WEIRD CHEMIST

WC

d-Block Elements

Classification and Electronic Configuration – SOLUTIONS

DPP – 01

Topic: Classification and EC **Questions:** 40 Questions **Exam:** NEET / JEE

Quick Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	2	9	3	17	1	25	4	33	4
2	1	10	1	18	4	26	4	34	4*
3	3	11	2	19	2	27	2	35	3
4	4	12	3	20	3	28	3	36	2
5	2	13	3	21	1	29	3	37	3
6	1	14	1	22	3	30	2	38	1
7	1	15	2	23	2	31	3	39	4
8	1	16	3	24	1	32	3	40	1

**Q.34 is an exact repeat of Q.26 in your source file (identical stem + options) – solved once, cross-referenced. See note at Q.34.*

► TYPE 1 : General Characteristics, Classification & Properties

[F] Master Formulae

The three questions every TYPE-1 question is really asking:

- **Is it a transition element?** → (n-1)d subshell must be *incomplete* in the ground state **or** in any oxidation state. Zn, Cd, Hg fail this (always d^{10}) → not transition metals, even though they sit in the d-block.
- **Where does it sit?** d-block = groups 3–12. Coinage metals (Cu, Ag, Au) = Group 11. Group 8 triad = Fe, Ru, Os.
- **Why "transition"?** Because d-block properties sit *between* the highly electropositive s-block and the far-less-electropositive p-block – a bridge, not an extreme.

Q1. Coinage metals are (Cu, Ag, Au)

(1) Normal metals (2) Transition metals (3) Active metals (4) Highly electropositive

[E] Explanation

Cu, Ag, Au sit in Group 11 of the d-block. In their neutral atoms the d-subshell is filled ($d^{10}s^1$), but that's not what decides the classification – their **+2 oxidation states** (Cu^{2+} is d^9, Ag^{2+} is d^9) have an *incomplete* d-subshell. That satisfies the IUPAC definition, so they are genuine transition metals, just an atypical/coinage subgroup of them.

[A] Approach

Yaad rakho: "coinage metal" is just a *nickname* based on history (these were literally used to mint coins) – it doesn't cancel their d-block citizenship. Nickname $\neq$ new category.

[Ans] Answer

Option (2) Transition metals.

Q2. Which of the following group of transition metal is called coinage metals?

(1) Cu, Ag, Au
(2) Ru, Rh, Pb
(3) Fe, Co, Ni
(4) Os, Ir, Pt

[E] Explanation

Coinage metals = Group 11 elements = Cu, Ag, Au. Historically used worldwide for minting currency because of their low reactivity, malleability, and lustre.

[Ans] Answer

Option (1) Cu, Ag, Au.

Q3. Which of the following belongs to group '8'?

(1) Ni, Pd, Pt
(2) F, Cl, Br
(3) Fe, Ru, Os
(4) Xe, Ar, Kr

[E] Explanation

Group 8 (iron triad, extended) = Fe, Ru, Os. (Ni/Pd/Pt is Group 10; halogens are Group 17; noble gases are Group 18 – both clean distractors from the p-block to test if you're actually thinking d-block groups.)

[Ans] Answer

Option (3) Fe, Ru, Os.

Q4. Transition element is defined as one which has

(1) Fully filled $(n-1)d$ subshell

(2) Incompletely filled nd subshell in ground or in higher oxidation state

(3) Incompletely filled $(n-1)d$ subshell in ground state

(4) Incompletely filled $(n-1)d$ subshell in ground state or any one of its oxidation states

[E] Explanation

This is the exact IUPAC definition – and every word matters:

- It's $(n-1)d$, not nd (option 2 is a trap – wrong subshell label).
- "Ground state **or** any oxidation state" – the "or" is critical. It's why Cu (d^{10} in ground state) still counts: its d^9 +2 ion saves it.

[!] Common Mistake

Students often stop at "incomplete d-subshell in ground state" and forget the "or any oxidation state" clause – that clause is exactly what makes Cu, Ag, Au qualify despite their filled-d ground states.

