

EXAM-DAY · 90-MIN REVISION CARD

d- and f-Block Elements

Print this · Fold it · Carry to the exam-hall gate · Revise once · Then walk in.

FORMULAS & KEY RESULTS

General config (d-block):
(n-1)d¹⁻¹⁰ ns⁰⁻²; exceptions
Cr 3d⁵ 4s¹, Cu 3d¹⁰ 4s¹

Spin-only magnetic moment: $\mu = \sqrt{n(n+2)}$ BM, n = number of UNPAIRED electrons

n=1 → 1.73 BM; n=2 → 2.83 BM;
n=3 → 3.87 BM; n=4 → 4.90 BM;
n=5 → 5.92 BM

Equivalent weight: KMnO₄
(acidic) = M/5; KMnO₄ (neutral) = M/3; KMnO₄ (alkaline) = M/1

Equivalent weight: K₂Cr₂O₇
(acidic) = M/6 (Cr: +6 to +3, 2 Cr × 3e = 6e)

For cations remove ns electrons BEFORE (n-1)d electrons

Lanthanides config: 4f¹⁻¹⁴ 5d⁰⁻¹ 6s²; common state +3;
Actinides: 5f¹⁻¹⁴ 6d⁰⁻¹ 7s²

Lanthanide contraction: steady decrease in radius La→Lu due to poor 4f shielding

TOP 5 PYQ PATTERNS

1 Spin-only magnetic moment of a given ion
2 marks · 85% of years
Write ion config, remove ns first, count unpaired n, apply $\sqrt{n(n+2)}$. State BM.

2 Lanthanide contraction: define + cause + two consequences
3 marks · 80% of years
Decrease in size; poor 4f shielding; consequences = Zr/Hf similarity + decreasing basicity of hydroxides.

3 KMnO₄ / K₂Cr₂O₇ preparation and oxidising-action equations
3 marks · 75% of years
Memorise acidic half-reactions (Mn +7→+2 / Cr +6→+3) and balance with H⁺ and H₂O.

4 Reason-type: colour / variable states / catalytic property
2 marks · 70% of years
Colour = d-d transition; variable states = close (n-1)d/ns energies; catalysis = variable states + large surface.

5 Lanthanides vs actinides comparison
2 marks · 60% of years
Actinides: wider oxidation states, all radioactive, greater contraction. Lanthanides: mostly +3.

90-MIN REVISION FLOW

0-15 min
Re-write the general configuration plus Cr and Cu exceptions; sketch the groups 3-12 strip from memory.

15-35 min
Drill 5 spin-only magnetic-moment ions (Ti³⁺, V³⁺, Cr³⁺, Mn²⁺, Fe²⁺). Verify each μ value against the table.

35-55 min
Write KMnO₄ acidic/neutral/alkaline half-reactions and K₂Cr₂O₇ acidic half-reaction; balance fully.

55-70 min
Define lanthanide contraction; list cause + two consequences. Then jot three lanthanide-vs-actinide differences.

70-85 min
Run the 15-Q drill MCQ set; tick only correct/wrong; review every miss.

85-90 min
Final skim of the cheat-sheet formula grid; sleep on $\mu = \sqrt{n(n+2)}$ as the mantra.

Confidence, not anxiety. You've practised this all year. Trust your steps. Don't change strategy on exam morning.
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