

* Crystal field Components of ground state and important excited states in weak octahedral field.

d^n	Free ion ground state	Crystal field substate (s)	Free ion excited state	Ground state term
d^1	$2D$	$2T_{2g} + 2E_g$		$2T_{2g}$
d^2	$3F$	$3T_{1g} + 3T_{2g} + 3A_{2g}$	$3P$	$3T_{1g}$
d^3	$4F$	$4T_{1g} + 4T_{2g} + 4A_{2g}$	$4P$	$4A_{2g}$
d^4	$5D$	$5T_{2g} + 5E_g$		$5E_g$
d^5	$6S$	$6A_{1g}$		$6A_{1g}$
d^6	$5D$	$5T_{2g} + 5E_g$		$5T_{2g}$
d^7	$4F$	$4T_{1g} + 4T_{2g} + 4A_{2g}$	$4P$	$4T_{1g}$
d^8	$3F$	$3T_{1g} + 3T_{2g} + 3A_{2g}$	$3P$	$3A_{2g}$
d^9	$2D$	$2T_{2g} + 2E_g$		$2E_g$

Energies of crystal field terms in weak octahedral field

<u>d^n</u>	<u>Energy</u>
d^1	$2T_{2g} (-4Dq), 2E_g (+6Dq)$
d^2	$3T_{1g}(F) (-6Dq), 3T_{2g} (+2Dq), 3A_{2g} (+12Dq),$ $3T_{1g}(P) (+15B)$
d^3	$4A_{2g} (-12Dq), 4T_{2g} (-2Dq), 4T_{1g}(F) (+6Dq),$ $4T_{1g}(P) (+15B)$
d^4	$2E_g (-6Dq), 5T_{2g} (+4Dq)$
d^5	$6A_{1g} (0)$
d^6	$5T_{2g} (-4Dq), 5E_g (+6Dq)$
d^7	$4T_{1g}(F) (-6Dq), 4T_{2g} (+2Dq), 4A_{2g} (+12Dq),$ $4T_{1g}(P) (+15B)$
d^8	$3A_{2g} (-12Dq), 3T_{2g} (-2Dq), 3T_{1g}(F) (+6Dq),$ $3T_{1g}(P) (+15B)$
d^9	$2E_g (-6Dq), 2T_{2g} (+4Dq)$