[Ans] Answer

Option (4)

Q5. Zn, Cd and Hg are not regarded as transition elements on the basis of electronic configuration because

(1) they do not have electrons in d-subshell

(2) their d and s-subshells remain fully filled in ground and higher oxidation states

(3) their s-subshell remains incomplete in ground and ionic state

(4) their penultimate shell remains completely filled in ground and in higher oxidation state

[E] Explanation

Zn, Cd, Hg all have configuration $(n-1)d^{10}ns^2$. On losing electrons to form M^{2+}, the ns^2 electrons leave completely (not "filled", just gone) but the d^{10} subshell stays exactly as full as it started. Since the d-subshell never becomes incomplete – not in the atom, not in the ion – they fail the transition-metal test even though they're physically sitting in the d-block.

[A] Approach

Socho ki d-orbital ek "full tiffin box" hai – 10 electrons bharte hi lid band, aur ionisation ke baad bhi wahi 10 electrons untouched rehte hain. Never opens up = never "transition."

[!] Common Mistake

Option (4) sounds tempting because "penultimate shell" is technically also true – but it's a vaguer, less precise statement than option (2), which names the exact subshell (d) responsible. Standard NCERT phrasing points to option (2).

[Ans] Answer

Option (2)

Q6. Statement-A: The hardness of Cr is due to covalent bond.

Statement-B: The metallic lustre of Cr is due to metallic bond.
Both A and B statements are

(1) True, True (2) True, False (3) False, True (4) False, False

[E] Explanation

Chromium's bonding is a **mix** of metallic and covalent character. Cr has the maximum number of unpaired d-electrons possible in the 3d series ($3d^5 4s^1$, 6 unpaired electrons total) – these extra unpaired d-electrons overlap and form additional covalent-type M–M bonds on top of the usual delocalised metallic bonding. The covalent contribution is what makes Cr exceptionally hard; the metallic (delocalised electron sea) contribution is what still gives it lustre, conductivity, and malleability.

[Ans] Answer

Option (1) True, True.

Q7. Match the column

Column-I	Column-II
A. Zn	i. coinage metal
B. Cr	ii. highest Mp in 3d series
C. Cu	iii. non-typical transition metal
D. Ce	iv. f-block element

(1) A–iii; B–ii; C–i; D–iv
(2) A–iv; B–i; C–ii; D–iii
(3) A–i; B–iv; C–iii; D–ii
(4) A–ii; B–i; C–iv; D–iii

[E] Explanation

Go entry by entry:

- **Zn** – sits in d-block but fails the transition-metal test (Q5) → *non-typical transition metal* (iii).
- **Cu** – *coinage metal* (i), Group 11.
- **Ce** – Cerium is a lanthanide → *f-block element* (iv).
- **Cr** – by elimination, gets *highest Mp in 3d series* (ii) – consistent with Cr's exceptionally strong bonding from Q6.

[Ans] Answer

Option (1) A–iii; B–ii; C–i; D–iv.

Q8. Which of the following group of transition metal is used to prepare currency coins?

(1) Cu, Ag, Au
(2) Ru, Rh, Pd
(3) Fe, Co, Ni
(4) Os, Ir, Pt

[E] Explanation

Same fact as Q2, restated – Cu, Ag, Au are literally called coinage metals *because* of this historical use.

[Ans] Answer

Option (1) Cu, Ag, Au.

Q9. Which groups of elements are called d-block elements in modern periodic table?

(1) 1 to 2 (2) 3 to 10 (3) 3 to 12 (4) 13 to 18

[E] Explanation

d-block spans Groups 3 through 12 (Sc/Y/La/Ac column through Zn/Cd/Hg/Cn column) – ten groups, corresponding to the ten electrons that can fill a d-subshell.

[!] Common Mistake

Option (2) "3 to 10" is a common slip – students sometimes stop at Group 10 (Ni/Pd/Pt) forgetting Groups 11 (coinage) and 12 (Zn family) are still physically in the d-block, even if Group 12 fails the "transition metal" definition.

[Ans] Answer

Option (3) 3 to 12.

Q10. Which block elements are more electropositive in modern periodic table?

(1) s (2) p (3) d (4) f

[E] Explanation

s-block = alkali and alkaline earth metals – the most reactive, most electron-losing (electropositive) elements in the periodic table.

[Ans] Answer

Option (1) s-block.

Q11. Which block elements are less electropositive in modern periodic table?

(1) s (2) p (3) d (4) f

[E] Explanation

p-block contains the metalloids, non-metals, and halogens – the least electropositive (most electronegative-leaning) region of the periodic table.

[Ans] Answer

Option (2) p-block.

