EngineeringRise

Transition elements: general trends and properties

Formulas and units, JEE Main. Status: Reviewed on 2026-11-20.

Result	Formula	Units or note
d electrons of an ion	d = Z - charge - 18 (first row, 4s emptied) Valid when: First-row ion with 4s emptied; Z is atomic number of the element	number
Spin-only magnetic moment	mu = sqrt(n(n + 2)) Valid when: Spin-only value; n is the number of unpaired d electrons	BM (Bohr magneton)
Moment table	n = 1, 2, 3, 4, 5 gives 1.73, 2.83, 3.87, 4.90, 5.92 Valid when: Spin-only values; read-off table for n unpaired electrons	BM
Unpaired electrons for dn	n = d for d up to 5; n = 10 - d for d above 5 Valid when: High-spin free ion; d electrons singly filled across five d orbitals first	number
Highest oxidation state	number of 4s + 3d electrons, Sc to Mn Valid when: Sc to Mn only; all 4s and 3d electrons used	number
Photon energy per mole	E = N_A h c / lambda Valid when: Energy of one mole of photons of wavelength lambda in metres	J per mol (divide by 1000 for kJ)
Alloy rule	radii within about 15 percent Valid when: Rough guide for substitutional alloys; metallic radii compared	percent
Exception configurations	Cr 3d5 4s1; Cu 3d10 4s1	n/a (configuration)

Full lesson with worked examples:
https://www.engineeringrise.in/learn/learn/jee-main/chemistry/d-and-f-block-elements/transition-elements-general-trends-and-proper

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