

CRYSTAL FIELD SPLITTING PATTERN

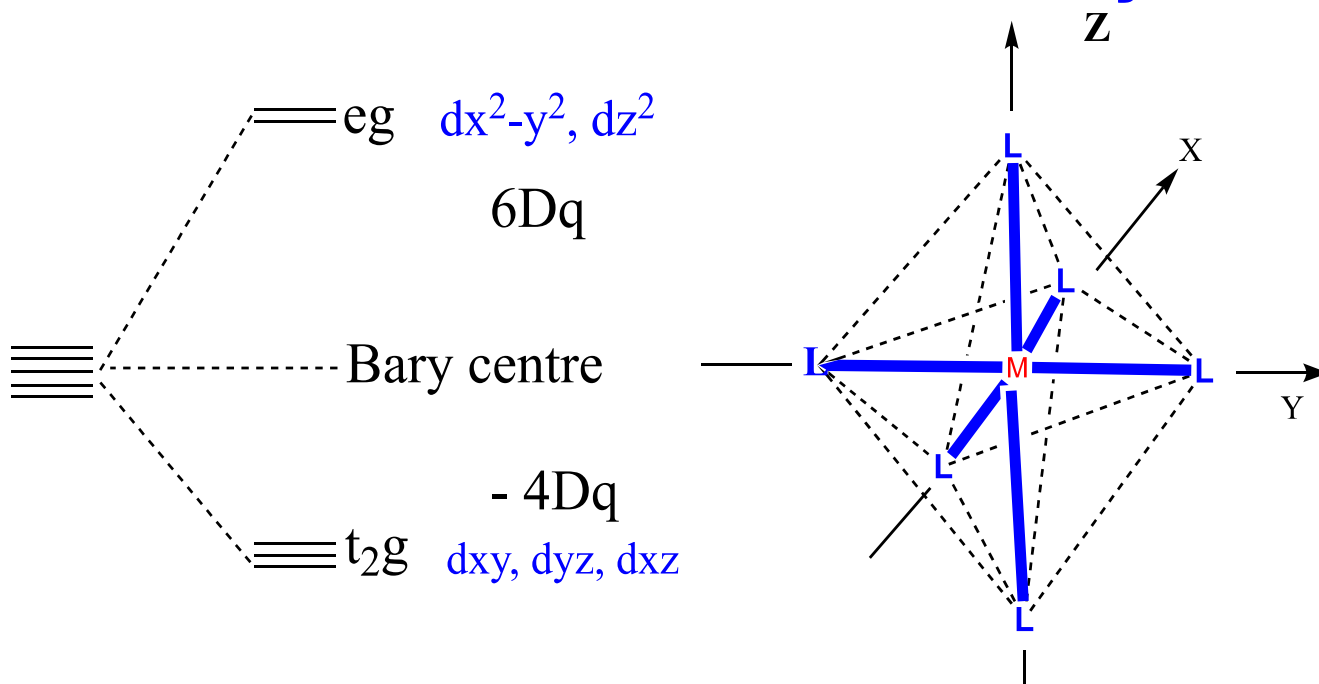
Splitting of d orbitals in Octahedral, Tetrahedral, Square planar, triangular planar, Trigonal bipyramidal, Square pyramidal, Trigonal prismatic, Square antiprismatic, Pentagonal bipyramidal and Cubic geometries

