



ARIHANTAM ACADEMY

Faith Strength Education

CLASS 12 CHEMISTRY — BIHAR BOARD (BSEB)

d- AND f-BLOCK ELEMENTS — DPP 42 TO 47

Student Workbook + Teacher Answer Key

Arihantam Academy • Faith Strength Education

Bihar Board Class 12 Chemistry: board-oriented daily practice for d- and f-Block Elements.

Coverage: transition elements; colour/magnetism; dichromate/permanganate; lanthanides/actinides; applications and full revision.



ARIHANTAM ACADEMY

Faith Strength Education

CLASS 12 CHEMISTRY — BIHAR BOARD (BSEB)

DAILY PRACTICE PROBLEM — DPP 42

d- and f-Block Elements | Transition elements: electronic configuration and general properties

Student Name: _____	Roll No.: _____
DPP No.: 42 Chapter: d- and f-Block Elements	Date: _____
Topic: Transition elements: electronic configuration and general properties	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)

- Transition elements have partially filled:
(A) s orbital only (B) d orbital in atom/ion (C) p orbital only (D) f orbital only
- General electronic configuration of d-block is:
(A) $(n-1)d^{1-9}ns^{1-2}$ (B) ns^2np^{1-6} (C) $(n-2)f^{1-14}$ (D) $1s^2$ only
- Which is not transition element?
(A) Sc (B) Ti (C) Zn (D) Cr
- Zn is not transition element because Zn^{2+} has:
(A) partially filled d (B) completely filled $3d^5$ (C) no electrons (D) f electrons
- Transition metals show variable oxidation states due to:
(A) large size only (B) similar energies of ns and $(n-1)d$ electrons (C) absence of d electrons (D) low density
- Colour of transition-metal ions is generally due to:
(A) d-d transition (B) nuclear reaction (C) ionic bond only (D) high mass
- Transition metals commonly form complexes because of:
(A) small size/high charge/d orbitals (B) only low melting point (C) lack of orbitals (D) nonmetallic character
- Transition metals are good catalysts due to:
(A) variable oxidation states and surface adsorption (B) inertness (C) no d electrons (D) low density only
- Transition metals form alloys readily because of:
(A) similar atomic sizes (B) very different sizes (C) gas nature (D) zero valency
- Transition metals have high melting points due to:
(A) weak metallic bonding (B) strong metallic bonding (C) hydrogen bonding only (D) no unpaired electrons
- Which has configuration $[Ar]3d^54s^1$?
(A) Fe (B) Cr (C) Mn (D) Cu
- Which has configuration $[Ar]3d^84s^1$?
(A) Zn (B) Cu (C) Ni (D) Co
- Scandium commonly shows oxidation state:
(A) +1 (B) +2 (C) +3 (D) +7
- Maximum oxidation state in first transition series is shown by:
(A) Fe (B) Mn (C) Cu (D) Zn
- Permanganate ion contains Mn in:
(A) +2 (B) +4 (C) +6 (D) +7

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

- Define transition element.
- Why is Zn not a transition element?
- Why do transition elements show variable oxidation states?
- Why are transition-metal compounds coloured?
- State any four general characteristics of transition elements.

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

- Explain general characteristics of transition elements.
- Why do transition metals act as catalysts and form complexes?

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 42

d- and f-Block Elements | Transition elements: electronic configuration and general properties

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

Short-answer marking points

- 16. Element whose atom or stable cation has incompletely filled d subshell.
- 17. Zn and Zn^{2+} have completely filled $3d^{10}$ configuration.
- 18. Small energy difference between ns and $(n-1)d$ electrons allows both to participate in bonding.
- 19. Absorption of visible light promotes d electrons between split d levels.
- 20. Variable oxidation state, colour, paramagnetism, complex formation, catalysis, alloys, high mp.

Long-answer marking points

- 21. Discuss electronic configuration and all major properties with reasons.
- 22. Variable oxidation states provide reaction pathways; adsorption on surface helps catalysis; small/highly charged ions with vacant orbitals form complexes.

Remedial rule: Score below 15/26: revise configurations, oxidation states, colours and half reactions; take a 10-MCQ re-test.



