

## Announcements – Lecture XIII – Tuesday Oct 25<sup>th</sup>

1.



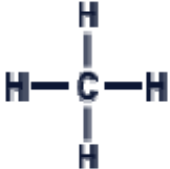
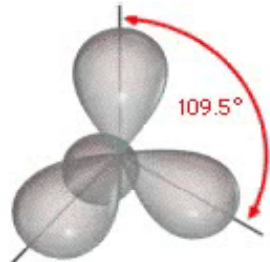
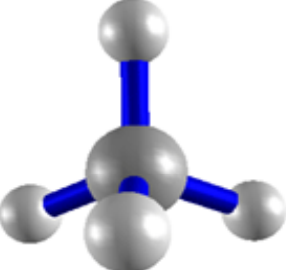

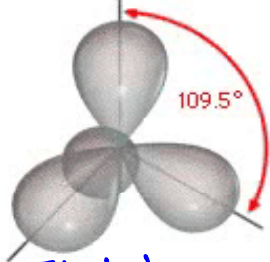
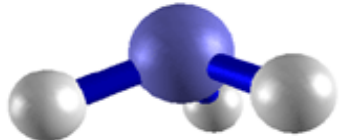

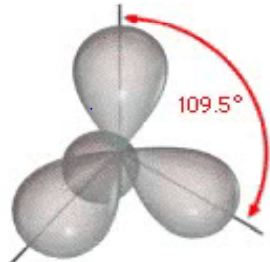
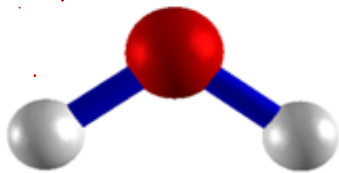
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*Choose any letter: A-E*


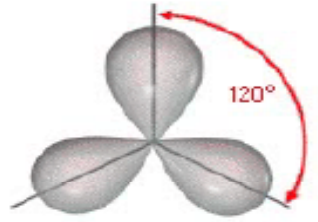
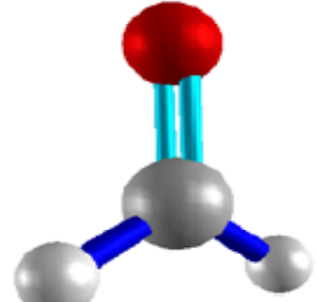
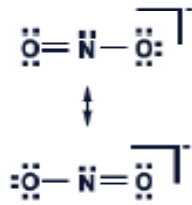
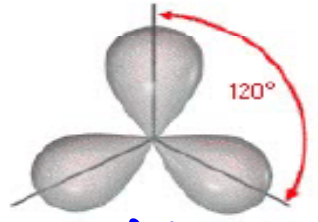
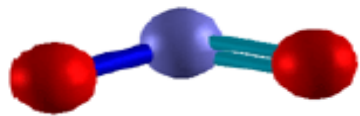
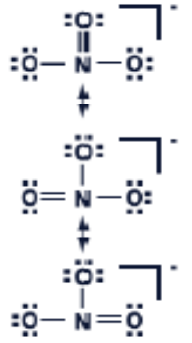
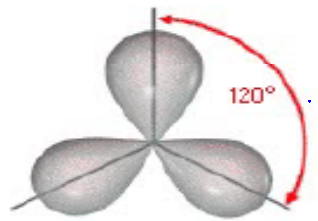
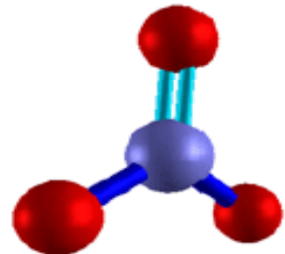