B. Sc and M. Sc Programme

Prof. Narendra Pratap Singh

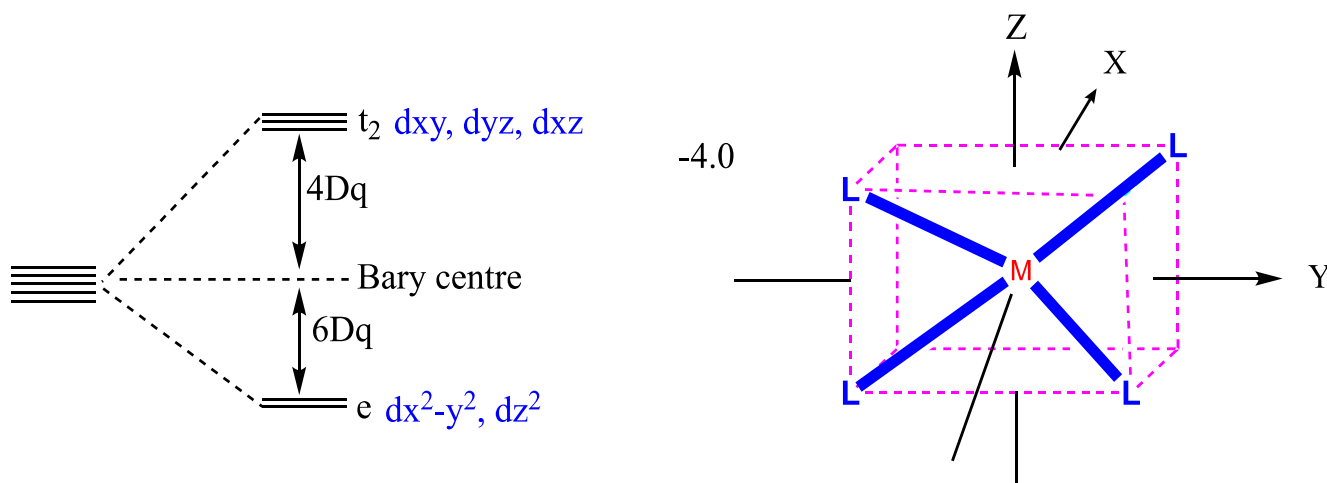
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Octahedral Geometry



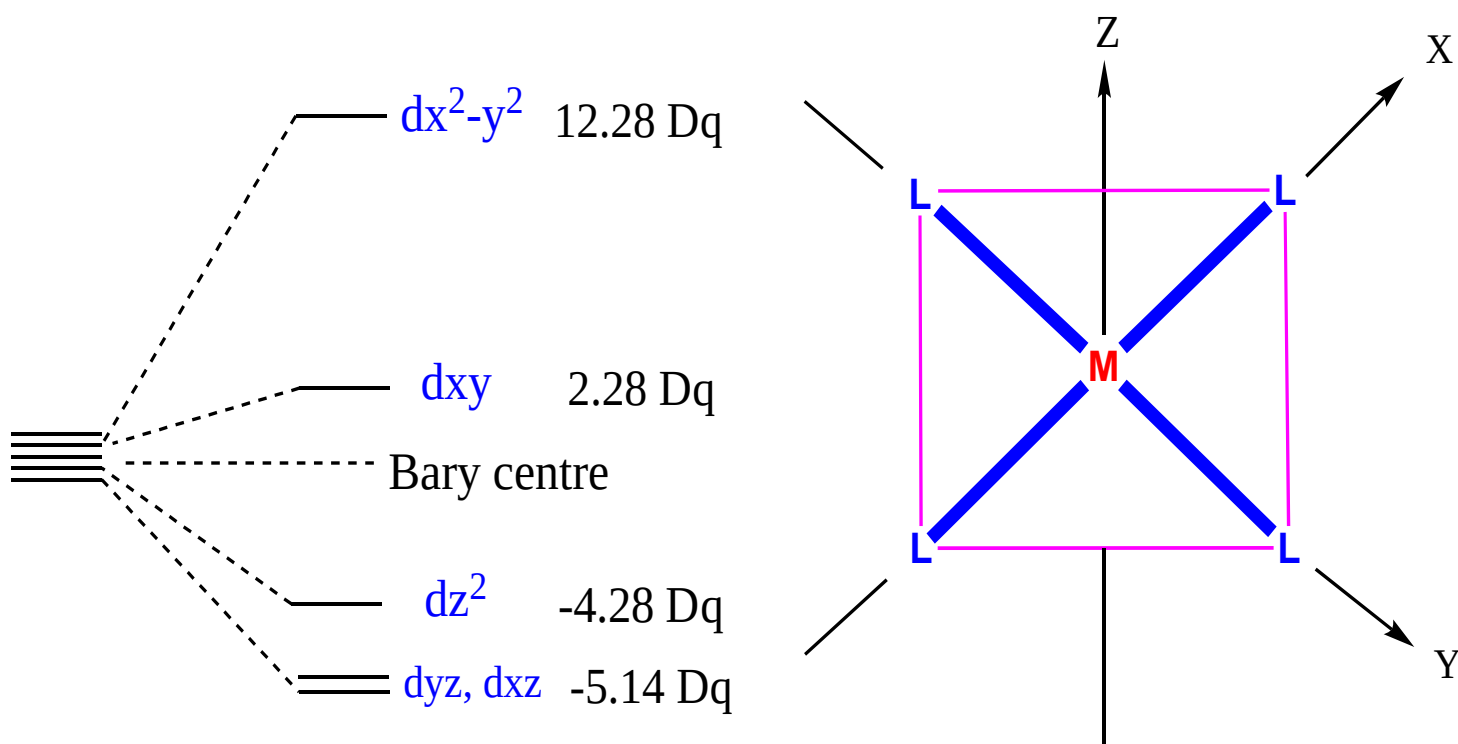
Geometry	d_{z^2}	$d_{x^2-y^2}$	d_{xy}	d_{xz}	d_{xy}
Octahedral	6.0	6.0	- 4.0	- 4.0	- 4.0