ARIHANTAM ACADEMY

Faith Strength Education

CLASS 12 CHEMISTRY — BIHAR BOARD (BSEB)

DAILY PRACTICE PROBLEM — DPP 43

d- and f-Block Elements | Oxidation states, colour, magnetism and catalytic properties

Student Name: _____	Roll No.: _____
DPP No.: 43 Chapter: d- and f-Block Elements	Date: _____
Topic: Oxidation states, colour, magnetism and catalytic properties	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)

- Paramagnetism is due to:
(A) paired electrons (B) unpaired electrons (C) ionic bond (D) large radius
- Magnetic moment is approximately:
(A) $\sqrt{n(n+2)}$ BM (B) n^2 BM (C) $n/2$ BM (D) $2n$ BM
- Number of unpaired electrons in Mn^{2+} is:
(A) 1 (B) 3 (C) 5 (D) 0
- Fe^{3+} has d configuration:
(A) d^3 (B) d^4 (C) d^5 (D) d^6
- Cu^{2+} has number of unpaired electrons:
(A) 0 (B) 1 (C) 2 (D) 5
- Ti is generally:
(A) coloured/paramagnetic (B) colourless/diamagnetic (C) ferromagnetic only (D) radioactive
- Colour of $\text{K}_2\text{Cr}_2\text{O}_7$ is:
(A) green (B) orange (C) purple (D) blue
- Colour of KMnO_4 is:
(A) orange (B) green (C) purple (D) yellow
- $\text{Cr}_2\text{O}_7^{2-}$ acts as:
(A) reducing agent only (B) oxidising agent (C) inert ion (D) base only
- MnO_4^{2-} in acidic medium is reduced to:
(A) MnO_2 (B) Mn^{2+} (C) MnO_2^{2-} (D) Mn metal
- Transition metals can form interstitial compounds with:
(A) H, B, C, N (B) only noble gases (C) only halogens (D) only oxygen
- Interstitial compounds are generally:
(A) soft/volatile (B) hard/high mp (C) liquid (D) colourless gases
- Which is used as catalyst in Haber process?
(A) Fe (B) V_2O_5 (C) Ni (D) Pt
- Which is used in hydrogenation of oils?
(A) Ni (B) Fe (C) V_2O_5 (D) $\text{Cr}_2\text{O}_7^{2-}$
- V_2O_5 is catalyst in:
(A) Haber process (B) Contact process (C) Ostwald process (D) Hall process

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

- Define paramagnetism.
- Calculate spin-only magnetic moment for $n=3$.
- Why is Ti colourless?
- Why do transition elements form interstitial compounds?
- Write one reduction half-reaction of MnO_4^{2-} in acidic medium.

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

- Explain origin of colour and magnetic properties of transition-metal ions.
- Discuss catalytic and alloy-forming properties of transition elements.

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 43

d- and f-Block Elements | Oxidation states, colour, magnetism and catalytic properties

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

Short-answer marking points

16. Attraction by magnetic field due to unpaired electrons.

17. $\mu = \sqrt{3(3+2)} = \sqrt{15} = 3.87 \text{ BM}$.

18. It is d^0 , so no d-d transition.

19. Small atoms fit into lattice interstices without greatly disturbing structure.

20. $\text{MnO}_2 + 8\text{H}^+ + 5\text{e}^- \rightarrow \text{Mn}^{2+} + 4\text{H}_2\text{O}$.

Long-answer marking points

21. d-d transition causes colour; unpaired electrons cause para-magnetism; use $\mu = \sqrt{n(n+2)}$.

22. Variable oxidation states and adsorption enable catalysts; comparable sizes permit alloy formation; give Fe/Ni/V O_5 examples.

Remedial rule: Score below 15/26: revise configurations, oxidation states, colours and half reactions; take a 10-MCQ re-test.



ARIHANTAM ACADEMY

Faith Strength Education

CLASS 12 CHEMISTRY — BIHAR BOARD (BSEB)

DAILY PRACTICE PROBLEM — DPP 44

d- and f-Block Elements | Potassium dichromate and potassium permanganate

Student Name: _____	Roll No.: _____
DPP No.: 44 Chapter: d- and f-Block Elements	Date: _____
Topic: Potassium dichromate and potassium permanganate	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)