Q12. Which elements transit between more electropositive and less electropositive elements?

(1) s (2) p (3) d (4) f

[E] Explanation

This is literally where the name comes from – d-block properties sit *between* s-block (very electropositive) and p-block (least electropositive). That "in-between" bridge is the transition.

[A] Approach

Q10, Q11, Q12 are one single fact tested three ways – s block sabse zyada electropositive, p block sabse kam, aur d block beech mein khada pul (bridge) hai. Ek concept, teen sawaal.

[Ans] Answer

Option (3) d-block.

Q13. In modern periodic table, by which name are d-block elements known?

(1) More electropositive elements
(2) Less electropositive elements
(3) Transition elements
(4) Inner-transition elements

[E] Explanation

d-block elements as a family are called **transition elements** – "inner-transition" is reserved for the f-block (lanthanides/actinides), which sits even deeper inside the table.

[Ans] Answer

Option (3) Transition elements.

Q14. Which of the following is not considered as a transition element?

(1) Cd (2) Pd (3) Ag (4) Ru

[E] Explanation

Cd is in Zn's family (Group 12) – always d^{10}, ground state and ion both. Pd, Ag, Ru all have genuinely incomplete d-subshells in at least one accessible state.

[Ans] Answer

Option (1) Cd.

Q15. Which of the following is not considered as a transition element?

(1) Au (2) Hg (3) La (4) Pt

[E] Explanation

Hg is the third member of the Zn/Cd/Hg family – $5d^{10}6s^2$, always filled. La ([Xe]$5d^16s^2$) has a genuinely incomplete d-subshell in the ground state itself, so it *does* qualify as a transition metal (it's placed as the first member of the d-block Group 3, period 6 row). Au and Pt both have accessible incomplete-d oxidation states.

[!] Common Mistake

Don't confuse La with the lanthanides just because it "sounds like" one – electronically, La's last electron enters $5d$, not $4f$, so by configuration it behaves as a d-block transition metal, not an f-block one.

[Ans] Answer

Option (2) Hg.

Q16. Which one of the following is not a transition metal?

(1) Chromium (2) Titanium (3) Lead (4) Tungsten

[E] Explanation

Lead (Pb) is a p-block metal (Group 14) – it was never in the d-block to begin with. Cr, Ti, W are all genuine d-block transition metals.

[Ans] Answer

Option (3) Lead.

Q17. The name 'transition metal' was derived from the fact that

(1) chemical properties transition between s & p block elements
(2) chemical properties transition between s & f block elements
(3) chemical properties transition between p & f block elements
(4) None of these

[E] Explanation

Same logic as Q10–Q12: d-block sits physically and chemically between the highly reactive s-block metals and the far less electropositive p-block elements – a transitional bridge between the two extremes.

[Ans] Answer

Option (1)

Q18. Which statement is correct?

(1) Transition metals have incomplete d-subshell either in neutral atom or in their ions.
(2) Zn, Cd and Hg are not regarded as transition metals.

(3) Due to presence of partly filled d or f orbitals in their atoms, transition elements differ from non-transition elements.

(4) All are correct.

[E] Explanation

Check each: (1) is the IUPAC definition – true. (2) established in Q5 – true. (3) is the reason transition elements show their signature properties (colour, variable oxidation states, catalysis, complex formation) – true. All three hold simultaneously.

[Ans] Answer

Option (4) All are correct.

Q19. Transition elements from Z = 39 to Z = 48 belong to

(1) 3d series (2) 4d series (3) 5d series (4) 6d series

[E] Explanation

Z = 39 is Yttrium (Y), Z = 48 is Cadmium (Cd) – this exact stretch of the periodic table is the second transition row, the **4d series**.

[A] Approach

Quick anchor: 3d series = Sc(21)–Zn(30); 4d = Y(39)–Cd(48); 5d = La/Hf(57/72)–Hg(80). Jab bhi atomic number diya ho, seedha apne series-range se match karo.

[Ans] Answer

Option (2) 4d series.

Q20. Which of the following is not a transition element?

(1) Cu (2) Ac (3) Zn (4) Pd

[E] Explanation

Zn is the odd one out here – always $3d^{10}4s^2$ and always $3d^{10}$ as Zn^{2+}, never incomplete. Ac ($[\mathrm{Rn}]6d^1 7s^2$) actually *does* have one d-electron in its ground state, which technically satisfies the "incomplete in ground state" clause of the definition – so between Zn and Ac, Zn is the clean fail.

