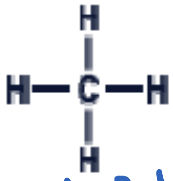
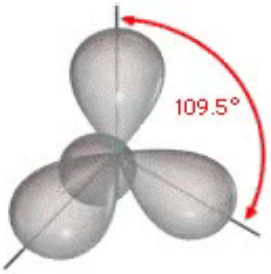
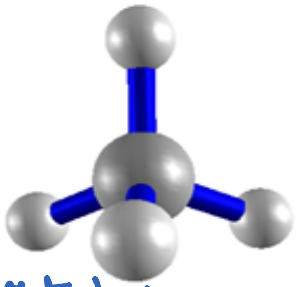
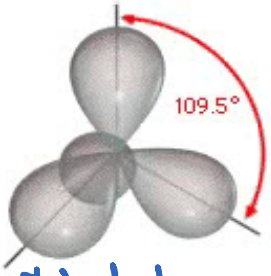
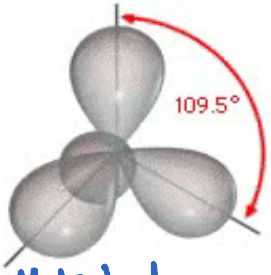
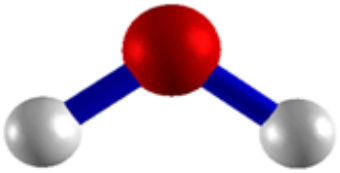
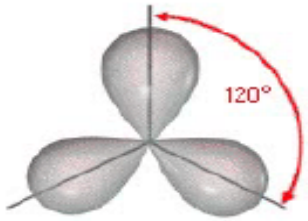
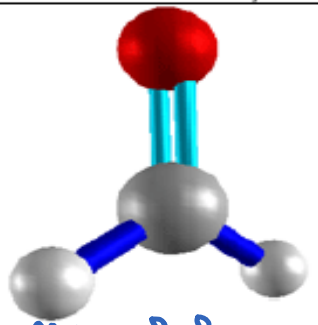
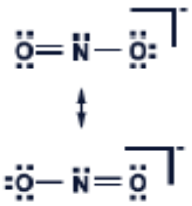
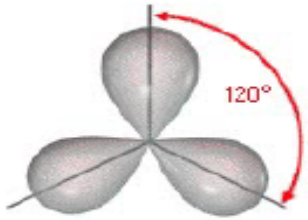
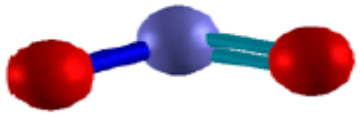
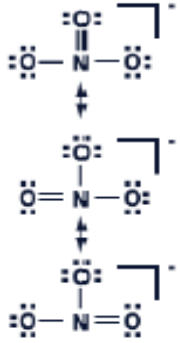
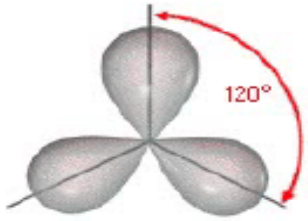
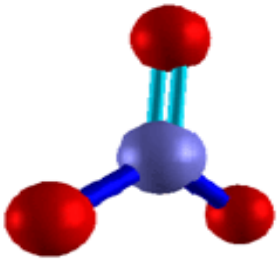
3.10 Molecular Geometries and Bond Angles

Molecular Geometry Worksheet ... Fall 2008 ... Whelan ... Page 1

Lewis Structure	Classification	X+E	Parent Geometry	Molecular Geometry	Bond Angle	Polarity
CH_4  A: Central atom X: Attachments on A E: Lone pairs on A	AX_4E_0	4	Electron Pair Geometry  Tetrahedron	 Tetrahedron	~109°	
NH_3 	AX_3E_1	4	 Tetrahedron	 Trigonal pyramid	~109°	
H_2O 	AX_2E_2	4	 Tetrahedron	 Angular/Bent (~109°)	~109°	