1. $\text{K}_2\text{Cr}_2\text{O}_7$ colour is:
(A) green (B) orange (C) purple (D) blue
2. KMnO_4 colour is:
(A) orange (B) green (C) purple (D) yellow
3. Chromium oxidation state in $\text{Cr}_2\text{O}_7^{2-}$ is:
(A) +3 (B) +4 (C) +6 (D) +7
4. Manganese oxidation state in MnO_4^{2-} is:
(A) +2 (B) +4 (C) +6 (D) +7
5. $\text{K}_2\text{Cr}_2\text{O}_7$ is a strong oxidant in:
(A) acidic medium (B) basic medium only (C) neutral only (D) all media equally
6. KMnO_4 is commonly used as:
(A) reducing agent (B) oxidising agent (C) catalyst poison (D) acid
7. Acidified $\text{K}_2\text{Cr}_2\text{O}_7$ changes from:
(A) orange to green (B) green to orange (C) purple to colourless (D) blue to red
8. Acidified KMnO_4 changes from:
(A) purple to colourless (B) orange to green (C) blue to red (D) green to orange
9. In neutral/alkaline medium, MnO_4^{2-} often forms:
(A) Mn^{2+} (B) MnO_2 (C) Mn metal (D) MnO_4^{3-}
10. Chromyl chloride test is for:
(A) chloride ion (B) sulphate ion (C) nitrate ion (D) iodide ion
11. $\text{K}_2\text{Cr}_2\text{O}_7$ is prepared from:
(A) chromite ore (B) haematite (C) bauxite (D) calamine
12. KMnO_4 is prepared from:
(A) pyrolusite (B) cinnabar (C) galena (D) cassiterite
13. Chromate ion colour is:
(A) yellow (B) orange (C) purple (D) green
14. Dichromate ion colour is:
(A) yellow (B) orange (C) purple (D) green
15. KMnO_4 self indicator because it has:
(A) intense purple colour (B) green colour (C) no colour (D) metallic lustre

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

16. Write colours and oxidation states of dichromate and permanganate ions.
17. Why is KMnO_4 a self indicator?
18. Write reduction half-reaction of $\text{Cr}_2\text{O}_7^{2-}$ in acidic medium.
19. What happens when chromate is acidified?
20. Name ores used to prepare $\text{K}_2\text{Cr}_2\text{O}_7$ and KMnO_4 .

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

21. Describe oxidising action of $\text{K}_2\text{Cr}_2\text{O}_7$ in acidic medium.
22. Describe oxidising action of KMnO_4 in acidic, neutral and alkaline media.

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



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CLASS 12 CHEMISTRY — BIHAR BOARD (BSEB)

TEACHER ANSWER KEY — DPP 44

d- and f-Block Elements | Potassium dichromate and potassium permanganate

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

Short-answer marking points

16. CrO_5 : orange, Cr +6; MnO_4^- : purple, Mn +7.

17. Its intense purple colour shows endpoint without external indicator.

18. $\text{CrO}_5 + 14\text{H}^+ + 6\text{e}^- \rightarrow 2\text{Cr}^{3+} + 7\text{H}_2\text{O}$.

19. $2\text{CrO}_4^{2-} + 2\text{H}^+ \rightarrow \text{Cr}_2\text{O}_7^{2-} + \text{H}_2\text{O}$; yellow changes to orange.

20. Chromite FeCr_2O_4 ; pyrolusite MnO_2 .

Long-answer marking points

21. Give half-reaction and examples oxidising Fe^{2+} , I^- , SO_3^{2-} , H_2S in acid.

22. Acid: Mn^{2+} ; neutral/weak alkaline: MnO_2 ; strong alkaline: MnO_4^{2-} , with relevant half reactions.

Remedial rule: Score below 15/26: revise configurations, oxidation states, colours and half reactions; take a 10-MCQ re-test.



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CLASS 12 CHEMISTRY — BIHAR BOARD (BSEB)

DAILY PRACTICE PROBLEM — DPP 45

d- and f-Block Elements | Lanthanides, actinides and lanthanide contraction

Student Name: _____	Roll No.: _____
DPP No.: 45 Chapter: d- and f-Block Elements	Date: _____
Topic: Lanthanides, actinides and lanthanide contraction	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)

- f-block elements involve filling of:
(A) $(n-1)d$ (B) ns (C) $(n-2)f$ (D) np
- Lanthanides involve filling of:
(A) $3d$ (B) $4f$ (C) $5f$ (D) $6d$
- Actinides involve filling of:
(A) $4f$ (B) $5f$ (C) $3d$ (D) $6p$
- Common oxidation state of lanthanides is:
(A) +1 (B) +2 (C) +3 (D) +7
- Lanthanide contraction is due to:
(A) increase in shielding (B) poor shielding by $4f$ electrons (C) large size increase (D) no f electrons
- Lanthanide contraction means:
(A) increase in atomic radii (B) gradual decrease in size from La to Lu (C) loss of electrons only (D) increase in oxidation state
- Consequence of lanthanide contraction is similarity of:
(A) Zr and Hf (B) Na and K (C) Fe and Cu (D) Cl and Br
- Ce acts as:
(A) reducing agent (B) oxidising agent (C) noble gas (D) base
- Most actinides are:
(A) non-radioactive (B) radioactive (C) gases (D) noble metals only
- Actinides show more variable oxidation states because:
(A) $5f, 6d, 7s$ levels similar in energy (B) they have no f electrons (C) only +3 possible (D) they are all gases
- Lanthanides have configuration:
(A) $[Xe]4f^{1-14}5d^{0-1}6s^2$ (B) $[Ar]3d^{1-10}4s^2$ (C) $[Rn]5f^{1-14}6d^{0-1}7s^2$ (D) ns^2np^1
- Actinides configuration begins with:
(A) [He] (B) [Ne] (C) [Xe] (D) [Rn]
- Eu^{2+} is stable due to:
(A) $4f^7$ (B) $4f^6$ (C) $5f^7$ (D) $3d^7$
- Yb^{2+} is stable due to:
(A) $4f^{14}$ (B) $4f^{13}$ (C) $5f^{14}$ (D) $3d^{14}$
- Actinide contraction is due to:
(A) poor shielding by $5f$ electrons (B) good shielding (C) no shielding effect (D) only nuclear force