Tetrahedral Geometry



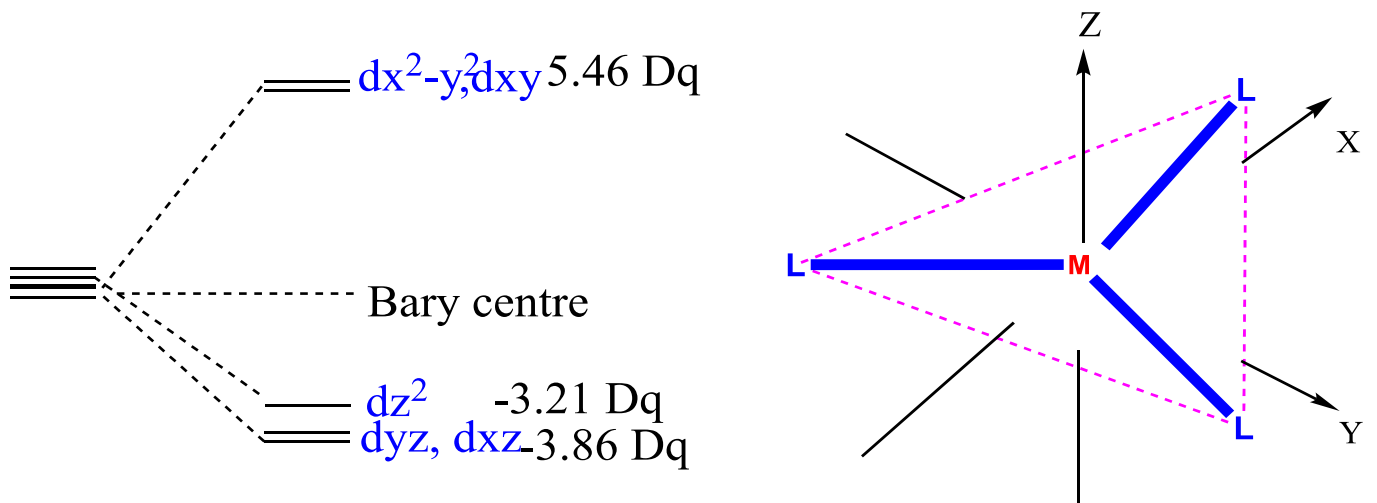
Geometry	d_{z^2}	$d_{x^2-y^2}$	d_{xy}	d_{xz}	d_{xy}
Tetrahedral	- 2.67	- 2.67	1.78	1.78	1.78