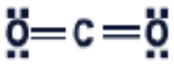
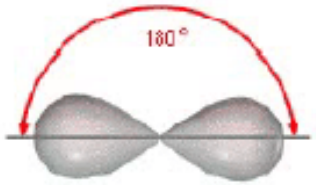
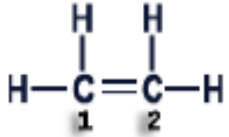
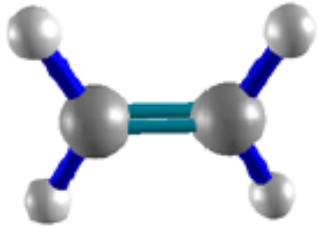
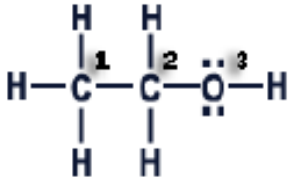
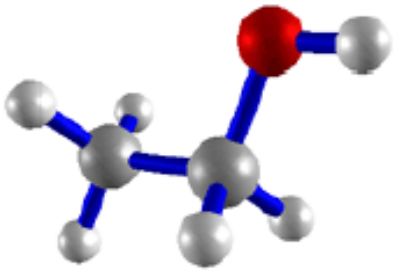
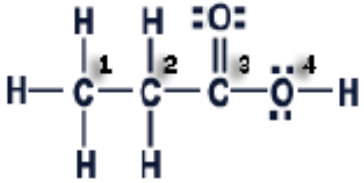
3.10 Molecular Geometries and Bond Angles

Molecular Geometry Worksheet ... Fall 2008 ... Whelan ... Page 2

Lewis Structure	Classification	X+E	Parent Geometry	Molecular Geometry	Bond Angle	Polarity
H_2CO 	AX_3E_0	3	 Trigonal planar	 Trigonal planar	120°	
NO_2^- 	AX_2E_1 AX_2E_1	3 3	 Trigonal planar	 Angular/Bent (120°)	120°	
NO_3^- 	AX_3E_0 AX_3E_0 AX_3E_0	3 3 3	 Trigonal planar	 Trigonal planar	120°	

3.10 Molecular Geometries and Bond Angles

Molecular Geometry Worksheet … Fall 2008 … Whelan … Page 3

Lewis Structure	Classification	X+E	Parent Geometry	Molecular Geometry	Bond Angle	Polarity
CO_2 	AX_2E_0	2	 Linear	 Linear	180°	
C_2H_4 	1: AX_3E_0 2: AX_3E_0	3 3	1: Trigonal planar 2: Trigonal planar		1: 120° 2: 120°	
C_2H_5OH 	1: AX_4E_0 2: AX_4E_0 3: AX_2E_2	4 4 4	1: Tetrahedron 2: Tetrahedron 3: Tetrahedron		1: ~109° 2: ~109° 3: ~109°	
C_2H_5COOH 	1: AX_4E_0 2: AX_4E_0 3: AX_3E_0 4: AX_2E_2	4 4 3 4	1: Tetrahedron 2: Tetrahedron 3: Trigonal planar 4: Tetrahedron		1: ~109° 2: ~109° 3: 120° 4: ~109°	