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

- Define lanthanide contraction.
- State two causes/consequences of lanthanide contraction.
- Why do actinides show more oxidation states than lanthanides?
- Give electronic configurations of lanthanides and actinides.
- Why are Ce^{3+} and Eu^{2+} important?

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

- Compare lanthanides and actinides.
- Explain lanthanide contraction and its consequences.

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 45

d- and f-Block Elements | Lanthanides, actinides and lanthanide contraction

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

Short-answer marking points

16. Gradual decrease in atomic/ionic radii from La to Lu because 4f electrons shield poorly.

17. Poor 4f shielding; results include Zr-Hf similarity and difficulty separating lanthanides.

18. 5f, 6d and 7s orbitals have comparable energies and 5f electrons participate in bonding.

19. Ln: $[\text{Xe}]4f^{1-14}5d^{0-1}6s^2$; An: $[\text{Rn}]5f^{1-14}6d^{0-1}7s^2$.

20. Ce is oxidising; Eu^{2+} stable due to half-filled 4f.

Long-answer marking points

21. Compare occurrence, radioactivity, oxidation states, complex formation, contraction and reactivity.

22. Explain poor 4f shielding; decreasing radii, Zr-Hf similarity, decreasing basicity of hydroxides and difficult separation.

Remedial rule: Score below 15/26: revise configurations, oxidation states, colours and half reactions; take a 10-MCQ re-test.



ARIHANTAM ACADEMY

Faith Strength Education

CLASS 12 CHEMISTRY — BIHAR BOARD (BSEB)

DAILY PRACTICE PROBLEM — DPP 46

d- and f-Block Elements | Applications, metallurgy and mixed revision

Student Name: _____	Roll No.: _____
DPP No.: 46 Chapter: d- and f-Block Elements	Date: _____
Topic: Applications, metallurgy and mixed revision	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)

- Misch metal contains mainly:
(A) Fe and C (B) lanthanides (C) Cu and Zn (D) Al and Mg
- Misch metal is used in:
(A) cigarette lighter flints (B) Haber process only (C) soap manufacture (D) glass only
- Lanthanides are used in:
(A) petroleum cracking catalysts (B) only fertilizers (C) only batteries (D) only bleaching powder
- Uranium is used as:
(A) nuclear fuel (B) food preservative (C) drying agent (D) flux
- Plutonium is used in:
(A) nuclear reactors/weapons (B) soap manufacture (C) glass only (D) bleaching powder
- ThO₂ is used in:
(A) gas mantles (B) Haber catalyst (C) dry cells only (D) photography
- Lanthanide hydroxide basicity from La to Lu:
(A) increases (B) decreases (C) unchanged (D) zero
- Which ion is colourless?
(A) Sc³⁺ (B) Ti³⁺ (C) Cu²⁺ (D) Mn²⁺
- Which is diamagnetic?
(A) Mn²⁺ (B) Fe³⁺ (C) Zn²⁺ (D) Cu²⁺
- KMnO₄ is used in:
(A) redox titrations (B) acid-base titration only (C) gas drying only (D) ore concentration
- K₂Cr₂O₇ is used as:
(A) oxidising agent (B) reducing agent (C) fuel (D) alloy
- Transition metal ion with d¹ configuration is:
(A) Ti³⁺ (B) Fe³⁺ (C) Cu²⁺ (D) Mn²⁺
- Transition metal ion with d¹⁰ is:
(A) Zn²⁺ (B) Fe³⁺ (C) Cu²⁺ (D) Cr³⁺
- Alloys of transition metals are common due to:
(A) similar atomic radii (B) same colour only (C) absence of bonding (D) gas formation
- Stainless steel contains:
(A) Fe, Cr, Ni (B) Cu, Zn (C) Al, Mg (D) Na, K

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

- What is misch metal? Give one use.
- Why do lanthanide hydroxides become less basic from La to Lu?
- Why is Zn²⁺ colourless and diamagnetic?
- State two uses each of KMnO₄ and K₂Cr₂O₇.
- What is stainless steel?