Square planar



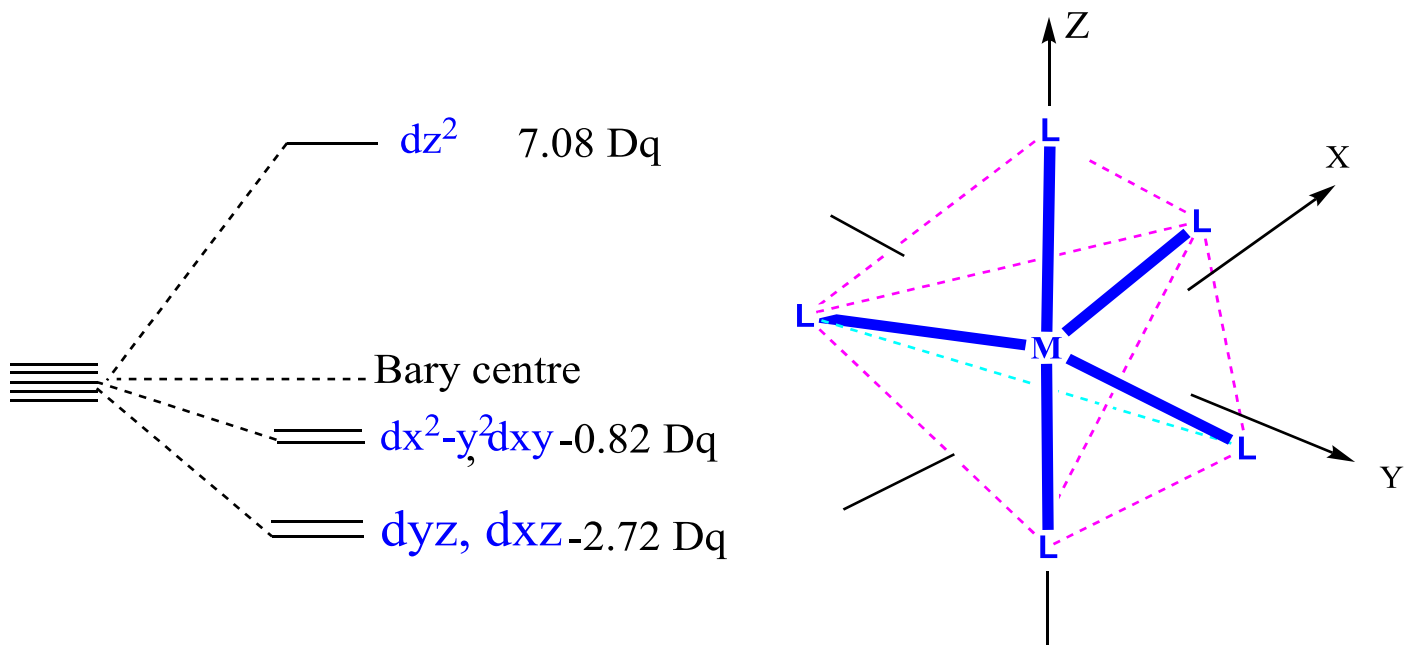
Geometry	d_{z^2}	$d_{x^2-y^2}$	d_{xy}	d_{xz}	d_{yz}
Square planar	- 4.28	12.28	2.28	- 5.14	- 5.24

