

MOLECULAR STRUCTURES—Exp. H-1

Pre-Lab Assignment: Study the sections of your textbook on Lewis Structures and Molecular Geometries (i.e., Valence-Shell Electron-Pair Repulsion theory). Alternatively or in addition, you can study the supplements to this experiment on pages 124–137 of this lab manual.

Study Supplement #3, page 138, on 3-D drawings.

In this laboratory period you will be asked to determine the Lewis Structures and the three-dimensional geometries of molecular species starting only with molecular formulas. Thus there will be no lab work, per se. The lab time is to be used to help you perfect your skills at deducing Lewis Structures and, most importantly, to help you become acquainted with various molecular geometries. Model kits or balls and sticks will be available so that you can construct 3-D models of the molecules.

You will be assigned to work with one of the lists of molecular species on the next page. You are to do the following for each species, writing your answers on the work sheets provided:

1. Determine the number of valence electrons in the molecule. (See your text and/or Supplement #1, page 124.)
2. Determine the Lewis Structure of the molecule. (See your text and/or Supplement #1, page 124.)
3. Determine the geometry around each centralized atom in the molecule from the Lewis Structure. See your text and/or Supplement #2, page 130.)
4. Construct an exact geometric model of the molecule using the materials provided.
5. Draw an exact 3-D representation of the molecule from the model. (See Supplement #3, page 138.)

Examples of how the work sheets are to be filled in are given on page 122.

MOLECULAR SPECIES LIST

List #1

1. SiCl_4 (no Cl-Cl bonds)
2. PCl_3 (no Cl-Cl bonds)
3. NO_3^- (no O-O bonds)
4. SF_6 (no F-F bonds)
5. PCl_5 (no Cl-Cl bonds)
6. IF_3 (no F-F bonds)
7. XeF_5^+ (no F-F bonds)
8. SO_4^{2-} (no O-O bonds)
9. $\text{C}_4\text{H}_8\text{O}$
10. C_5H_{12}

List #2

1. CH_3Br (C is central atom)
2. ICl_2^+ (no Cl-Cl bonds)
3. NO_2^- (no O-O bonds)
4. BF_3 (no F-F bonds)
5. HOOH (bonding as in formula)
6. SbCl_5 (no Cl-Cl bonds)
7. BrF_3 (no F-F bonds)
8. ICl_4^- (no Cl-Cl bonds)
9. $\text{CH}_3\text{CH}_2\text{CO}_2^-$ (bonding as in formula)
10. C_5H_{10}

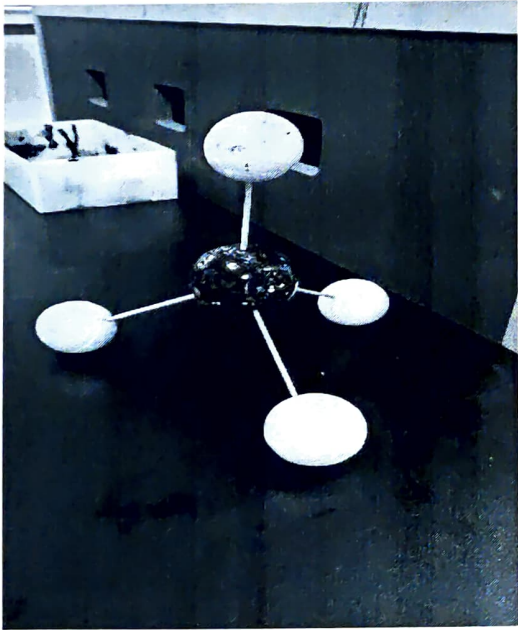
List #3

1. PO_4^{3-} (no O-O bonds)
2. H_2NNH_2 (bonding as in formula)
3. CS_2 (no S-S bonds)
4. BCl_3 (no Cl-Cl bonds)
5. SbF_5 (no F-F bonds)
6. PCl_6^- (no Cl-Cl bonds)
7. ClF_5 (no F-F bonds)
8. XeF_2 (no F-F bonds)
9. $\text{C}_3\text{H}_5\text{Cl}$ (C's are central atoms)
10. C_6H_{12} (6 C's in a ring)

List #4

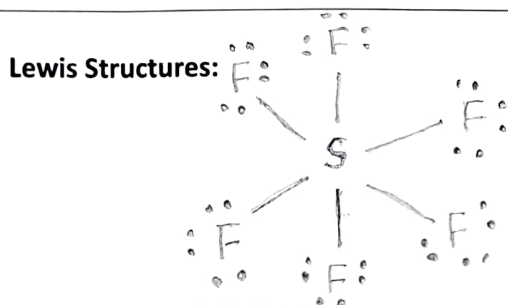
1. NH_4^+
2. SF_2 (no F-F bonds)
3. COF_2 (C is central atom)
4. SO_2 (no O-O bonds)
5. PBr_5 (no Br-Br bonds)
6. TeCl_4 (no Cl-Cl bonds)
7. XeF_4 (no F-F bonds)
8. ClO_4^- (no O-O bonds)
9. $\text{C}_3\text{H}_8\text{O}$
10. C_6H_6 (6 C's in a ring)

Chemistry Model Kit System: Chemical Bonding & Molecular Structures

Name: 1. Student 1: Md. Saifayat Jabben 2. Student 2: Ibrahim Md Sofi Uddin 3. Student 3: Joy Islam	Section:14.....
Lewis Structures: $\begin{array}{c} \text{H} \\ \\ \text{H} - \text{C} - \text{H} \\ \\ \text{H} \end{array}$	# Molecular Geometry = Tetrahedral
# Valence electrons = 8	
<p>Please insert your jpeg snapshot from lab here</p> 	