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

- Discuss important uses of lanthanides and actinides.
- Explain trends/properties of d-block and f-block elements with examples.

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 46

d- and f-Block Elements | Applications, metallurgy and mixed revision

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

Short-answer marking points

- 16. Alloy containing mainly lanthanides, often Ce/La/Nd; used in lighter flints.
- 17. Lanthanide contraction increases charge density/covalent character, lowering basicity.
- 18. Zn^{2+} is $3d^0$ with no unpaired electrons/d-d transitions.
- 19. KMnO_4 : oxidant, redox titration/disinfectant; $\text{K}_2\text{Cr}_2\text{O}_7$: oxidant, redox titration/cleaning.
- 20. Fe-Cr-Ni alloy resistant to corrosion.

Long-answer marking points

- 21. Uses: catalysts, phosphors, lasers, magnets, nuclear fuels, gas mantles; note radioactivity/safety.
- 22. Cover configuration, variable states, colour/magnetism, complexes/catalysis/alloys, f-block contraction and applications.

Remedial rule: Score below 15/26: revise configurations, oxidation states, colours and half reactions; take a 10-MCQ re-test.



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CLASS 12 CHEMISTRY — BIHAR BOARD (BSEB)

DAILY PRACTICE PROBLEM — DPP 47

d- and f-Block Elements | d- and f-Block Elements: full chapter important-question test

Student Name: _____	Roll No.: _____
DPP No.: 47 Chapter: d- and f-Block Elements	Date: _____
Topic: d- and f-Block Elements: 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)

- Transition element has:
(A) partially filled d in atom/ion (B) only s electrons (C) only p electrons (D) f only
- Zn is not transition because:
(A) d¹⁰ in Zn²⁺ (B) no electrons (C) gas (D) d¹⁰
- Colour is mainly due to:
(A) d-d transition (B) nuclear reaction (C) mass (D) ionic radius
- Paramagnetism due to:
(A) paired electrons (B) unpaired electrons (C) no electrons (D) metallic bond
- Spin-only moment formula:
(A) $\sqrt{n(n+2)}$ (B) n^2 (C) $n/2$ (D) $2n$
- K₂Cr₂O₇ colour:
(A) green (B) orange (C) purple (D) blue
- KMnO₄ colour:
(A) orange (B) green (C) purple (D) yellow
- Cr in dichromate:
(A) +3 (B) +4 (C) +6 (D) +7
- Mn in permanganate:
(A) +2 (B) +4 (C) +6 (D) +7
- Lanthanides fill:
(A) 3d (B) 4f (C) 5f (D) 6d
- Actinides fill:
(A) 4f (B) 5f (C) 3d (D) 6p
- Lanthanide contraction due to:
(A) poor 4f shielding (B) good shielding (C) large radius (D) no electrons
- Zr-Hf similarity due to:
(A) lanthanide contraction (B) radioactivity (C) colour (D) magnetism
- Actinides are mostly:
(A) nonradioactive (B) radioactive (C) gases (D) noble
- Zn²⁺ is:
(A) paramagnetic (B) diamagnetic (C) ferromagnetic (D) antiferromagnetic

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

- Define transition element.
- Why are transition-metal ions coloured?
- Write reduction half reaction of acidified permanganate.
- Define lanthanide contraction.
- Why do actinides show variable oxidation states?

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

- Explain general properties of transition elements.
- Compare lanthanides and actinides.

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 47

d- and f-Block Elements | d- and f-Block Elements: full chapter important-question test

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

Short-answer marking points

- 16. Atom/stable cation with incomplete d subshell.
- 17. d-d transitions absorb visible light.
- 18. $\text{MnO}_2 + 8\text{H}^+ + 5\text{e}^- \rightarrow \text{Mn}^{2+} + 4\text{H}_2\text{O}$.
- 19. Gradual decrease in Ln radii due to poor 4f shielding.
- 20. 5f, 6d, 7s have similar energies.

Long-answer marking points

- 21. Discuss configuration, oxidation states, colour, magnetic behaviour, catalysis, complex formation and alloys.
- 22. Compare 4f vs 5f filling, radioactivity, oxidation states, bonding/complexes and contraction.

Remedial rule: Score below 15/26: revise configurations, oxidation states, colours and half reactions; take a 10-MCQ re-test.