### 3.10 Molecular Geometries and Bond Angles

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

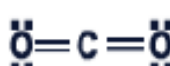
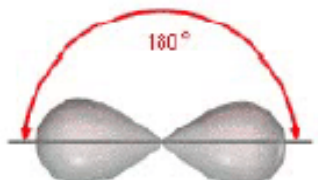
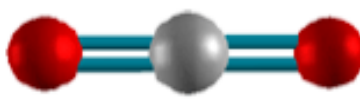
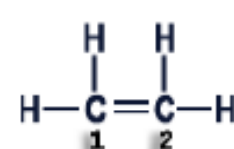
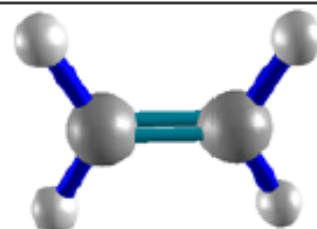
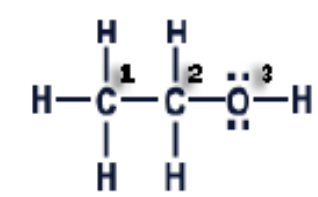
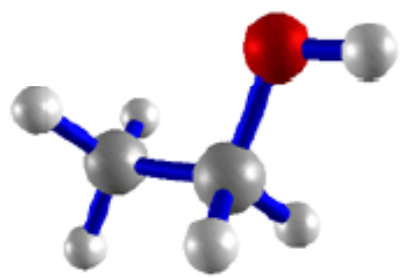
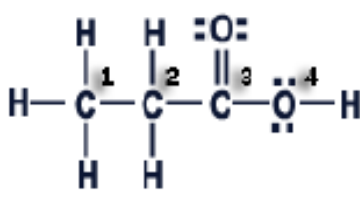
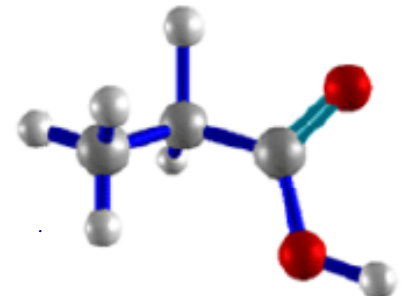
Lewis Structure	Classification	X+E	Parent Geometry	Molecular Geometry	Bond Angle	Polarity
$\text{CH}_4$  A: Central atom X: Attachments on A E: Lone Pairs on A	$\text{AX}_4\text{E}_0$	<u>4</u>	Electron Pair Geometry  Tetrahedron	 Tetrahedron	<u><math>\sim 109^\circ</math></u>	
$\text{NH}_3$ 	$\text{AX}_3\text{E}_1$	<u>4</u>	 Tetrahedron	 Trigonal pyramid	<u><math>\sim 109^\circ</math></u>	
$\text{H}_2\text{O}$ 	$\text{AX}_2\text{E}_2$	<u>4</u>	 Tetrahedron	 Angular/Bent ( $\sim 109^\circ$ )	<u><math>\sim 109^\circ</math></u>	

### 3.10 Molecular Geometries and Bond Angles

Lewis Structure	Classification	X+E	Parent Geometry	Molecular Geometry	Bond Angle	Polarity
$\text{H}_2\text{CO}$ 	$\text{AX}_3\text{E}_0$	<u>3</u>	 <u>Trigonal planar</u>	 <u>Trigonal planar</u>	<u>120°</u>	
$\text{NO}_2^-$ 	$\text{AX}_2\text{E}_1$	<u>3</u>	 <u>Trigonal planar</u>	 <u>Angular/Bent (120°)</u>	<u>120°</u>	
$\text{NO}_3^-$ 	$\text{AX}_3\text{E}_0$	<u>3</u>	 <u>Trigonal planar</u>	 <u>Trigonal planar</u>	<u>120°</u>	

### 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
$CO_2$ 	$AX_2E_0$	<u>2</u>	 LINEAR	 LINEAR	<u><math>180^\circ</math></u>	
$C_2H_4$ 	1: $AX_3E_0$ 2: $AX_3E_0$	<u>3</u> <u>3</u>	1: <u>Trigonal planar</u> 2: <u>Trigonal planar</u>		1: <u><math>120^\circ</math></u> 2: <u><math>120^\circ</math></u>	
$C_2H_5OH$ 	1: $AX_4E_0$ 2: $AX_4E_0$ 3: $AX_2E_2$	<u>4</u> <u>4</u> <u>4</u>	1: <u>Tetrahedron</u> 2: <u>Tetrahedron</u> 3: <u>Tetrahedron</u>		1: <u><math>\sim 109^\circ</math></u> 2: <u><math>\sim 109^\circ</math></u> 3: <u><math>\sim 109^\circ</math></u>	
$C_2H_5COOH$ 	1: $AX_4E_0$ 2: $AX_4E_0$ 3: $AX_3E_0$ 4: $AX_2E_2$	<u>4</u> <u>4</u> <u>3</u> <u>4</u>	1: <u>Tetrahedron</u> 2: <u>Tetrahedron</u> 3: <u>Trigonal planar</u> 4: <u>Tetrahedron</u>		1: <u><math>\sim 109^\circ</math></u> 2: <u><math>\sim 109^\circ</math></u> 3: <u><math>120^\circ</math></u> 4: <u><math>\sim 109^\circ</math></u>	