[!] Common Mistake

Ac looks like the "obviously weird one" because it's usually filed under the actinides, but by strict electron configuration it has a genuinely incomplete d-subshell in its ground state. Zn is the one that fails on configuration grounds, not Ac.

[Ans] Answer

Option (3) Zn.

Q21. The first transition element is

(1) scandium (2) chromium (3) nickel (4) copper

[E] Explanation

Scandium (Z = 21, $[\mathrm{Ar}]3d^1 4s^2$) is the very first element of the 3d series and hence the first transition element in the periodic table.

[Ans] Answer

Option (1) Scandium.

Q22. Iron is a/an

(1) normal element
(2) representative element
(3) transition element
(4) inner-transition element

[E] Explanation

Iron ($[\mathrm{Ar}]3d^6 4s^2$) has an incomplete d-subshell – textbook transition element.

[Ans] Answer

Option (3) Transition element.

Q23. Which one of the following statements is not correct?

(1) Iron belongs to VIII group
(2) Iron belongs to third period
(3) Iron is a member of the 3d-series
(4) Iron is a transition metal

[E] Explanation

Iron (Z = 26) is in **Period 4**, not Period 3 – Period 3 ends at Argon (Z = 18), before the d-block even begins. Iron is Group 8 (old nomenclature "Group VIII" alongside Co, Ni), a genuine 3d-series transition metal – statements (1), (3), (4) are all correct. Only the period is wrong.

[!] Common Mistake

Easy to autopilot past "third period" because Fe "feels early" in the transition series – always double check period number against the actual row of the periodic table, not against how early the element appears within its own d-block series.

[Ans] Answer

Option (2) "Iron belongs to third period" – this is the incorrect statement.

Q24. Assertion: Transition elements are different from non-transition elements.
Reason: Due to the presence of partly filled d or f orbitals in their atoms.

(1) If both Assertion & Reason are True and the Reason is a correct explanation of the Assertion.

(2) If both Assertion & Reason are True but Reason is not a correct explanation of the Assertion.

(3) If Assertion is True but the Reason is False.

(4) If both Assertion & Reason are False.

[E] Explanation

Both statements are true, and the Reason directly explains the Assertion: it is exactly the partly-filled d (or f) orbitals that give transition (and inner-transition) elements their distinctive properties – variable oxidation states, colour, catalytic activity, complex formation – setting them apart from elements with fully filled or fully empty d/f orbitals.

[Ans] Answer

Option (1)

▶ TYPE 2 : Electronic Configuration

[F] Master Formulae

The three rules that solve almost every question in this section:

- **Ionisation order:** always remove ns electrons *completely first*, then $(n-1)d$ electrons. ($Fe \rightarrow Fe^{2+} = [Ar]3d^6$, *not* $3d^4 4s^2$.)
- **The famous exceptions:** $Cr = [Ar]3d^5 4s^1$ and $Cu = [Ar]3d^{10} 4s^1$ – half-filled and fully-filled d-subshells are extra stable, so one $4s$ electron jumps into $3d$. The same pattern repeats in the 4d row: $Mo = [Kr]4d^5 5s^1$.
- **General formula:** $(n-1)d^{1-10}\, ns^{1 \text{ or } 2}$ for the d-block as a whole (covers Zn-family too, even though they're not "transition" by definition).

Q25. Which one of the following ions has electronic configuration $[Ar]3d^6$?

[AIPMT (Prelims)-2010]

(1) Ni^{3+} (2) Mn^{3+} (3) Fe^{3+} (4) Co^{3+}

[E] Explanation

Work out each ion by removing $4s$ first, then $3d$:

- $Ni\ (3d^8 4s^2) \rightarrow Ni^{3+} = 3d^7$
- $Mn\ (3d^5 4s^2) \rightarrow Mn^{3+} = 3d^4$
- $Fe\ (3d^6 4s^2) \rightarrow Fe^{3+} = 3d^5$ (the famous stable half-filled ion)
- $Co\ (3d^7 4s^2) \rightarrow Co^{3+} = 3d^6$ ✓

[A] Approach

Yeh trap hai – most students' first instinct is Fe^{3+} because "iron +3" sounds so familiar from titrations. But Fe^{3+} is actually the textbook example of *half-filled* $3d^5$, not $3d^6$. The real $3d^6$ ion here is Co^{3+} – also a very famous one (it's the diamagnetic, low-spin d^6 centre in $[Co(NH_3)_6]^{3+}$, a staple coordination-chemistry example).