Triangular Planar



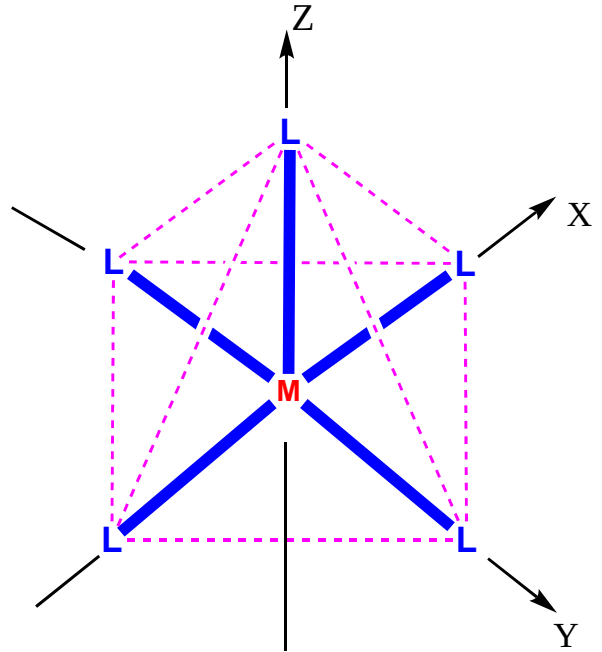
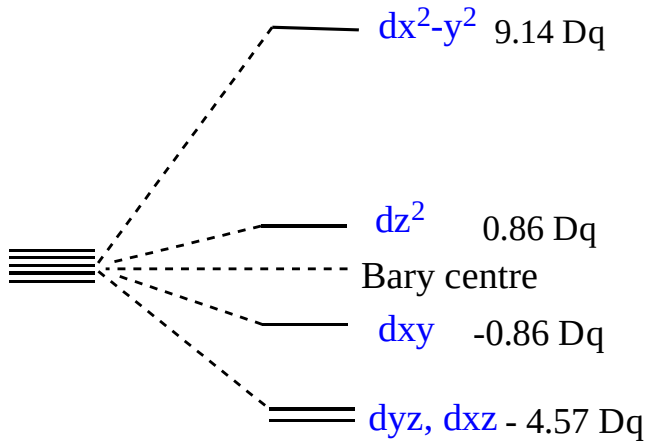
Geometry	d_{z^2}	$d_{x^2-y^2}$	d_{xy}	d_{xz}	d_{yz}
Trigonal planar	-3.21	5.46	5.46	-3.86	-3.86

Trigonal Bipyramidal



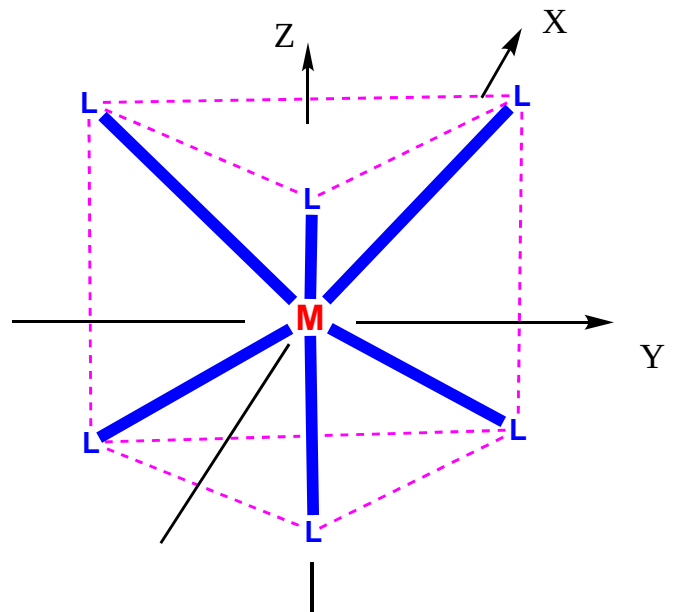
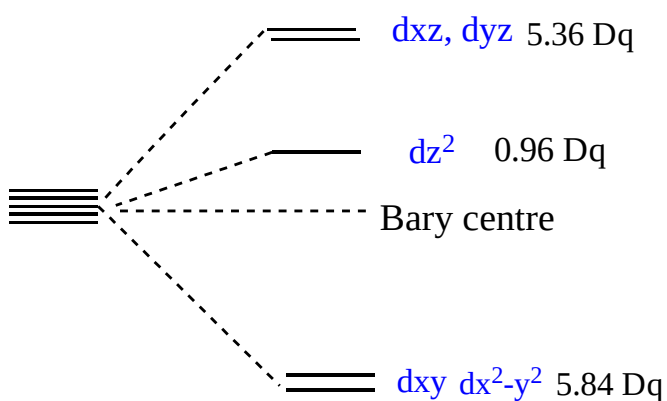
Geometry	d_{z^2}	$d_{x^2-y^2}$	d_{xy}	d_{xz}	d_{yz}
Trigonal bipyramidal	7.08	-0.82	-0.82	-2.72	-2.72

