



ARIHANTAM ACADEMY

Faith Strength Education

CLASS 12 CHEMISTRY — BIHAR BOARD (BSEB)

ELECTROCHEMISTRY — DPP 12 TO 18

Student Workbook + Teacher Answer Key

Arihantam Academy • Faith Strength Education

Bihar Board Class 12 Chemistry: Board-oriented daily practice set for Electrochemistry.

Coverage: Cell and electrode potential; Nernst equation; conductance; Kohlrausch law; electrolysis and Faraday laws; batteries, fuel cells and corrosion; full chapter test.



ARIHANTAM ACADEMY

Faith Strength Education

CLASS 12 CHEMISTRY — BIHAR BOARD (BSEB)

DAILY PRACTICE PROBLEM — DPP 12

Electrochemistry | Electrochemical cells, electrode potential and cell notation

Student Name: _____	Roll No.: _____
DPP No.: 12 Chapter: Electrochemistry	Date: _____
Topic: Electrochemical cells, electrode potential and cell notation	Score: ____ / 30

Instructions: Answer all objective questions. Attempt any 3 short-answer questions and any 1 long-answer question.

Section A — Objective Questions (15 × 1 = 15)

- Oxidation in a galvanic cell occurs at:
(A) Cathode (B) Anode (C) Salt bridge (D) External wire
- Cathode in a galvanic cell is:
(A) Negative (B) Positive (C) Neutral (D) Always platinum
- Electrons flow through outer circuit from:
(A) Cathode to anode (B) Anode to cathode (C) Salt bridge to cathode (D) Solution to wire
- Salt bridge mainly maintains:
(A) Colour (B) Electrical neutrality (C) Temperature (D) Pressure
- Standard hydrogen electrode has E° :
(A) 1 V (B) 0 V (C) -1 V (D) Variable
- In Daniell cell zinc electrode is:
(A) Cathode (B) Anode (C) Salt bridge (D) Inert electrode
- Daniell cell notation begins with:
(A) Cu (B) Zn (C) Salt bridge (D) Electron
- Reduction potentials are measured relative to:
(A) SHE (B) Calomel only (C) Zn electrode (D) Cu electrode
- Positive E°_{cell} means reaction is:
(A) Non-spontaneous (B) Spontaneous (C) Impossible (D) Always slow
- In Daniell cell Cu^{2+} ions are:
(A) Oxidised (B) Reduced (C) Unchanged (D) Evaporated
- Salt bridge electrolyte may be:
(A) KNO_3 (B) Sugar (C) Oil (D) Distilled water
- At anode metal generally:
(A) Gains electrons (B) Loses electrons (C) Does not react (D) Gains protons
- E°_{cell} equals:
(A) $E_{\text{anode}} - E_{\text{cathode}}$ (B) $E_{\text{cathode}} - E_{\text{anode}}$ (C) Sum of oxidation potentials (D) Zero
- Reduction occurs at:
(A) Anode (B) Cathode (C) Salt bridge (D) Wire
- A galvanic cell converts:
(A) Electrical to chemical energy (B) Chemical to electrical energy (C) Heat to light (D) Mechanical to chemical energy

Section B — Short Answer (Attempt any 3) (3 × 2 = 6)

- Define galvanic cell.
- State two functions of salt bridge.
- Write Daniell cell notation.
- What is standard electrode potential?
- Calculate E°_{cell} when $E^\circ_{\text{cathode}} = +0.34 \text{ V}$ and $E^\circ_{\text{anode}} = -0.76 \text{ V}$.

Section C — Long Answer (Attempt any 1) (1 × 5 = 5)

- Explain construction and working of Daniell cell with electrode reactions.
- Why is anode negative and cathode positive in a galvanic cell?

Teacher record: MCQ ____/15 | Short ____/6 | Long ____/5 | Presentation/Homework ____/4 | Total ____/30



ARIHANTAM ACADEMY

Faith Strength Education

CLASS 12 CHEMISTRY — BIHAR BOARD (BSEB)

TEACHER ANSWER KEY — DPP 12

Electrochemistry | Electrochemical cells, electrode potential and cell notation

MCQ answers: 1-B, 2-B, 3-B, 4-B, 5-B, 6-B, 7-B, 8-A, 9-B, 10-B, 11-A, 12-B, 13-B, 14-B, 15-B

Short-answer marking points

16. Device that converts chemical energy of spontaneous redox reaction into electrical energy.

17. Completes circuit, maintains electrical neutrality, prevents direct mixing.

18. $\text{Zn}|\text{Zn}^{2+}(1\text{ M})||\text{Cu}^{2+}(1\text{ M})|\text{Cu}$.