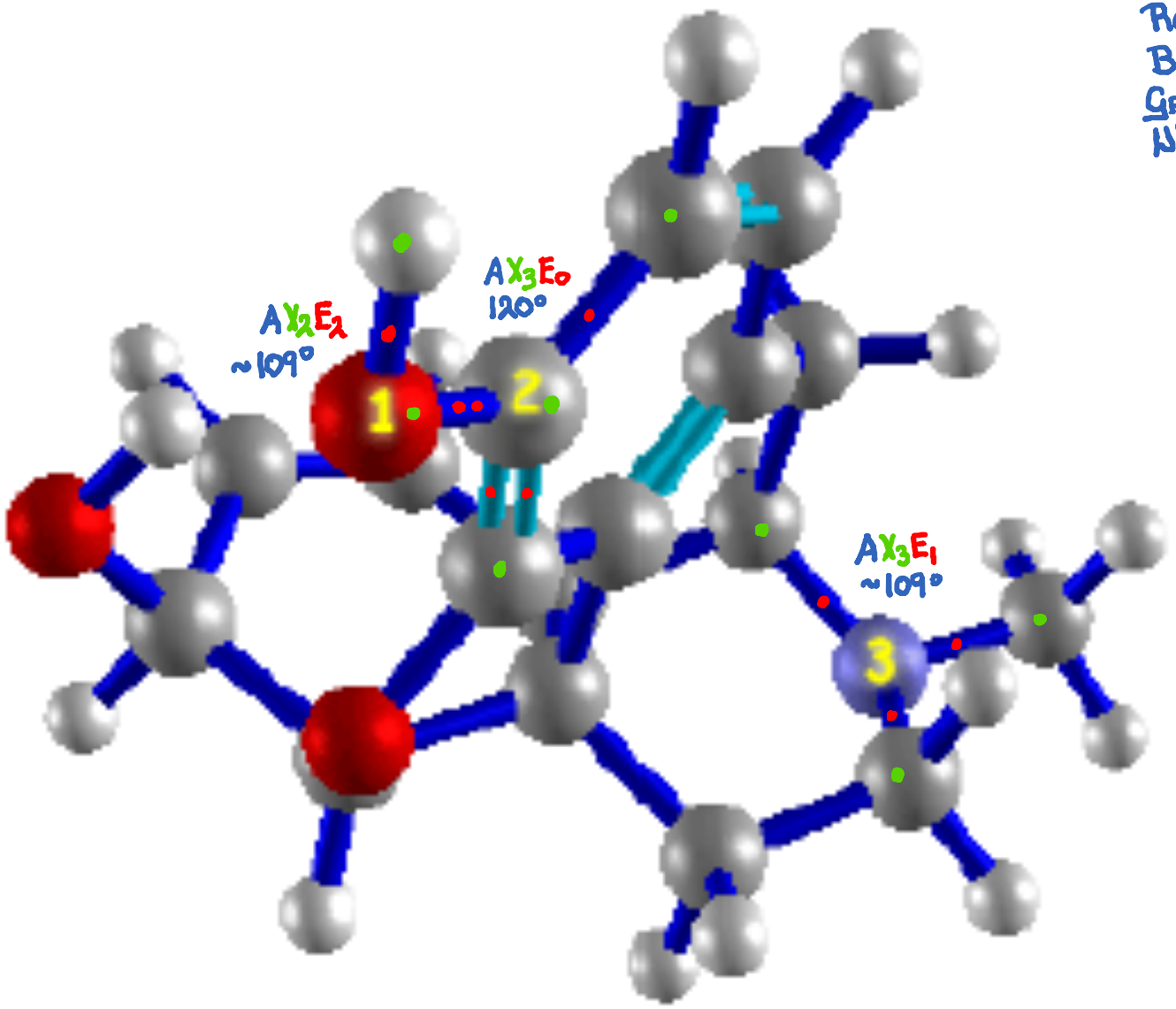
3.10 Molecular Geometries and Bond Angles

Summary

X+E	Electron Pair Geometry	Molecular Geometry
4	Tetrahedron (~109°)	E=0: Tetrahedron E=1: Trigonal pyramid E=2: Angular / Bent ~109°
3	Trigonal planar (120°)	E=0: Trigonal planar E=1: Angular / Bent 120°
2	Linear (180°)	E=0: Linear