Square Pyramidal



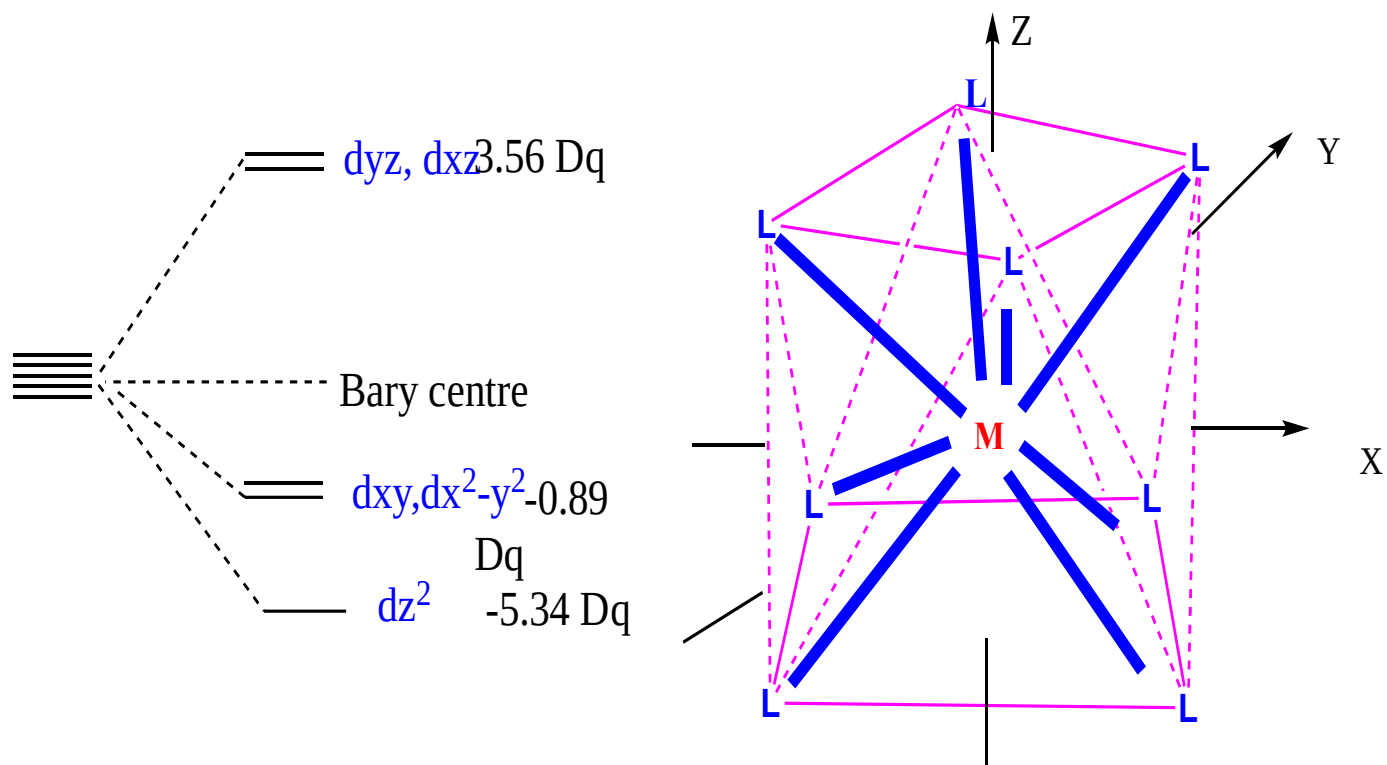
Geometry	d_{z^2}	$d_{x^2-y^2}$	dxy	dxz	dxy
Square bipyramidal	0.86	9.14	-0.86	- 4.57	- 4.57