19. Electrode potential measured against SHE under standard conditions.

20. $E^\circ_{\text{cell}} = 0.34 - (-0.76) = 1.10\text{ V}$.

Long-answer marking points

21. $\text{Zn} \rightarrow \text{Zn}^{2+} + 2\text{e}^-$ at anode; $\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}$ at cathode; electrons flow Zn to Cu and salt bridge maintains neutrality.

22. Anode produces electrons and hence is negative; cathode consumes electrons and hence is positive.

Remedial rule: Score below 15/26: redo formulae, numericals and wrong MCQs; take a 10-question re-test next class.



ARIHANTAM ACADEMY

Faith Strength Education

CLASS 12 CHEMISTRY — BIHAR BOARD (BSEB)

DAILY PRACTICE PROBLEM — DPP 13

Electrochemistry | Nernst equation, Gibbs energy and equilibrium constant

Student Name: _____	Roll No.: _____
DPP No.: 13 Chapter: Electrochemistry	Date: _____
Topic: Nernst equation, Gibbs energy and equilibrium constant	Score: ____ / 30

Instructions: Answer all objective questions. Attempt any 3 short-answer questions and any 1 long-answer question.

Section A — Objective Questions (15 × 1 = 15)

- At 298 K, Nernst equation is:
(A) $E = E^\circ - 0.0591/n \log Q$ (B) $E = E^\circ + 0.0591/n \log Q$ (C) $E = RT/nF$ (D) $E = 0$
- Relation between ΔG and cell emf is:
(A) $\Delta G = nFE$ (B) $\Delta G = -nFE$ (C) $\Delta G = RT \ln K$ (D) $\Delta G = nRT$
- At equilibrium E_{cell} is:
(A) Positive (B) Maximum (C) Zero (D) Negative
- At 298 K, $\log K$ equals:
(A) $nE^\circ/0.0591$ (B) $0.0591/nE^\circ$ (C) nE° (D) E°/n
- If Q increases, E_{cell} normally:
(A) Increases (B) Decreases (C) Unchanged (D) Becomes infinite
- Faraday constant is:
(A) 96500 C mol⁻¹ (B) 6.022×10^{23} (C) 8.314 (D) 0.0821
- For Daniell cell n is:
(A) 1 (B) 2 (C) 3 (D) 4
- If E°_{cell} is positive, K is generally:
(A) Less than 1 (B) Greater than 1 (C) Zero (D) Negative
- At equilibrium ΔG is:
(A) Positive (B) Negative (C) Zero (D) Infinite
- In Nernst equation Q denotes:
(A) Reaction quotient (B) Charge (C) Heat (D) Molar mass
- E_{cell} equals E°_{cell} when:
(A) $Q=0$ (B) $Q=1$ (C) $n=0$ (D) $T=0$
- Large positive E°_{cell} suggests:
(A) Small K (B) Large K (C) No reaction (D) No electron transfer
- For a spontaneous cell ΔG is:
(A) Positive (B) Negative (C) Zero (D) Always 1
- Standard concentration is:
(A) 0.1 M (B) 1 M (C) 10 M (D) Pure water only
- Unit of E is:
(A) Volt (B) Ohm (C) Siemens (D) Coulomb

Section B — Short Answer (Attempt any 3) (3 × 2 = 6)

- Write the Nernst equation at 298 K.
- State the relation between ΔG and E_{cell} .
- Why is E_{cell} zero at equilibrium?
- Calculate ΔG° for $n=2$ and $E^\circ_{\text{cell}}=1.10$ V. ($F=96500$ C mol⁻¹)
- Calculate $\log K$ for $n=2$, $E^\circ=0.0591$ V at 298 K.

