



INDIAN SCHOOL NIZWA - WORKSHEET

CHEMISTRY

CHAPTER: 2 ELECTROCHEMISTRY

Name: _____

Date: _____

Class: XII Sec: ____

Answer the following

1. Depict the galvanic cell in which the following reaction takes place.
$$\text{Ni(s)} + 2 \text{Ag}^+(\text{aq}) \rightarrow \text{Ni}^{2+}(\text{aq}) + 2 \text{Ag(s)}$$
2. Why is equilibrium constant K related to only E^0 cell and not E_{cell} ?
3. Suggest a way to determine the ΔG^0 value of water.
4. Electrolysis of KBr (aq) gives Br_2 at anode but of KF (aq) does not give F_2 . Give reason for disparity in behavior.
5. What type of metals can be used in cathodic protection of iron against rusting?
6. Use the data to answer the following and also justify giving reason:

E^0 values	Cr	Mn	Fe	Co
$E^0 \text{M}^{2+}/\text{M}$	-0.91	- 1.18	-0.44	-0.28
$E^0 \text{M}^{3+}/\text{M}^{2+}$	- 0.41	+1.57	+0.77	+1.97

- a) Which is a stronger reducing agent in aqueous medium, Cr^{2+} or Fe^{2+} and why?
 - b) Which is the most stable ion in +2 oxidation and why?
7. Calculate the cell potential of the following cell at 25°C .
$$\text{Sn}^{4+}(1.5\text{M}) + \text{Zn} \rightarrow \text{Sn}^{2+}(0.5 \text{M}) + \text{Zn}^{2+}(2\text{M})$$

given $E^0(\text{Sn}^{4+}/\text{Sn}^{2+}) = - 0.154 \text{ V}$ and $E^0 \text{Zn}^{2+}/\text{Zn} = -0.76 \text{ V}$.
Will the cell potential increase or decrease if the concentration of Sn^{4+} is increased?
 8. Calculate ΔrG^0 and $\log K_c$ for the following reaction:
$$\text{Cd}^{2+}(\text{aq}) + \text{Zn}(\text{s}) \rightarrow \text{Zn}^{2+}(\text{aq}) + \text{Cd}(\text{s})$$

Given $E^0 \text{Cd}^{2+}/\text{Cd} = -0.403 \text{ V}$ $E^0 \text{Zn}^{2+}/\text{Zn} = - 0.763 \text{ V}$
 9. Determine the equilibrium constant for the following at 298 K.
$$2 \text{Fe}^{3+} + \text{Sn}^{2+} \rightarrow 2\text{Fe}^{2+} + \text{Sn}^{4+}$$

 $E^0(\text{Fe}^{3+}/\text{Fe}^{2+}) = 0.771 \text{ V}$ and $E^0 \text{Sn}^{4+}/\text{Sn}^{2+} = 0.154 \text{ V}$. From the value of K_c predict whether Sn^{2+} can reduce Fe^{3+} to Fe^{2+} quantitatively or not.



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10. A voltaic cell is set up at 25 °C with the following half cells:
Al / Al³⁺ (0.0010M) and Ni/Ni²⁺ (0.50 M) Given E⁰ Ni²⁺ /Ni = 0.25 V, E⁰ Al³⁺ /Al = - 1.66 V
Write the Nernst equation for the cell reaction that occurs when the cell generates an electric current and determine the cell potential.
11. If specific conductance of 0.25M KCl at 25 °C is 2.56 x 10⁻² S/cm, find Λ_m .
12. Chromium metal is electroplated using an acidic solution containing CrO₃ according to the following equation:
$$\text{CrO}_3(\text{aq}) + 6 \text{H}^+ + 6\text{e}^- \rightarrow \text{Cr}(\text{s}) + 3 \text{H}_2\text{O}$$
- 13.. Calculate how many grams of chromium will be electroplated by 24000 coulombs. How long will it take to electroplate 1.5 g chromium using 12.5 A current?
[Atomic mass of Cr = 52 g mol⁻¹ , 1 F = 96500 C mol⁻¹]
14. How many hours does it take to reduce 3 mols of Fe³⁺ to Fe²⁺ with a current of 2 amps?
15. How do fuel cells resemble and differ from galvanic cell?
16. Calculate Λ^0_m for acetic acid, given that
 $\Lambda^0_m(\text{HCl}) = 426 \text{ S cm}^2 \text{ mol}^{-1}$
 $\Lambda^0_m (\text{NaCl}) = 126 \text{ S cm}^2 \text{ mol}^{-1}$
 $\Lambda^0_m (\text{CH}_3\text{COONa}) = 91 \text{ S cm}^2 \text{ mol}^{-1}$