## SHAPES OF $MX_n$ MOLECULES BY V.S.E.P.R. THEORY

| Electron Domains | Arrangement of Domains | Bond Domains[1] | Lone Pairs | Molecular Shape | Polar?[2] |
|---|---|---|---|---|---|
| 2 | linear | 2 | 0 | linear [$MX_2$] | No |
| 3 | trigonal planar | 3 | 0 | trigonal planar [$MX_3$] | No |
| | | 2 | 1 | bent (<120°) [$MX_2$] | Yes |
| 4 | tetrahedral | 4 | 0 | tetrahedral [$MX_4$] | No |
| | | 3 | 1 | trigonal pyramidal [$MX_3$] | Yes |
| | | 2 | 2 | bent (<109.5°) [$MX_2$] | Yes |
| 5 | trigonal bipyramidal | 5 | 0 | trigonal bipyramidal [$MX_5$] | No |
| | | 4 | 1 | irregular tetrahedron [$MX_4$] | Yes |
| | | 3 | 2 | T-shaped [$MX_3$] | Yes |
| | | 2 | 3 | linear [$MX_2$] | No |
| 6 | octahedral | 6 | 0 | octahedral [$MX_6$] | No |
| | | 5 | 1 | square pyramid [$MX_5$] | Yes |
| | | 4 | 2 | square planar [$MX_4$] | No |

[1]A single, double, or triple bond constitutes one domain of electron density. Therefore, to establish the number of electron domains about a central atom, count the number of atom-pair linkages and add to this any non-bonding pairs. The need to count domains, rather than simply electron pairs, has prompted the co-author of V.S.E.P.R. theory to rename it the Electron Domain theory. [R. J. Gillespie. *J. Chem. Educ.* **1992,** *69*, 116.]

[2]Listed polarity is for *binary* compounds ($MX_n$) only. Composition of ternary ($MX_nY_m$) and higher compounds may result in polarity for a shape that might be nonpolar if the compound were binary.