Section C — Long Answer (Attempt any 1) (1 × 5 = 5)

- Derive relation between E°_{cell} and equilibrium constant.
- For $\text{Zn}|\text{Zn}^{2+}(0.1 \text{ M})||\text{Cu}^{2+}(1 \text{ M})|\text{Cu}$ calculate E_{cell} at 298 K. $E^\circ_{\text{cell}}=1.10$ V.

Teacher record: MCQ ____/15 | Short ____/6 | Long ____/5 | Presentation/Homework ____/4 | Total ____/30



ARIHANTAM ACADEMY

Faith Strength Education

CLASS 12 CHEMISTRY — BIHAR BOARD (BSEB)

TEACHER ANSWER KEY — DPP 13

Electrochemistry | Nernst equation, Gibbs energy and equilibrium constant

MCQ answers: 1-A, 2-B, 3-C, 4-A, 5-B, 6-A, 7-B, 8-B, 9-C, 10-A, 11-B, 12-B, 13-B, 14-B, 15-A

Short-answer marking points

16. $E = E^\circ - (0.0591/n) \log Q$.

17. $\Delta G = -nFE$.

18. At equilibrium, there is no net driving force and emf is zero.

19. $\Delta G^\circ = -2 \times 96500 \times 1.10 = -212.3 \text{ kJ mol}^{-1}$.

20. $\log K = 2 \times 0.0591 / 0.0591 = 2$; $K = 100$.

Long-answer marking points

21. Using $\Delta G^\circ = -nFE^\circ$ and $\Delta G^\circ = -RT \ln K$: $\log K = nE^\circ / 0.0591$ at 298 K.

22. $Q = [\text{Zn}^{2+}] / [\text{Cu}^{2+}] = 0.1$; $E = 1.10 - (0.0591/2) \log 0.1 = 1.1296 \text{ V}$.

Remedial rule: Score below 15/26: redo formulae, numericals and wrong MCQs; take a 10-question re-test next class.



ARIHANTAM ACADEMY

Faith Strength Education

CLASS 12 CHEMISTRY — BIHAR BOARD (BSEB)

DAILY PRACTICE PROBLEM — DPP 14

Electrochemistry | Conductance, conductivity and molar conductivity

Student Name: _____	Roll No.: _____
DPP No.: 14 Chapter: Electrochemistry	Date: _____
Topic: Conductance, conductivity and molar conductivity	Score: ____ / 30

Instructions: Answer all objective questions. Attempt any 3 short-answer questions and any 1 long-answer question.

Section A — Objective Questions (15 × 1 = 15)

- Resistance unit is:
(A) Siemens (B) Ohm (C) Volt (D) Ampere
- Conductance is reciprocal of:
(A) Current (B) Resistance (C) Voltage (D) Charge
- Unit of conductance is:
(A) Ohm (B) Siemens (C) Volt (D) Farad
- Cell constant equals:
(A) l/A (B) A/l (C) R/G (D) ρl
- Conductivity is reciprocal of:
(A) Resistivity (B) Conductance (C) Molarity (D) Cell constant
- Conductivity unit is:
(A) $S\ cm^{-1}$ (B) $S\ cm^2\ mol^{-1}$ (C) $Ohm\ cm$ (D) $mol\ L^{-1}$
- Molar conductivity equals:
(A) $\kappa \times 1000/C$ (B) $\kappa C/1000$ (C) C/κ (D) κ/C
- On dilution, Δm of strong electrolyte:
(A) Decreases sharply (B) Increases slightly (C) Becomes zero (D) Unchanged
- On dilution, Δm of weak electrolyte:
(A) Increases sharply (B) Decreases (C) Unchanged (D) Negative
- Conductivity on dilution:
(A) Increases (B) Decreases (C) Constant (D) Infinite
- Cell constant depends on:
(A) Nature of electrolyte (B) Cell geometry (C) Molar mass (D) Only pressure
- If $l=1\ cm$, $A=1\ cm^2$, cell constant is:
(A) 0 (B) $1\ cm^{-1}$ (C) $1\ cm$ (D) $1\ S$
- HCl is a:
(A) Weak electrolyte (B) Strong electrolyte (C) Non-electrolyte (D) Insulator
- CH_3COOH is a:
(A) Strong electrolyte (B) Weak electrolyte (C) Metal (D) Salt bridge
- Unit of Δm is:
(A) $S\ cm^{-1}$ (B) $S\ cm^2\ mol^{-1}$ (C) $Ohm\ cm$ (D) $C\ mol^{-1}$

Section B — Short Answer (Attempt any 3) (3 × 2 = 6)

- Define conductance and conductivity.
- Define cell constant.
- Write the relation between κ and Δm .
- Why does conductivity decrease on dilution?
- Why does Δm of a weak electrolyte rise sharply on dilution?

