



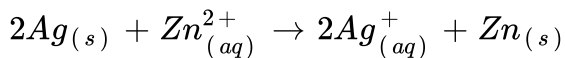
CHEMISTRY

NCERT - NCERT CHEMISTRY(GUJRATI)

ELECTROCHEMISTRY - II

Example

1. Predict whether the reaction

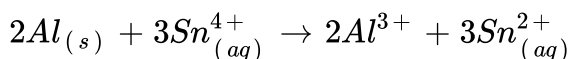


is feasible or not.



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2. Determine the feasibility of the reaction

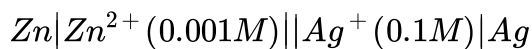


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3. What is the potential of a half-cell consisting of zinc electrode in $0.01M ZnSO_4$ solution $25^\circ C$. $E^\circ = 0.763V$.

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4. Calculate the emf of the cell.



The standard potential of Ag/Ag^+ half - cell is $+0.80V$ and Zn/Zn^{2+} is $-0.76V$.

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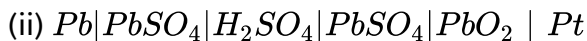
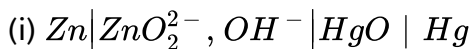
5. Calculate the equilibrium constant for the reaction between silver nitrate and metallic zinc.

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6. Calculate the E.M.F. of the zinc - silver cell at $25^{\circ}C$ when $[Zn^{2+}] = 0.10M$ and $[Ag^{+}] = 10M$. [E° cell at $25^{\circ}C = 1.56$ volt]

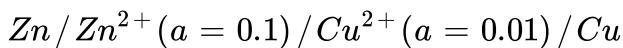
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7. Write the cell reactions for the following cells.



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8. Calculate the potential of the following cell at 298 K



$$E_{Zn^{2+}/Zn}^{\circ} = -0.762V$$

$$E_{Cu^{2+}/Cu}^{\circ} = +0.337V$$

Compare the free energy change for this cell with the free energy of the cell in the standard state.



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9. Calculate the standard e.m.f. of the reaction

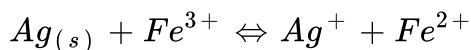
$Fe^{3+} + 3e^{-} \rightarrow Fe_{(s)}$. Given the e.m.f. values of

$Fe^{3+} + e \rightarrow Fe^{2+}$ and $Fe^{2+} + 2e \rightarrow Fe_{(s)}$ as $+0.771V$ and $=0.44V$ respectively.



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10. The standard electrode potentials of the half cells Ag^{+}/Ag and $Fe^{3+}, Fe^{2+}/Pt$ are $0.7991V$ and $0.771V$ respectively. Calculate the equilibrium constant of the reaction :



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Self Evaluation B Answer In One Or Two Sentences

1. The standard reduction potentials of Fe^{3+}/Fe and Fe^{2+}/Fe electrode systems are $-0.035V$ and $-0.44V$ respectively. Predict which of the two oxidations is easy: Fe^{3+}/Fe and Fe^{2+}/Fe .

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2. Write the cell reaction for the half cell $Cl_{(aq)}^- / AgCl_{(s)} Ag$.

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Self Evaluation D Solve The Problems

1. Write the Nernst equation for the half cell $Zn_{(aq)}^{2+} / Zn_{(s)}$.

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2. The emf of the cell : $Cd / CdCl_2 \cdot 2.5H_2O / AgCl_{(s)} Ag$ is $0.675V$.

Calculate ΔG of the cell reaction.

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3. The standard free energy change of the reaction $M_{(aq)}^+ + e \rightarrow rM_{(s)}$

is $-23.125kJ$. Calculate the standard emf of the half cell.

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4. The emf of the half cell $Cu_{(aq)}^{2+} / Cu_{(s)}$ containing $0.01 M Cu^{2+}$

solution is $+0.301V$. Calculate the standard emf of the half cell.

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5. If $E_1 = 0.5V$ corresponds to $Cr^3 + 3e^- \rightarrow Cr_{(s)}$ and $E_2 = 0.41V$

corresponds to $Cr^{3+} + e \rightarrow Cr^{2+}$ reactions, calculate the emf (E_3) of

the reaction $Cr^{2+} + e \rightarrow Cr^{2+}$ reactions, calculate the emf (E_3) of the reaction $Cr^{2+} + 2e \rightarrow Cr_{(s)}$

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6. Calculate the standard emf of the cell having the standard free energy change of the cell reaction is $-64.84kJ$ for 2 electrons transfer.

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7. Calculate the emf of the cell $Zn/ZnO_2^-, OH_{(aq)}^-, HgO/Hg$ given that E° values of $OH^-, ZnO_2^-/Zn$ and $OH^-, HgO/Hg$ half cells are $-1.216V$ and $0.098V$ respectively.

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8. The equilibrium constant of cell reaction :

$Ag_{(s)} + Fe^{3+} \rightleftharpoons Fe^{2+} + Ag$ is 0.335, at $25^\circ C$. Calculate the standard

emf of the cell $Ag/Ag^+, Fe^{3+}, Fe^{2+}/Pt$. Calculate E° of $Fe^{3+}, Fe^{2+}/Pt$ half cell.

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9. Calculate the emf of the cell having the cell reaction

$2Ag^+ + Zn \rightleftharpoons 2Ag + Zn^{2+}$ and $E_{\text{cell}}^\circ = 1.56V$ at $25^\circ C$ when concentration of $Zn^{2+} = 0.1M$ and $Ag^+ = 10M$ in the solution.

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10. The emf values of the cell reactions $Fe^{3+} + e^- \rightarrow Fe^{2+}$ and $Ce^{2+} \rightarrow Ce^{3+} + e^-$ are $0.61V$ and $-0.85V$ respectively. Construct the cell such that the free energy change of the cell is negative. Calculate the emf of the cell.

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11. A zinc rod is placed in 0.095 M zinc chloride solution at $25^{\circ}C$. emf of this half cell is $-0.79V$. Calculate $E^{\circ}_{Zn^{2+} / Zn}$.



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