[!] Common Mistake

Don't pattern-match "Fe = d6 feeling" from memory of the *neutral atom* ($3d^6 4s^2$) – once you form Fe^{3+}, one more electron leaves from the d-subshell itself (after both $4s$ electrons are already gone), landing on $3d^5$.

[Ans] Answer

Option (4) Co^{3+}.

Q26. Among the following series of transition metal ions, the one where all metal ions have $3d^2$ electronic configuration is [At. No. Ti = 22, V = 23, Cr = 24, Mn = 25]

(1) Ti^{3+}, V^{2+}, Cr^{3+}, Mn^{4+}
(2) Ti^{+}, V^{4+}, Cr^{6+}, Mn^{7+}
(3) Ti^{4+}, V^{3+}, Cr^{2+}, Mn^{3+}
(4) Ti^{2+}, V^{3+}, Cr^{4+}, Mn^{5+}

[E] Explanation

Neutral configs: Ti $3d^2 4s^2$, V $3d^3 4s^2$, Cr $3d^5 4s^1$, Mn $3d^5 4s^2$. Strip ns first, then count how many d-electrons survive removal of (charge) electrons total. Testing option (4):

- Ti^{2+}: remove $4s^2 \to 3d^2$ ✓
- V^{3+}: remove $4s^2$, then 1 from $3d \to 3d^2$ ✓
- Cr^{4+}: remove $4s^1$, then 3 from $3d \to 3d^2$ ✓
- Mn^{5+}: remove $4s^2$, then 3 from $3d \to 3d^2$ ✓

All four land on $3d^2$ – this is an isoelectronic (d^2) family.

[A] Approach

Charge jitna zyada badhta hai series mein (2,3,4,5), utna hi atomic number badhta hai (Ti,V,Cr,Mn = 22,23,24,25) – ek saath badhte hain, isliye d-electron count *constant* rehta hai. Jab bhi ek series mein charge aur Z dono ek jaisi step size se badhein, expect same d^n across the row.

[!] Common Mistake

Don't forget Cr's neutral-atom exception ($3d^5 4s^1$, only one $4s$ electron to begin with) when computing Cr^{4+} – you remove that single $4s^1$ first, then three more from $3d^5$, landing on $3d^2$, not $3d^1$.

[Ans] Answer

Option (4) Ti^{2+}, V^{3+}, Cr^{4+}, Mn^{5+}.

Q27. Which one of the following pairs of ions have same electronic configuration?

(1) Cr^{3+}, Fe^{3+}
(2) Mn^{2+}, Fe^{3+}
(3) Fe^{3+}, Co^{3+}
(4) Sc^{3+}, Cr^{3+}

[E] Explanation

Mn ($3d^5 4s^2$) $\rightarrow$ $Mn^{2+} = 3d^5$. Fe ($3d^6 4s^2$) $\rightarrow$ $Fe^{3+} = 3d^5$. Both land on the same stable half-filled $3d^5$ configuration – genuinely isoelectronic. (Check the rest: $Cr^{3+} = 3d^3$ vs $Fe^{3+} = 3d^5$ – no match; $Fe^{3+} = 3d^5$ vs $Co^{3+} = 3d^6$ – no match; $Sc^{3+} = 3d^0$ vs $Cr^{3+} = 3d^3$ – no match.)

[Ans] Answer

Option (2) Mn^{2+}, Fe^{3+}.

Q28. Match the column

Element	Unpaired e^-
A. Fe	i. 4
B. Mn	ii. 5
C. Cu	iii. 0
D. Zn	iv. 1

(1) A–i; B–ii; C–iii; D–iv

(2) A–ii; B–i; C–iv; D–iii

(3) A–i; B–ii; C–iv; D–iii

(4) A–iv; B–iii; C–ii; D–i

[E] Explanation

Fill each with Hund's rule (max unpaired first across 5 d-orbitals):

- **Fe** ($3d^6$): 5 orbitals, 6 electrons $\rightarrow$ one pair forms, 4 stay unpaired.
- **Mn** ($3d^5$): exactly half-filled, all 5 unpaired.
- **Cu** ($3d^{10} 4s^1$): d^{10} is fully paired (0), but the lone $4s^1$ electron is unpaired $\rightarrow$ 1 unpaired total.
- **Zn** ($3d^{10} 4s^2$): both subshells fully paired $\rightarrow$ 0 unpaired.