### 3.10 Molecular Geometries and Bond Angles Summary

#### ELECTRON PAIR GEOMETRY

#### MOLECULAR GEOMETRY

$$X + E = 4$$

Tetrahedron  
( $\sim 109^\circ$ )

E=0: Tetrahedron

E=1: Trigonal pyramid

E=2: Angular/Bent  $\sim 109^\circ$

$$X + E = 3$$

Trigonal planar  
( $120^\circ$ )

E=0: Trigonal planar

E=1: Angular/Bent  $120^\circ$

$$X + E = 2$$

Linear  
( $180^\circ$ )

E=0: Linear



### 3.10 Molecular Geometries and Bond Angles Morphine

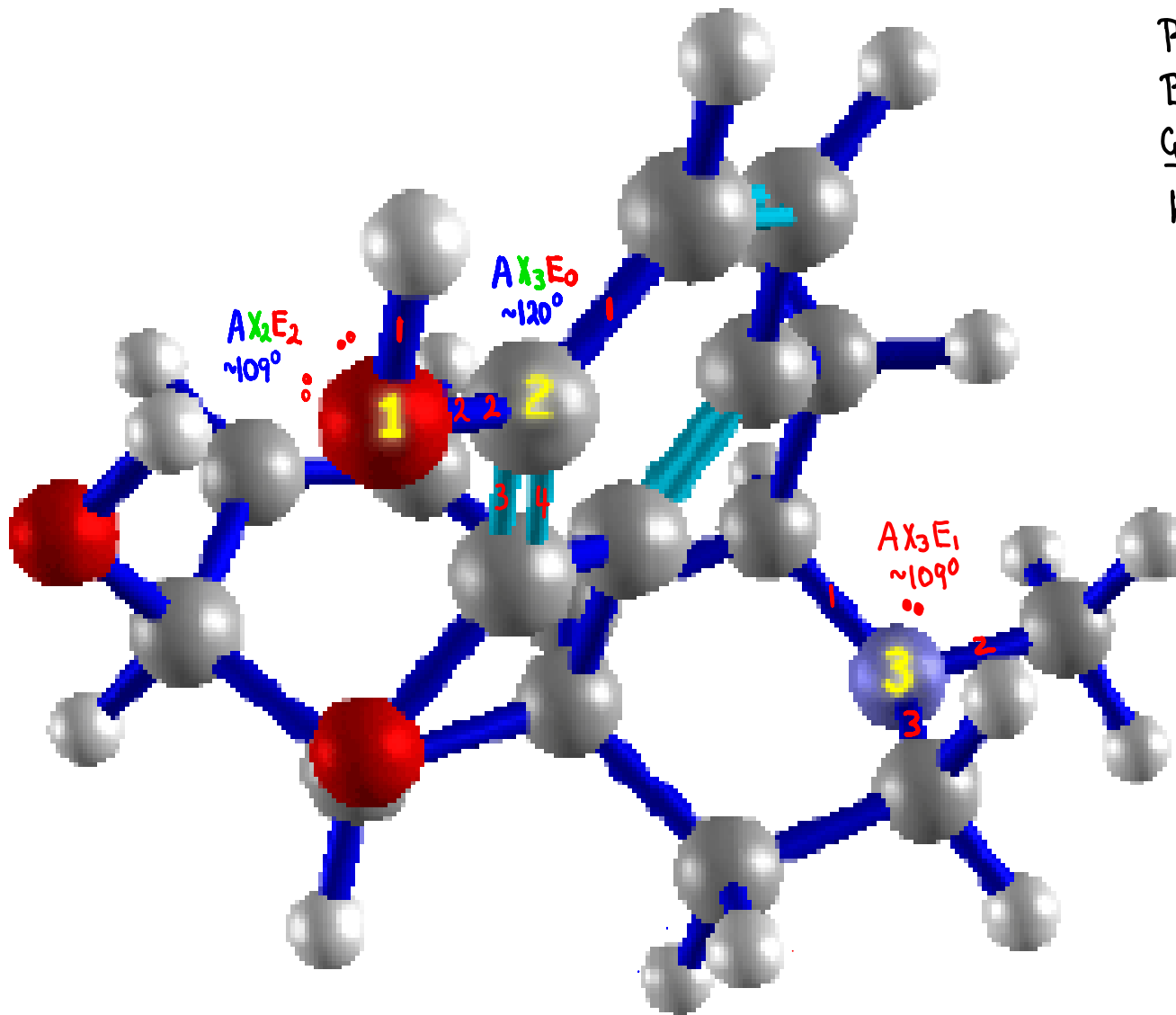
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Red: O