Section C — Long Answer (Attempt any 1) (1 × 5 = 5)

- Differentiate conductance, conductivity and molar conductivity.
- A solution has $\kappa=1.5 \times 10^{-3}\ S\ cm^{-1}$ and $C=0.01\ M$. Calculate Δm .

Teacher record: MCQ ____/15 | Short ____/6 | Long ____/5 | Presentation/Homework ____/4 | Total ____/30



ARIHANTAM ACADEMY

Faith Strength Education

CLASS 12 CHEMISTRY — BIHAR BOARD (BSEB)

TEACHER ANSWER KEY — DPP 14

Electrochemistry | Conductance, conductivity and molar conductivity

MCQ answers: 1-B, 2-B, 3-B, 4-A, 5-A, 6-A, 7-A, 8-B, 9-A, 10-B, 11-B, 12-B, 13-B, 14-B, 15-B

Short-answer marking points

16. $G=1/R$; conductivity is conductance of a 1 cm cube of solution.

17. Cell constant= l/A .

18. $\Lambda_m = \kappa \times 1000/C$.

19. Ions per unit volume decrease on dilution.

20. Weak electrolyte ionises much more on dilution.

Long-answer marking points

21. G is reciprocal resistance (S); κ is conductance of unit cube ($S\text{ cm}^{-1}$); Λ_m is conductance due to ions from 1 mole solute ($S\text{ cm}^2\text{ mol}^{-1}$).

22. $\Lambda_m = (1.5 \times 10^{-3} \times 1000)/0.01 = 150\text{ S cm}^2\text{ mol}^{-1}$.

Remedial rule: Score below 15/26: redo formulae, numericals and wrong MCQs; take a 10-question re-test next class.



ARIHANTAM ACADEMY

Faith Strength Education

CLASS 12 CHEMISTRY — BIHAR BOARD (BSEB)

DAILY PRACTICE PROBLEM — DPP 15

Electrochemistry | Kohlrausch law and degree of dissociation

Student Name: _____	Roll No.: _____
DPP No.: 15 Chapter: Electrochemistry	Date: _____
Topic: Kohlrausch law and degree of dissociation	Score: ____ / 30

Instructions: Answer all objective questions. Attempt any 3 short-answer questions and any 1 long-answer question.

Section A — Objective Questions (15 × 1 = 15)

- Kohlrausch law applies at:
(A) High concentration (B) Infinite dilution (C) Melting point (D) Zero pressure
- At infinite dilution Λ_m° is:
(A) Sum of ionic conductivities (B) Zero (C) Cell constant (D) Resistance
- Λ_m° of CH_3COOH is obtained using:
(A) HCl , NaCl and CH_3COONa (B) Only water (C) Only HCl (D) Only NaOH
- Degree of dissociation α is:
(A) $\Lambda_m^\circ/\Lambda_m$ (B) $\Lambda_m/\Lambda_m^\circ$ (C) κ/Λ_m (D) R/G
- For weak electrolyte α on dilution:
(A) Decreases (B) Increases (C) Zero (D) Unchanged
- Kohlrausch law is law of:
(A) Independent migration of ions (B) Constant resistance (C) Electrolysis (D) Gas solubility
- Ionic conductivity is denoted by:
(A) λ° (B) π (C) E° (D) K_f
- At infinite dilution interionic attraction is:
(A) Maximum (B) Minimal (C) Infinite (D) Unchanged
- $\Lambda^\circ\text{CH}_3\text{COOH}$ equals:
(A) $\Lambda^\circ\text{HCl} + \Lambda^\circ\text{CH}_3\text{COONa} - \Lambda^\circ\text{NaCl}$ (B) $\Lambda^\circ\text{HCl} - \Lambda^\circ\text{CH}_3\text{COONa}$ (C) $\Lambda^\circ\text{NaCl}$ only (D) Zero
- Kohlrausch law helps find:
(A) Λ_m° weak electrolyte (B) Atomic number (C) Boiling point only (D) Molar mass only
- Strong electrolyte Λ_m on dilution approaches:
(A) Zero (B) Λ_m° (C) Negative (D) Infinite
- Weak electrolyte has low Λ_m because:
(A) Complete ionisation (B) Partial ionisation (C) No solute (D) High density
- Ostwald dilution law links α with:
(A) Concentration (B) Colour (C) Pressure only (D) Density
- At infinite dilution ions migrate:
(A) Independently (B) As neutral pairs (C) Not at all (D) Only at anode
- $\Lambda_m/\Lambda_m^\circ$ gives:
(A) Degree of dissociation (B) Cell constant (C) Resistance (D) Molarity