So A(Fe)=4, B(Mn)=5, C(Cu)=1, D(Zn)=0 $\rightarrow$ A–i, B–ii, C–iv, D–iii.

[!] Common Mistake

Don't forget Cu's lone $4s^1$ electron when counting "unpaired" – it's easy to only look at the d-subshell (which is fully paired, d^{10}) and conclude 0, missing the single unpaired s-electron that actually gives Cu its answer of 1.

[Ans] Answer

Option (3) A–i; B–ii; C–iv; D–iii.

Q29. Assertion: Group 11 is also known as coinage metals. Reason: In Cu, there are 17 e^- in penultimate shell.

(1) If both Assertion & Reason are True and the Reason is a correct explanation of the Assertion.

(2) If both Assertion & Reason are True but Reason is not a correct explanation of the Assertion.

(3) If Assertion is True but the Reason is False.

(4) If both Assertion & Reason are False.

[E] Explanation

Assertion is true (Q2). Now count Cu's penultimate (M, $n = 3$) shell: Cu $= 1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^1$, so the M-shell holds $3s^2 + 3p^6 + 3d^{10} = 2 + 6 + 10 =$ **18** electrons, not 17. The Reason is false – and even if it were true, an electron count wouldn't logically *explain* why a group is nicknamed "coinage metals" anyway.

[A] Approach

Jab bhi "penultimate shell electron count" wala assertion-reason aaye, seedha shell-by-shell (K, L, M, N) gin lo – guess mat karo. Cu ke liye M-shell hamesha 18 hota hai ($3d^{10}$ khud hi 10 deta hai), 17 nahi.

[!] Common Mistake

17 is a classic "off-by-one" trap – students sometimes forget to add the full $3d^{10}$ contribution, or misremember Cu's exceptional $4s^1$ (not $4s^2$) and miscount downstream.

[Ans] Answer

Option (3) Assertion True, Reason False.

Q30. Which of the following is general electron configuration of transition elements?

(1) $(n-1)d^{1-9}\,ns^{1-2}$
(2) $(n-1)d^{1-10}\,ns^{1-2}$
(3) $(n-1)d^{1-10}\,ns^{1}$
(4) $(n-1)d^{1-9}\,ns^{2}$

[E] Explanation

The standard NCERT general formula for the d-block is $(n-1)d^{1-10}\,ns^{1-2}$ – it covers the full range from Sc ($d^1 s^2$) through the exceptions ($d^5 s^1$, $d^{10} s^1$) right up to Zn ($d^{10} s^2$).

[Ans] Answer

Option (2)

Q31. How many d-electrons are there in Fe^{2+} (Z = 26)?

(1) 4 (2) 5 (3) 6 (4) 3

[E] Explanation

Fe $=$ [Ar]$3d^6 4s^2$. Forming Fe^{2+} removes both $4s$ electrons and leaves the $3d$ subshell completely untouched $\rightarrow$ Fe^{2+} $=$ [Ar]$3d^6$.

[!] Common Mistake

Don't remove a d-electron here – with only a $+2$ charge, the two $4s$ electrons alone account for the full loss. d-electrons are only touched once the charge exceeds what ns alone can supply (i.e. from $+3$ onward for Fe).

[Ans] Answer

Option (3) 6.

Q32. Which of the following is an electron configuration of Cr?

Ar $3d^4\,4s^2$	Ar $3d^5\,4s^1$
Ar $3d^5\,4s^2$	Ar $3d^5\,3s^1$

[E] Explanation

Chromium is the textbook exception: instead of the "expected" $3d^4 4s^2$, one $4s$ electron shifts into $3d$ to reach the extra-stable **half-filled** $3d^5$ configuration. Actual ground state: $[\text{Ar}]3d^5 4s^1$.

[Ans] Answer

Option (3) $[\text{Ar}]3d^5 4s^1$.

Q33. Which of the following is an electron configuration of Cu?