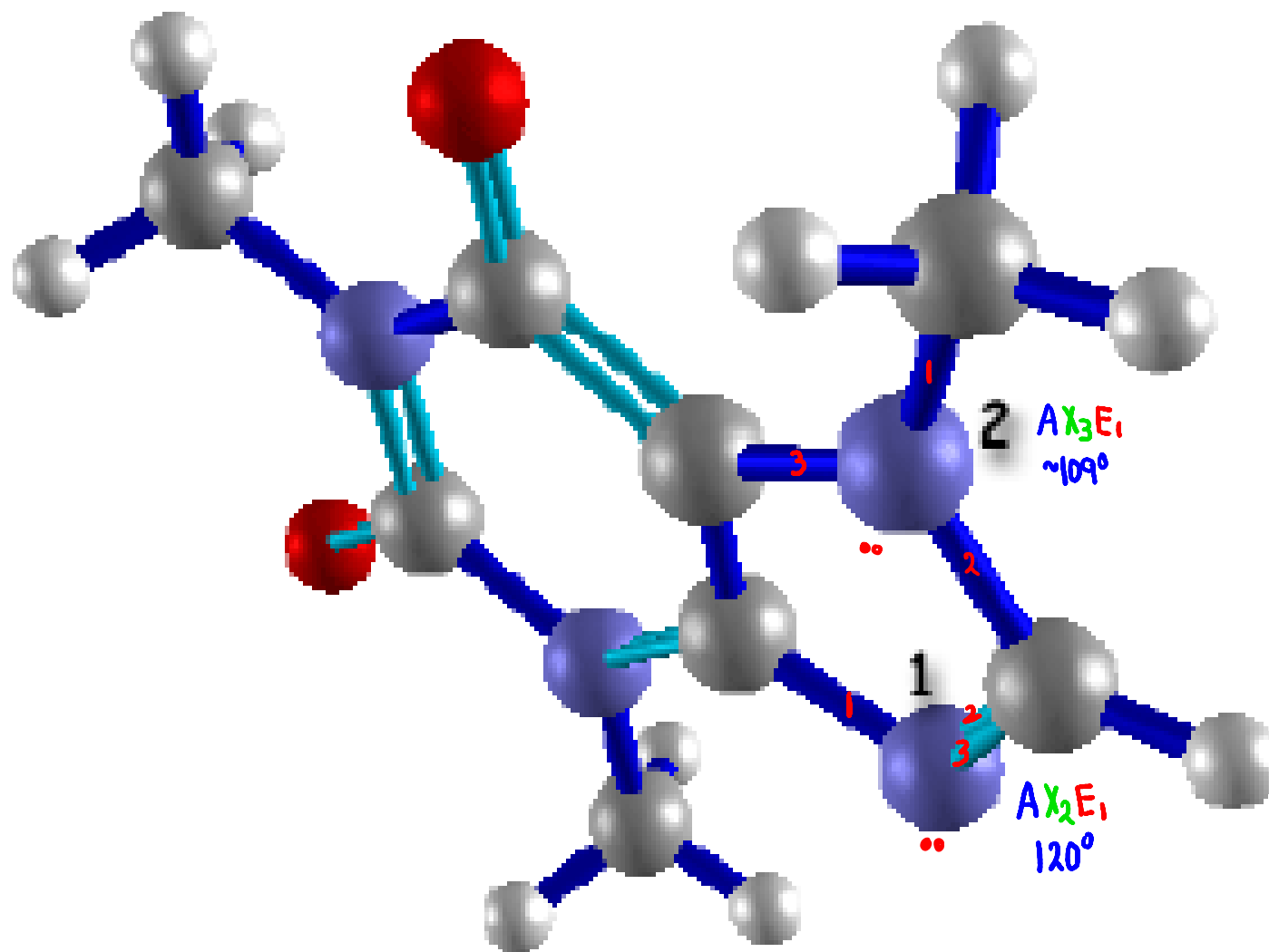
Blue: N

Gray: C

White: H

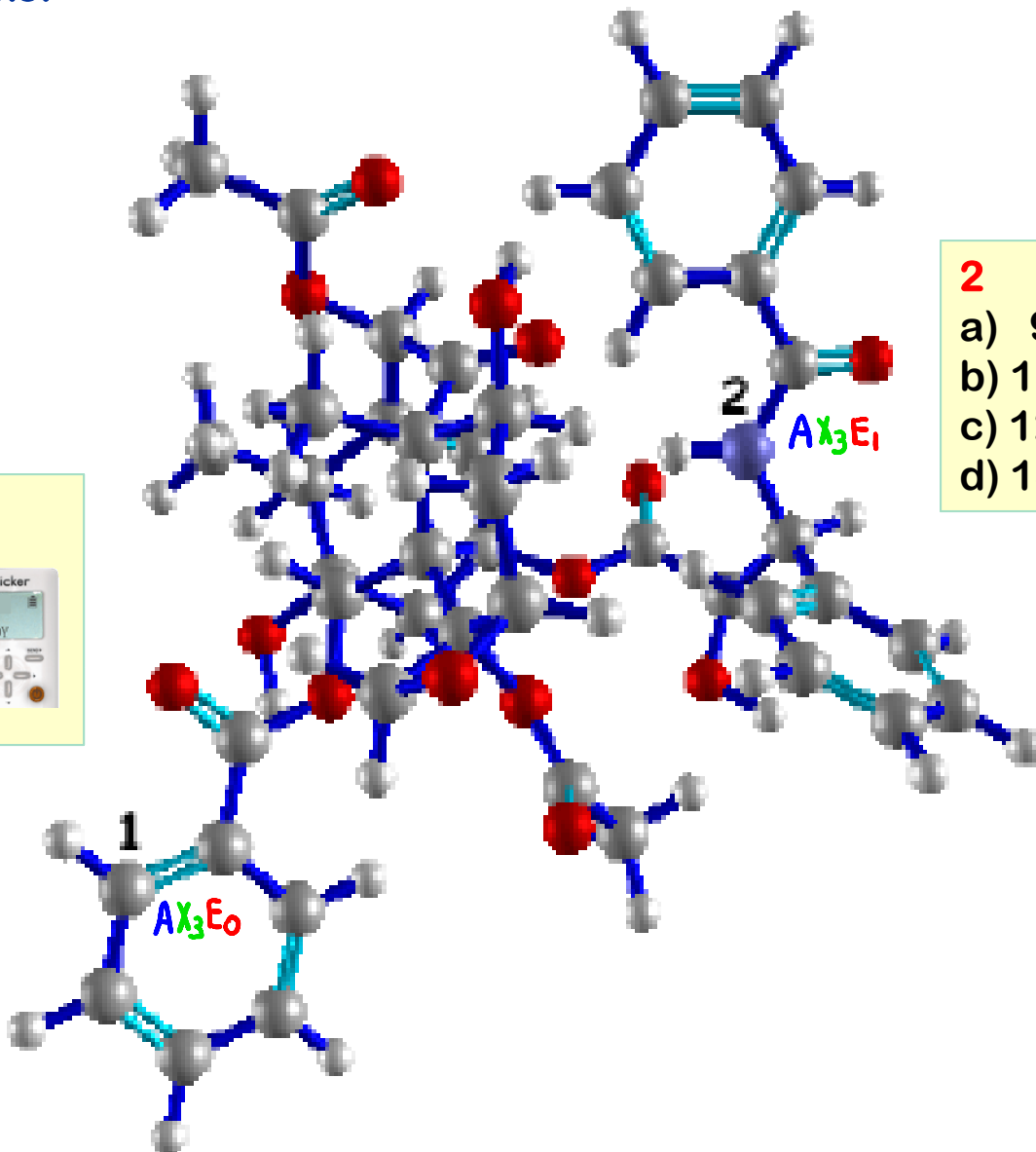