Section B — Short Answer (Attempt any 3) (3 × 2 = 6)

- State Kohlrausch law.
- How is Λ_m° of acetic acid calculated?
- Write α in terms of conductance.
- Why is Kohlrausch law useful for weak electrolytes?
- If $\Lambda_m=20$ and $\Lambda_m^\circ=400$, calculate α .

Section C — Long Answer (Attempt any 1) (1 × 5 = 5)

- State applications of Kohlrausch law.
- Given $\Lambda^\circ\text{HCl}=426$, $\Lambda^\circ\text{NaCl}=126$, $\Lambda^\circ\text{CH}_3\text{COONa}=91 \text{ S cm}^2 \text{ mol}^{-1}$, calculate $\Lambda^\circ\text{CH}_3\text{COOH}$.

Teacher record: MCQ ____/15 | Short ____/6 | Long ____/5 | Presentation/Homework ____/4 | Total ____/30



ARIHANTAM ACADEMY

Faith Strength Education

CLASS 12 CHEMISTRY — BIHAR BOARD (BSEB)

TEACHER ANSWER KEY — DPP 15

Electrochemistry | Kohlrausch law and degree of dissociation

MCQ answers: 1-B, 2-A, 3-A, 4-B, 5-B, 6-A, 7-A, 8-B, 9-A, 10-A, 11-B, 12-B, 13-A, 14-A, 15-A

Short-answer marking points

16. At infinite dilution every ion contributes independently to total limiting molar conductivity.

17. $\Lambda^\circ \text{CH}_3\text{COOH} = \Lambda^\circ \text{HCl} + \Lambda^\circ \text{CH}_3\text{COONa} - \Lambda^\circ \text{NaCl}$.

18. $\alpha = \Lambda_m / \Lambda_m^\circ$.

19. It yields limiting molar conductivity of weak electrolytes not fully ionised in normal solutions.

20. $\alpha = 20/400 = 0.05$.

Long-answer marking points

21. Applications: determine Λ° weak electrolyte, degree/dissociation constant and solubility of sparingly soluble salts.

22. $426 + 91 - 126 = 391 \text{ S cm}^2 \text{ mol}^{-1}$.

Remedial rule: Score below 15/26: redo formulae, numericals and wrong MCQs; take a 10-question re-test next class.



ARIHANTAM ACADEMY

Faith Strength Education

CLASS 12 CHEMISTRY — BIHAR BOARD (BSEB)

DAILY PRACTICE PROBLEM — DPP 16

Electrochemistry | Electrolysis and Faraday laws

Student Name: _____	Roll No.: _____
DPP No.: 16 Chapter: Electrochemistry	Date: _____
Topic: Electrolysis and Faraday laws	Score: ____ / 30

Instructions: Answer all objective questions. Attempt any 3 short-answer questions and any 1 long-answer question.

