$ mol L^{-1} at 298 K. Given $\lambda°(H^+) = 349.6$ and $\lambda°(ClCH_2COO^-) = 40.4$ S cm^2 mol^{-1}, calculate for its 0.010 M solution the degree of dissociation ($1 - \alpha$ cannot be neglected), the molar conductivity and the conductivity. [3]

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