Ar $3d^9\,4s^2$	Ar $3d^{10}\,3s^1$
Ar $3d^9\,3s^2$	Ar $3d^{10}\,4s^1$

[E] Explanation

Same exception mechanism as Cr, but here the shift completes a **fully-filled** $3d^{10}$ instead of half-filled. Actual ground state: $[\text{Ar}]3d^{10} 4s^1$.

[A] Approach

Cr aur Cu dono hi "$4s$ se ek electron udhaar lo, $3d$ ko extra stable banao" wale exceptions hain – Cr half-filled (d^5) ke liye, Cu fully-filled (d^{10}) ke liye. Dono hi pattern yaad rakhne layak hain, kyunki 4d/5d row mein bhi yehi repeat hota hai (Mo, Ag, Au).

[Ans] Answer

Option (4) $[\text{Ar}]3d^{10} 4s^1$.

Q34. In which of the following group, all ions have $3d^2$ configuration? [Atomic No. Ti = 22, V = 23, Cr = 24, Mn = 25]

(1) Ti^{3+}, V^{2+}, Cr^{3+}, Mn^{4+}	(3) Ti^{4+}, V^{3+}, Cr^{2+}, Mn^{3+}
(2) Ti^{+}, V^{4+}, Cr^{6+}, Mn^{7+}	(4) Ti^{2+}, V^{3+}, Cr^{4+}, Mn^{5+}

[E] Explanation

This is the identical question to Q.26 above – same stem (rephrased "Among the following series..." → "In which of the following group..."), same atomic numbers given, and the same four options word-for-word. I'm flagging this rather than silently re-deriving it as if it were new content from your source PDF; the working is unchanged.

[Ans] Answer

Option (4) Ti^{2+}, V^{3+}, Cr^{4+}, Mn^{5+} – see full working at Q.26.

Q35. Which of following pair of elements has $(n-1)d^{10}ns^2$ electronic configuration?

(1) Fe, Co, Ni
(2) Cu, Ag, Au
(3) Zn, Cd, Hg
(4) Sc, Y, La

[E] Explanation

$(n-1)d^{10}ns^2$ is the signature configuration of the **Zn family** – Zn ($3d^{10}4s^2$), Cd ($4d^{10}5s^2$), Hg ($5d^{10}6s^2$). Note the coinage metals (Cu, Ag, Au) are close but *not* this – they're $d^{10}s^1$ (one s electron, not two).

[!] Common Mistake

Cu/Ag/Au vs Zn/Cd/Hg is the single most common mix-up in this whole chapter – both families are "d^{10}", but coinage metals stop at s^1 while the Zn family goes all the way to s^2. Always check the exponent on s, not just whether d is full.

[Ans] Answer

Option (3) Zn, Cd, Hg.

Q36. General electronic configuration of Zn, Cd, Hg and Cn is

(1) $(n-1)d^{10}\,ns^1$
(2) $(n-1)d^{10}\,ns^2$
(3) $(n-1)d^{9}\,ns^2$
(4) $(n-1)d^{1-10}\,ns^1$

[E] Explanation

Same family as Q35, now including Copernicium (Cn, the synthetic Group 12 element below Hg) – all four share $(n-1)d^{10}ns^2$.

[Ans] Answer

Option (2)

Q37. The general electronic configuration of transition elements is

(1) $(n-1)d^{1-5}$
(2) $(n-1)d^{1-10}\,ns^1$
(3) $(n-1)d^{1-10}\,ns^{1\ or\ 2}$
(4) none

[E] Explanation

Same fact as Q30, just written with "1 or 2" instead of "1–2" – both option sets describe the identical formula $(n-1)d^{1-10}ns^{1\text{ or }2}$, so this question is testing whether you recognise the same rule under different notation.

[Ans] Answer

Option (3) $(n-1)d^{1-10}\, ns^{1\ or\ 2}$.

Q38. The electronic configuration of the element which is just above the element with atomic number 43 in the same periodic group is

(1) $1s^2,\ 2s^22p^6,\ 3s^23p^63d^5,\ 4s^2$

(2) $1s^2,\ 2s^22p^6,\ 3s^23p^63d^{10},\ 4s^24p^5$

(3) $1s^2,\ 2s^22p^6,\ 3s^23p^63d^6,\ 4s^1$

(4) $1s^2,\ 2s^22p^6,\ 3s^23p^63d^{10},\ 4s^14p^6$

[E] Explanation

Z = 43 is Technetium (Tc), Group 7, Period 5. Directly **above** it in the same group, Period 4, is Manganese (Mn, Z = 25). Mn's full configuration: $1s^22s^22p^63s^23p^63d^54s^2$ – exactly option (1).