Section A — Objective Questions (15 × 1 = 15)

- Electrolysis converts:
(A) Chemical to electrical (B) Electrical to chemical (C) Heat to light (D) Mechanical to heat
- Faraday first law says deposited mass is proportional to:
(A) Current only (B) Charge passed (C) Resistance (D) Voltage
- Quantity of electricity is:
(A) $Q=IR$ (B) $Q=It$ (C) $Q=V/R$ (D) $Q=I/t$
- One Faraday equals:
(A) 96500 C (B) 6.022×10^{23} C (C) 1 C (D) 8.314 C
- Mass deposited is:
(A) $m=ZIt$ (B) $m=I/Zt$ (C) $m=Z/I t$ (D) $m=It/Z$
- Equivalent weight is:
(A) $M \times \text{valency}$ (B) $M/\text{valency}$ (C) $\text{valency}/M$ (D) $M+\text{valency}$
- Faraday second law compares masses deposited by:
(A) Same charge (B) Different temperatures (C) Same volume (D) Different cells only
- At cathode cations:
(A) Lose electrons (B) Gain electrons (C) Do not change (D) Become anions
- At anode anions:
(A) Gain electrons (B) Lose electrons (C) Become cations (D) Remain neutral
- If current doubles, mass deposited:
(A) Halves (B) Doubles (C) Unchanged (D) Four times
- If time doubles, deposited mass:
(A) Halves (B) Doubles (C) Unchanged (D) Zero
- Unit of electrochemical equivalent:
(A) g C^{-1} (B) C g^{-1} (C) g mol^{-1} (D) S cm^{-1}
- Charge to deposit 1 mol Ag is:
(A) 1 F (B) 2 F (C) 3 F (D) 0.5 F
- Charge to deposit 1 mol Al is:
(A) 1 F (B) 2 F (C) 3 F (D) 4 F
- Electrolysis of acidified water gives H_2 at:
(A) Anode (B) Cathode (C) Salt bridge (D) Both electrodes

Section B — Short Answer (Attempt any 3) (3 × 2 = 6)

- State Faraday first law.
- Define electrochemical equivalent.
- State Faraday second law.
- How much charge is passed by 2 A in 30 min?
- Calculate mass of Ag deposited by 96500 C. (Ag=108)

Section C — Long Answer (Attempt any 1) (1 × 5 = 5)

- Explain Faraday laws with equations.
- 2 A current passes through CuSO_4 for 30 min. Calculate Cu deposited. (Cu=63.5, F=96500)

Teacher record: MCQ ____/15 | Short ____/6 | Long ____/5 | Presentation/Homework ____/4 | Total ____/30



ARIHANTAM ACADEMY

Faith Strength Education

CLASS 12 CHEMISTRY — BIHAR BOARD (BSEB)

TEACHER ANSWER KEY — DPP 16

Electrochemistry | Electrolysis and Faraday laws

MCQ answers: 1-B, 2-B, 3-B, 4-A, 5-A, 6-B, 7-A, 8-B, 9-B, 10-B, 11-B, 12-A, 13-A, 14-C, 15-B

Short-answer marking points

- 16. $m = ZIt$; deposited mass is proportional to charge.
- 17. Mass deposited by one coulomb, $Z = m/Q$.
- 18. For same charge, deposited masses are proportional to equivalent weights.
- 19. $Q = 2 \times 30 \times 60 = 3600$ C.
- 20. One Faraday deposits one equivalent of Ag = 108 g.

Long-answer marking points

- 21. First law $m = ZIt$; second law $m_1/m_2 = E_1/E_2$ for same charge.
- 22. $m = MIt/(nF) = 63.5 \times 2 \times 1800 / (2 \times 96500) = 1.184$ g.

Remedial rule: Score below 15/26: redo formulae, numericals and wrong MCQs; take a 10-question re-test next class.



ARIHANTAM ACADEMY

Faith Strength Education

CLASS 12 CHEMISTRY — BIHAR BOARD (BSEB)

DAILY PRACTICE PROBLEM — DPP 17

Electrochemistry | Batteries, fuel cells and corrosion

Student Name: _____	Roll No.: _____
DPP No.: 17 Chapter: Electrochemistry	Date: _____
Topic: Batteries, fuel cells and corrosion	Score: ____ / 30

Instructions: Answer all objective questions. Attempt any 3 short-answer questions and any 1 long-answer question.