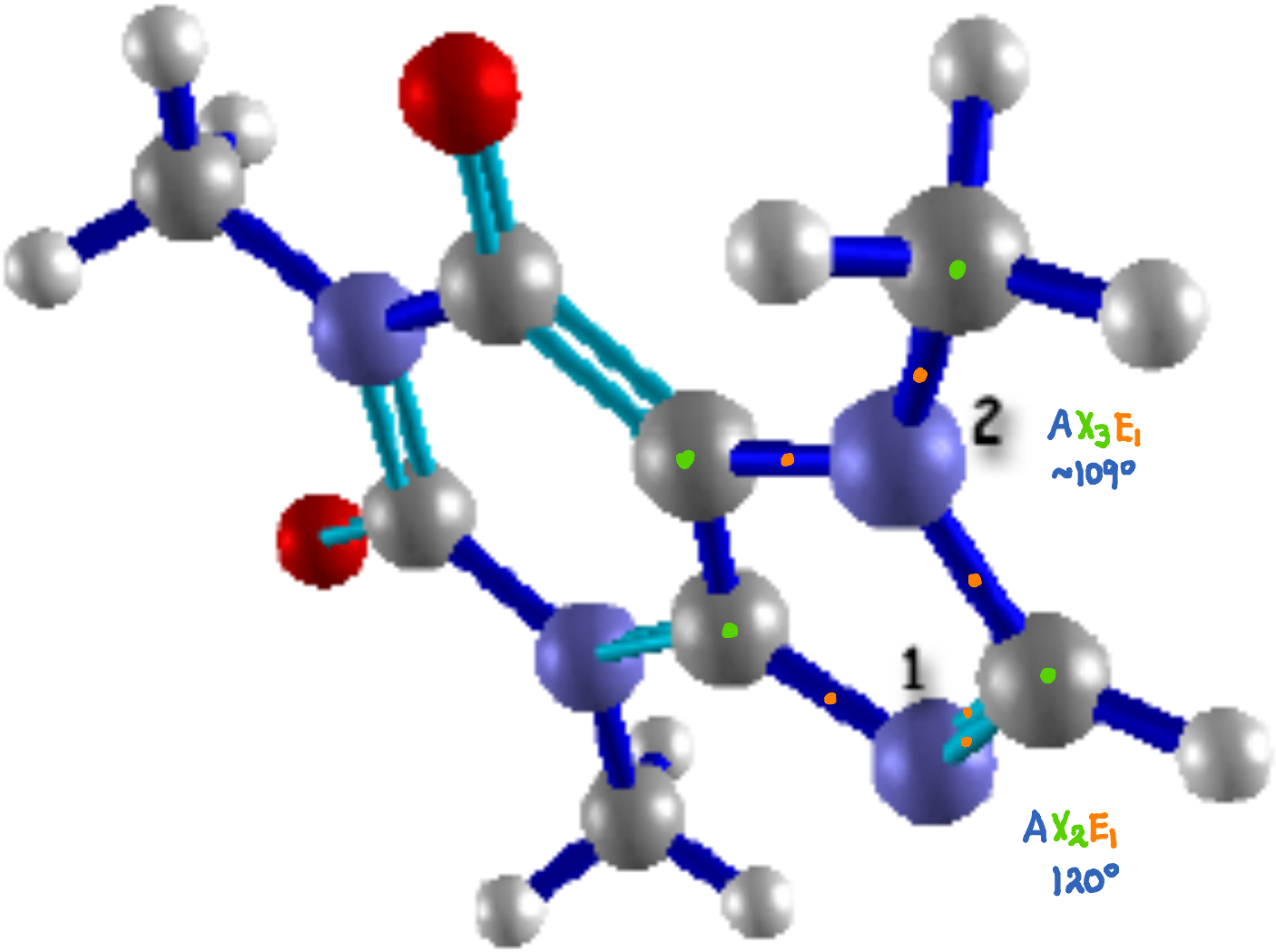
3.10 Molecular Geometries and Bond Angles