Trigonal Prismatic



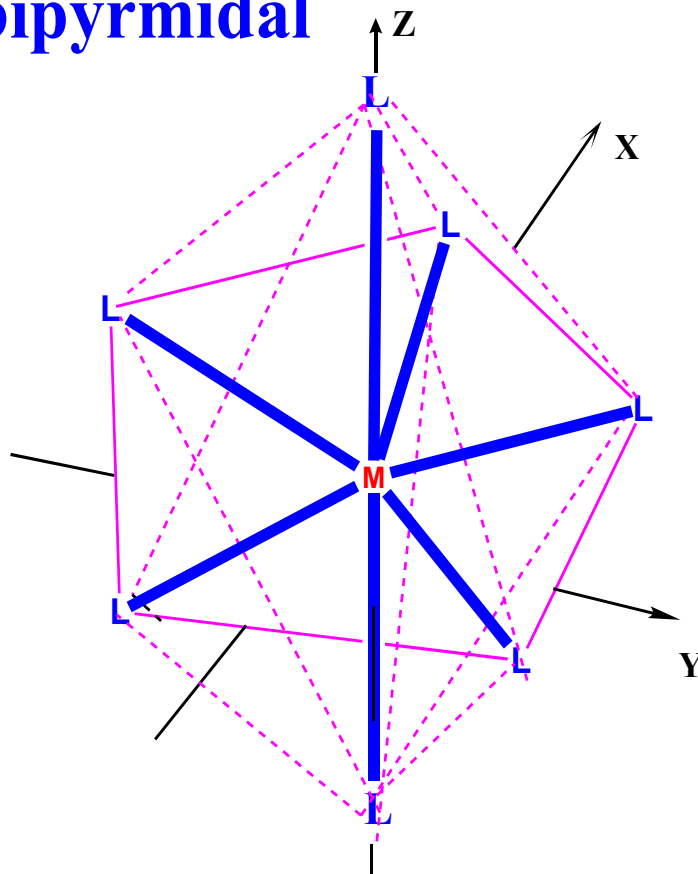
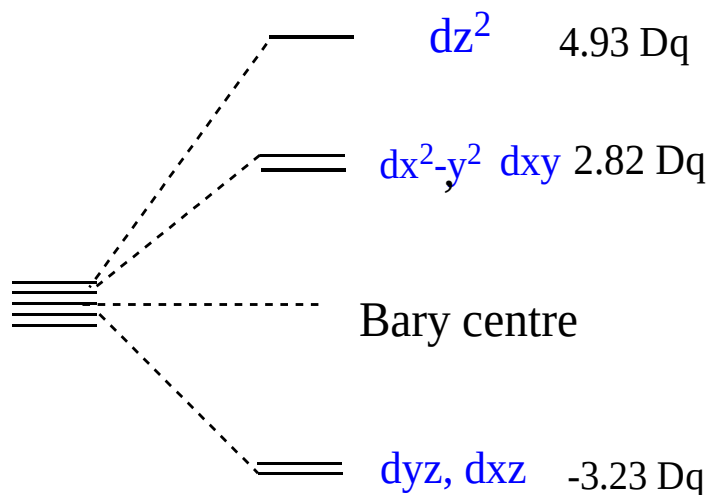
Geometry	d_{z^2}	$d_{x^2-y^2}$	dxy	dxz	dxy
Trigonal prismatic	0.96	- 5.84	- 5.84	5.36	5.36