Section A — Objective Questions (15 × 1 = 15)

- Primary cell is:
(A) Rechargeable (B) Not rechargeable (C) Fuel cell (D) Electrolytic cell
- Lead storage battery is:
(A) Primary (B) Secondary (C) Fuel cell (D) Dry cell
- Electrolyte in lead battery is:
(A) HCl (B) H_2SO_4 (C) NaOH (D) KCl
- Fuel cell converts:
(A) Fuel chemical energy directly to electricity (B) Electricity to fuel (C) Heat only (D) Solar to chemical
- H_2 -O $_2$ fuel cell product is:
(A) CO $_2$ (B) H_2O (C) H_2SO_4 (D) O $_2$
- Corrosion of iron is:
(A) Tarnishing (B) Rusting (C) Galvanising (D) Electroplating
- Rust mainly is:
(A) FeO (B) Hydrated Fe $_2\text{O}_3$ (C) FeS (D) FeCl $_2$
- Galvanisation coats iron with:
(A) Copper (B) Zinc (C) Silver (D) Lead
- Sacrificial protection uses:
(A) Less reactive metal (B) More reactive metal (C) Noble gas (D) Plastic
- Mercury cell anode is:
(A) Zn-Hg amalgam (B) Cu (C) Pt (D) Fe
- Dry cell is:
(A) Primary cell (B) Secondary cell (C) Fuel cell (D) Electrolytic cell
- Rechargeable cell is:
(A) Lead storage battery (B) Dry cell (C) Mercury cell (D) Fuel cell
- Corrosion is:
(A) Electrochemical oxidation (B) Physical process only (C) Reduction only (D) Nuclear process
- Fuel-cell electrodes are usually:
(A) Consumed quickly (B) Catalytic/not consumed (C) Salt bridges (D) Wooden rods
- Fuel-cell advantage is:
(A) High pollution (B) Clean product water (C) No redox (D) No electricity

Section B — Short Answer (Attempt any 3) (3 × 2 = 6)

- Differentiate primary and secondary cells.
- Write electrode reactions of lead storage battery during discharge.
- What is a fuel cell?
- Why is zinc used in galvanisation?
- Define corrosion.

Section C — Long Answer (Attempt any 1) (1 × 5 = 5)

- Explain working of lead storage battery.
- Explain electrochemical theory of rusting and prevention methods.

Teacher record: MCQ ____/15 | Short ____/6 | Long ____/5 | Presentation/Homework ____/4 | Total ____/30



ARIHANTAM ACADEMY

Faith Strength Education

CLASS 12 CHEMISTRY — BIHAR BOARD (BSEB)

TEACHER ANSWER KEY — DPP 17

Electrochemistry | Batteries, fuel cells and corrosion

MCQ answers: 1-B, 2-B, 3-B, 4-A, 5-B, 6-B, 7-B, 8-B, 9-B, 10-A, 11-A, 12-A, 13-A, 14-B, 15-B

Short-answer marking points

16. Primary cells are not rechargeable; secondary cells are rechargeable by reversing reaction.

17. Anode: $\text{Pb} + \text{SO}_4^{2-} \rightarrow \text{PbSO}_4 + 2\text{e}^-$; cathode: $\text{PbO}_2 + 4\text{H}^+ + \text{SO}_4^{2-} + 2\text{e}^- \rightarrow \text{PbSO}_4 + 2\text{H}_2\text{O}$.

18. A cell with continuous fuel and oxidant supply converting chemical energy directly to electricity.

19. Zn is more reactive and protects iron sacrificially.

20. Slow electrochemical deterioration of metal due to environment.

Long-answer marking points

21. Describe Pb and PbO_2 plates in H_2SO_4 , discharge reactions and reverse charging reaction.

22. $\text{Fe} \rightarrow \text{Fe}^{2+} + 2\text{e}^-$ at anode; oxygen reduction at cathodic area; rust forms as hydrated Fe_2O_3 . Prevent by painting, oiling, galvanising, alloying and cathodic protection.

Remedial rule: Score below 15/26: redo formulae, numericals and wrong MCQs; take a 10-question re-test next class.



ARIHANTAM ACADEMY

Faith Strength Education

CLASS 12 CHEMISTRY — BIHAR BOARD (BSEB)

DAILY PRACTICE PROBLEM — DPP 18

Electrochemistry | Full chapter important-question test

Student Name: _____	Roll No.: _____
DPP No.: 18 Chapter: Electrochemistry	Date: _____
Topic: Full chapter important-question test	Score: ____ / 30

Instructions: Answer all objective questions. Attempt any 3 short-answer questions and any 1 long-answer question.