[A] Approach

"Just above in the same group" = go up one period, same column. Group 7's period-4 member is Mn – and Mn's config is a clean $3d^5$ (half-filled, no exception needed, unlike its neighbour Cr).

[Ans] Answer

Option (1)

Q39. The number of d-electrons in Fe^{2+} (at. no. of iron = 26) is not equal to that of

(1) p electrons in neon (at. no. = 10)

(2) s electrons in Mg (at. no. = 12)

(3) d electrons in Fe

(4) p electrons in Cl^- (at. no. of Cl = 17)

[E] Explanation

Fe^{2+} has $3d^6$ = **6** d-electrons (Q31). Now check each option:

- Ne ($1s^22s^22p^6$): p-electrons $= 6$. Matches.
- Mg ($1s^22s^22p^63s^2$): s-electrons $= 2+2+2 = 6$. Matches.
- Fe neutral ($3d^64s^2$): d-electrons $= 6$. Matches.
- Cl^- (Cl $1s^22s^22p^63s^23p^5$, gains 1 electron $\to 3p^6$): p-electrons $= 2p^6 + 3p^6 = 6+6 =$ **12**. Does **not** match.

[!] Common Mistake

Easy to only count the outer $3p^6$ of Cl^- and get 6 – but the question asks for *total* p-electrons, which must include the inner $2p^6$ too. That's exactly what makes 12 the odd one out.

[Ans] Answer

Option (4) p electrons in Cl^-.

Q40. Match the column

Column-I (Element)	Column-II (Electronic configuration)
(i) Rg (Z = 111)	(a) [Kr] $4d^6\,5s^1$
(ii) W (Z = 74)	(b) [Rn] $5f^{14}\,6d^{10}\,7s^1$
(iii) Mo (Z = 42)	(c) [Xe] $4f^{14}\,5d^4\,6s^2$
(iv) Tc (Z = 43)	(d) [Kr] $4d^5\,5s^1$

(1) i–b; ii–c; iii–d; iv–a

(2) i–c; ii–b; iii–d; iv–a

(3) i–a; ii–c; iii–d; iv–b

(4) i–d; ii–b; iii–c; iv–a

[E] Explanation

Match by identity first, then confirm by elimination:

- **Rg** (Group 11, coinage-metal family) behaves like Au – extra electron shifts to give a filled $d^{10}s^1$: $[\mathrm{Rn}]5f^{14}6d^{10}7s^1 \rightarrow$ **(b)**.
- **W** (Group 6, regular filling, no exception at this row): $[\mathrm{Xe}]4f^{14}5d^4 6s^2 \rightarrow$ **(c)**.
- **Mo** (Group 6, but 4d row – shows the Cr-style exception): $[\mathrm{Kr}]4d^5 5s^1 \rightarrow$ **(d)**.
- **Tc** (Group 7) is left with **(a)**, $[\mathrm{Kr}]4d^6 5s^1$, by elimination.

So: i–b, ii–c, iii–d, iv–a.

[A] Approach

Rg ekdum Au jaisa behave karta hai (same group, coinage-family exception pattern) – yeh sabse pehla anchor point hai. W ekdum "normal" filling follow karta hai (no exception). Mo, Cr ki tarah d^5s^1 exception dikhata hai. Baaki bacha Tc, jo elimination se apne aap match ho jaata hai.

[!] Common Mistake

Note for your own reference: Tc's experimentally measured ground state is actually $[\mathrm{Kr}]4d^5 5s^2$ (a *regular* filling, like Mn) rather than the $4d^6 5s^1$ shown in option (a) – but since this is a closed four-item matching question and (b), (c), (d) are unambiguously fixed to Rg, W, Mo, option (a) is forced onto Tc by elimination regardless. Flagging this in case your answer key differs or a student asks why Tc "looks like" an exception here.

[Ans] Answer

Option (1) i–b; ii–c; iii–d; iv–a.

That's a wrap on Classification & Electronic Configuration –
the rest of d-block chemistry builds directly on these two ideas.

– Your Weird Chemist