Square Antiprismatic



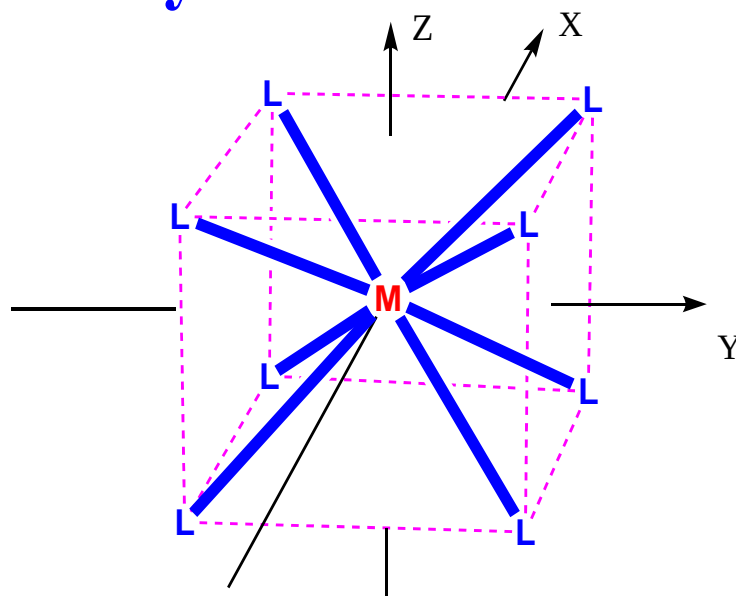
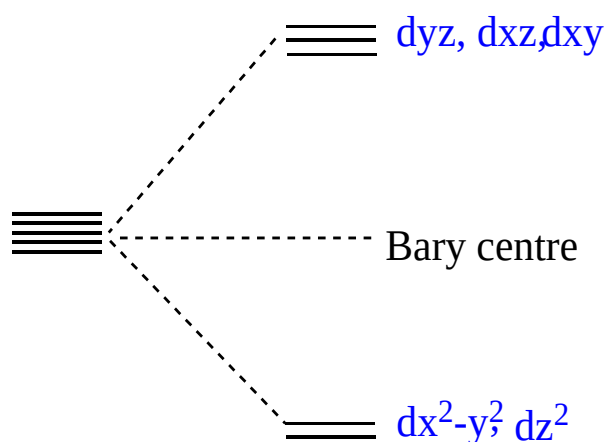
Geometry	d_{z^2}	$d_{x^2-y^2}$	d_{xy}	dxz	d_{xy}
Square Antiprismatic	- 5.34	- 0.89	- 0.89	3.56	3.56

Pentagonal bipyramidal



Geometry	d_{z^2}	$d_{x^2-y^2}$	d_{xy}	d_{xz}	d_{yz}
Pentagonal bipyramidal	4.93	2.82	2.82	- 3.23	- 3.23

Cubic Geometry



Geometry	d_{z^2}	$d_{x^2-y^2}$	d_{xy}	d_{xz}	d_{yz}
Cubic geometry	- 5.34	- 5.34	3.56	3.56	3.56

The energy levels of d-orbitals in crystal fields of different symmetries

C. N.	Geometry	d_{z^2}	$d_{x^2-y^2}$	d_{xy}	d_{xz}	d_{yz}
1	Linear	10.28	-6.28	-6.28	1.14	1.14
2	Trigonal planar	-3.21	5.46	5.46	-3.86	-3.86
3	Tetrahedral	-2.67	-2.67	1.78	1.78	1.78
4	Square planar	-4.28	12.28	2.28	-5.14	-5.14
5	Trigonal bipyramidal	7.07	-0.82	-0.82	-2.72	-2.72
6	Square pyramidal	0.86	9.14	-0.86	-4.57	-4.57
7	Octahedral	6.00	6.00	-4.00	-4.00	-4.00
8	Trigonal prismatic	0.96	-5.84	-5.84	5.36	5.36
9	Pentagonal bipyramidal	4.93	2.82	2.82	-5.28	-5.28
10	Cubic	-5.34	-5.34	3.56	3.56	3.56
11	Square antiprismatic	-5.34	-0.89	-0.89	3.56	3.56
12	Icosahedral	0.00	0.00	0.00	0.00	0.00