Section A — Objective Questions (15 × 1 = 15)

- Oxidation occurs at:
(A) Cathode (B) Anode (C) Salt bridge (D) Wire
- E°_{SHE} is:
(A) 1 V (B) 0 V (C) -1 V (D) Variable
- E°_{cell} is:
(A) Eanode–Ecathode (B) Ecathode–Eanode (C) Sum of both (D) Zero
- At equilibrium E_{cell} is:
(A) Positive (B) Zero (C) Negative (D) Infinite
- Conductance unit is:
(A) Ohm (B) Siemens (C) Volt (D) Coulomb
- Δm is:
(A) $\kappa \times 1000/C$ (B) $\kappa C/1000$ (C) C/κ (D) κ only
- Kohlrausch law applies at:
(A) Infinite dilution (B) High pressure (C) Melting point (D) Zero K
- Faraday constant is:
(A) 96500 C mol⁻¹ (B) 8.314 (C) 6.022×10^{23} C (D) 1.10 V
- Deposited mass is proportional to:
(A) Charge (B) Resistance (C) Cell constant (D) Temperature
- Lead storage battery is:
(A) Primary (B) Secondary (C) Fuel cell (D) Dry cell
- Rusting is:
(A) Reduction of Fe (B) Electrochemical oxidation of Fe (C) Melting (D) Neutralisation
- In Zn–Cu cell electrons flow:
(A) Cu to Zn (B) Zn to Cu (C) Salt bridge to Cu (D) Solution to Zn
- If $Q=1$, Nernst equation gives:
(A) $E=0$ (B) $E=E^\circ$ (C) $E=nF$ (D) $E=RT$
- At cathode in electrolysis:
(A) Oxidation (B) Reduction (C) No reaction (D) Corrosion
- $\text{H}_2\text{O}-\text{O}_2$ fuel-cell product is:
(A) H_2O (B) CO_2 (C) O_2 (D) H_2SO_4

Section B — Short Answer (Attempt any 3) (3 × 2 = 6)

- Write Nernst equation at 298 K.
- Find E°_{cell} for Zn/Cu given $E^\circ_{\text{Cu}} = +0.34$ V and $E^\circ_{\text{Zn}} = -0.76$ V.
- Define conductivity and molar conductivity.
- State Faraday first law.
- Why is fuel cell environment-friendly?

Section C — Long Answer (Attempt any 1) (1 × 5 = 5)

- Derive $E^\circ_{\text{cell}}-K$ relation.
- A 0.01 M electrolyte has $\kappa = 2 \times 10^{-3}$ S cm⁻¹. Find Δm .

Teacher record: MCQ ____/15 | Short ____/6 | Long ____/5 | Presentation/Homework ____/4 | Total ____/30



ARIHANTAM ACADEMY

Faith Strength Education

CLASS 12 CHEMISTRY — BIHAR BOARD (BSEB)

TEACHER ANSWER KEY — DPP 18

Electrochemistry | Full chapter important-question test

MCQ answers: 1-B, 2-B, 3-B, 4-B, 5-B, 6-A, 7-A, 8-A, 9-A, 10-B, 11-B, 12-B, 13-B, 14-B, 15-A

Short-answer marking points

16. $E = E^\circ - (0.0591/n) \log Q$.

17. $E^\circ_{\text{cell}} = 0.34 - (-0.76) = 1.10 \text{ V}$.

18. κ is conductance of 1 cm cube; $\Lambda m = \kappa \times 1000 / C$.

19. $m = ZIt$.

20. H₂-O₂ cell mainly produces water and reduces pollutant emissions.

Long-answer marking points

21. From $\Delta G^\circ = -nFE^\circ$ and $\Delta G^\circ = -RT \ln K$, $\log K = nE^\circ / 0.0591$ at 298 K.

22. $\Lambda m = (2 \times 10^{-3} \times 1000) / 0.01 = 200 \text{ S cm}^2 \text{ mol}^{-1}$.

Remedial rule: Score below 15/26: redo formulae, numericals and wrong MCQs; take a 10-question re-test next class.