

CH301 Worksheet 6: Creating 3 dimensional structures of molecules to determine polarity

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
Name molecular formula	Initial layout EN values	Ionic or Covalent bond	N	A	S	B	Octet rule?	Double or triple	Resonance?	Lewis dot structure	#e- rich regions	Electronic geometry	Hybridization	Bond angle	Bonding pairs	Unbonded pairs	Molecular geometry	VSEPR structure	VSEPR with dipoles	Polar?
H ₂ O																				
NH ₃																				
I ₃ ⁻																				
SO ₂																				

Explanation of columns:

- B Create symmetrical layout of atoms and assign EN values to each atom
- D Calculate $\Delta EN > 1.5$, bond is ionic. If $\Delta EN < 1.5$, bond is covalent.
- D-G Assign needed (N), available (A), shared electrons (S) and bond sites (B) for Lewis dot determination
- H Does structure follow octet rule. If yes, then answer J and K as below.
- I Double or triple bonds in molecule is $S/2/B$ is integer > 1
- J Resonance if $(S/2)/B$ is not an integer
- K Create Lewis dot structure
- L Count regions of electron density to perform VSEPR and VB determinations
- M-O Electronic geometry, hybridization bond angle from regions of electron density
- P-R Bonding and nonbonding electron pairs around central atom and molecular geometry that results.
- S Draw VSEPR 3-D structure including all available electrons (column E)
- T,U Draw VSEPR 3-D structure with dipole moments (ΔEN) from column B. If $\Sigma \Delta EN = 0$, then non-polar, $\Sigma \Delta EN \neq 0$ then polar.