Morphine



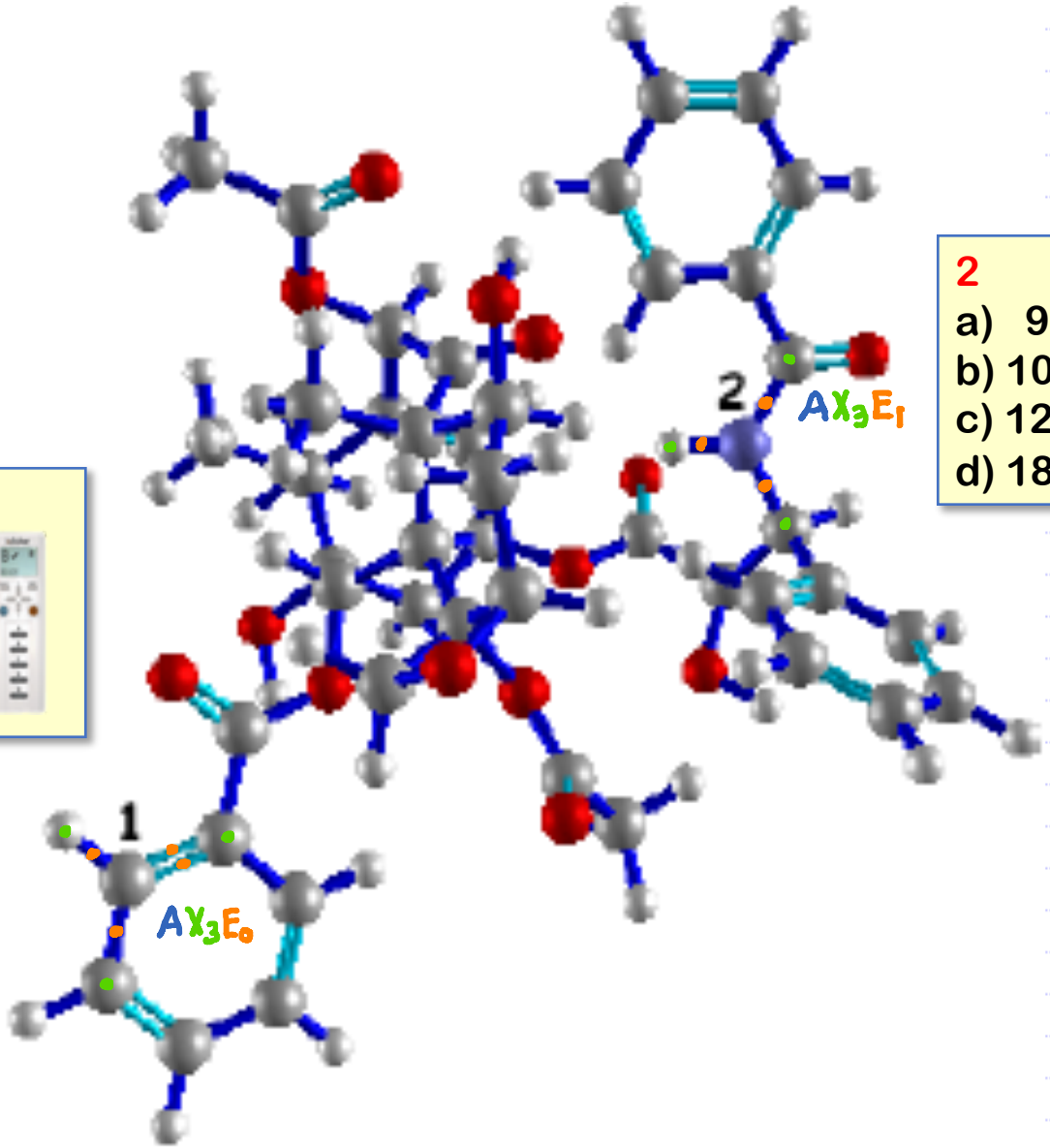
3.10 Molecular Geometries and Bond Angles

Caffeine



3.10 Molecular Geometries and Bond Angles

Taxol



1

a) 90
b) 109
c) 120 ✓
d) 180

2

a) 90
b) 109 ✓
c) 120
d) 180

3.10 Molecular Geometries and Bond Angles

Tamiflu

1

a) 90
b) 109 ✓
c) 120
d) 180

2

a) 90
b) 109 ✓
c) 120
d) 180