### 3.10 Molecular Geometries and Bond Angles Caffeine



### 3.10 Molecular Geometries and Bond Angles

#### Taxol



1

- a) 90
- b) 109
- c) 120 ✓
- d) 180



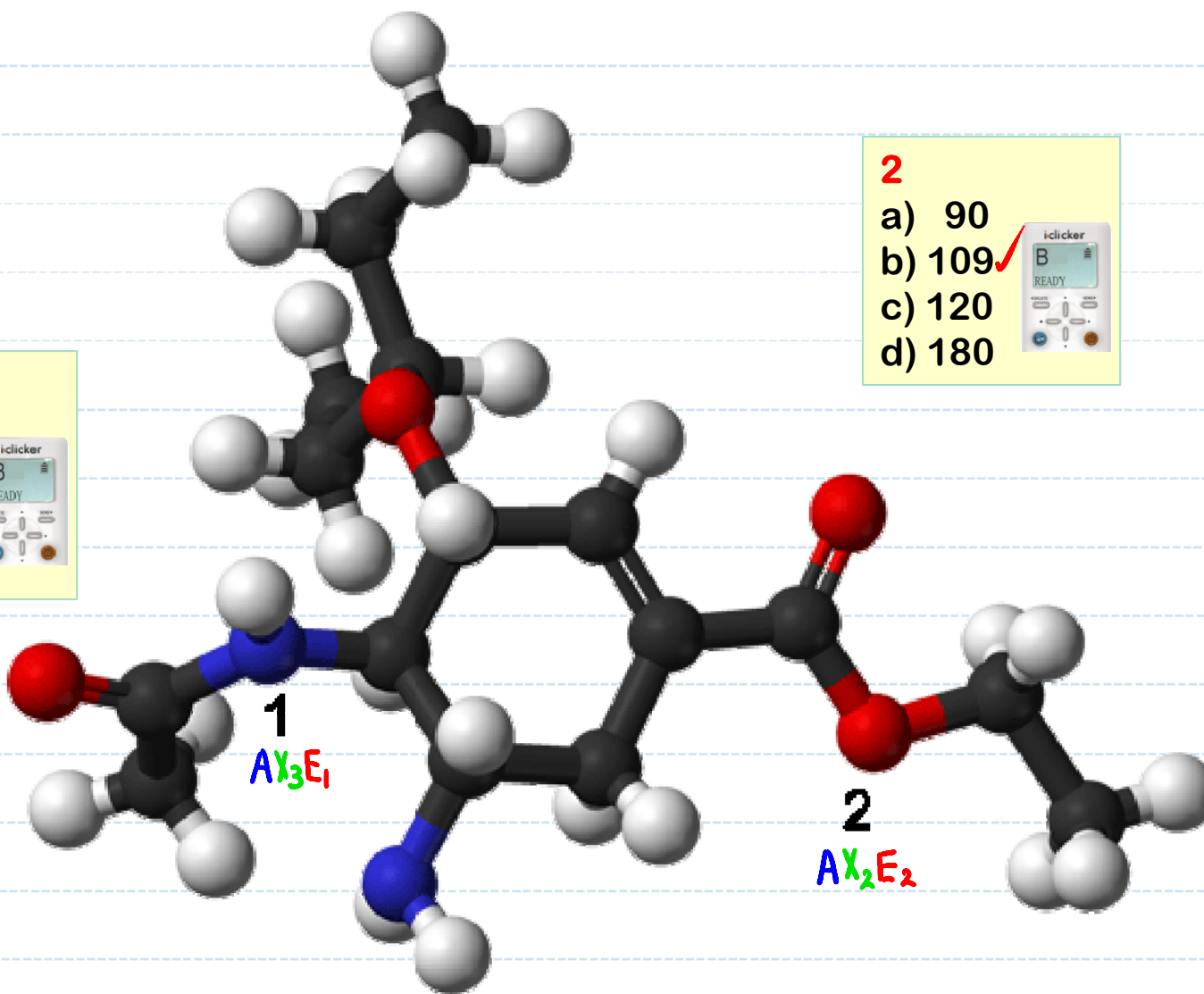
2

- 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