Individual student's Name: Md. Safayat ID: 2012551642
Jabben

Name and Formula of the molecule/species: SF_6 (Sulfur hexafluoride)

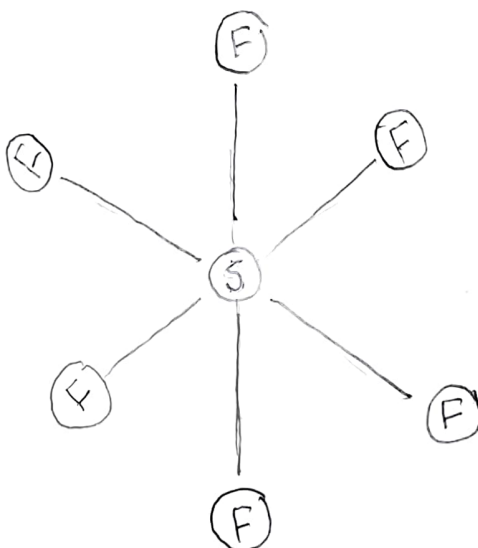


Molecular Geometry =

Octahedral

Valence electrons = 48

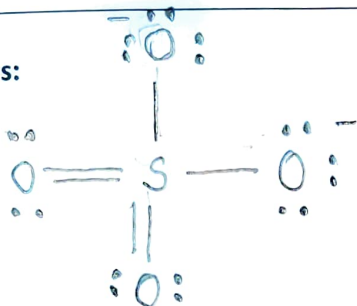
3-D drawing here



Individual student's Name: Md. Safayat ID: 2012551642
Jabben

Name and Formula of the molecule/species: SO_4^{2-} (Sulfate ion)

Lewis Structures:

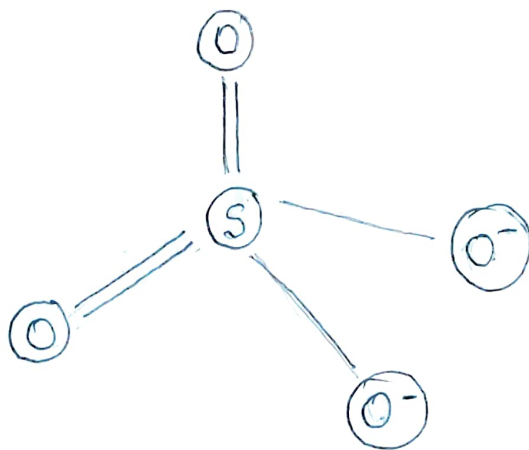


Molecular Geometry =

Tetrahedral

Valence electrons = 32

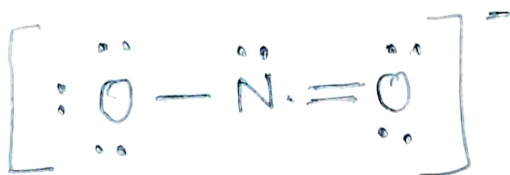
3-D drawing here



Individual student's Name: Md. Sakyat ID: 2012551642
Jabbar

Name and Formula of the molecule/species: NO_2^- (Nitrite ion)

Lewis Structures:

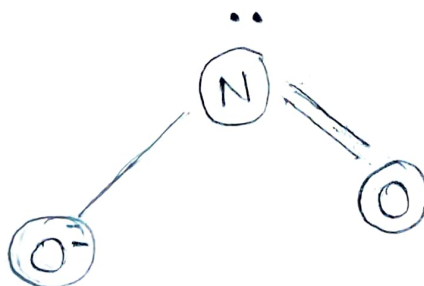


Molecular Geometry = ~~18~~

Bent

Valence electrons = 18

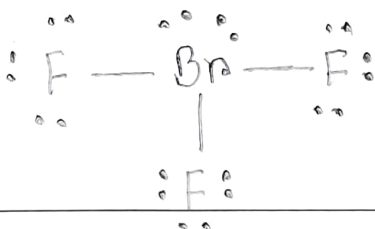
3-D drawing here



Individual student's Name: Md. Sayat Jabbar ID: 2012351642

Name and Formula of the molecule/species: BrF_3 (Bromine trifluoride)

Lewis Structures:

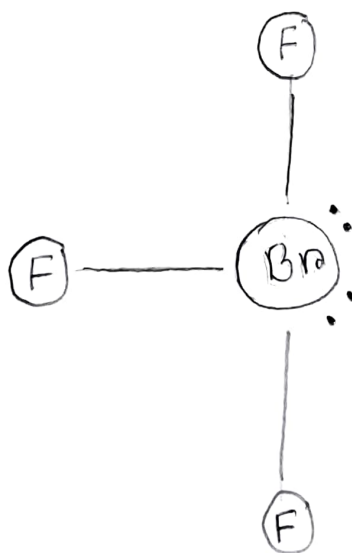


Molecular Geometry =

T-shaped

Valence electrons = 28

3-D drawing here

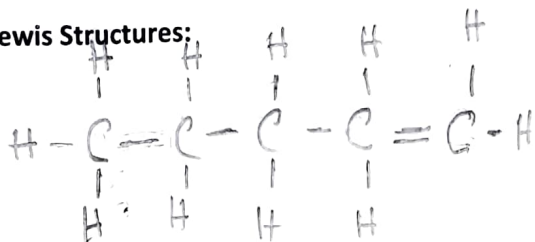


Individual student's Name: Md. Safayat
Jabben

ID: 2012551642

Name and Formula of the molecule/species: C_5H_{10} (Pentene)

Lewis Structures:

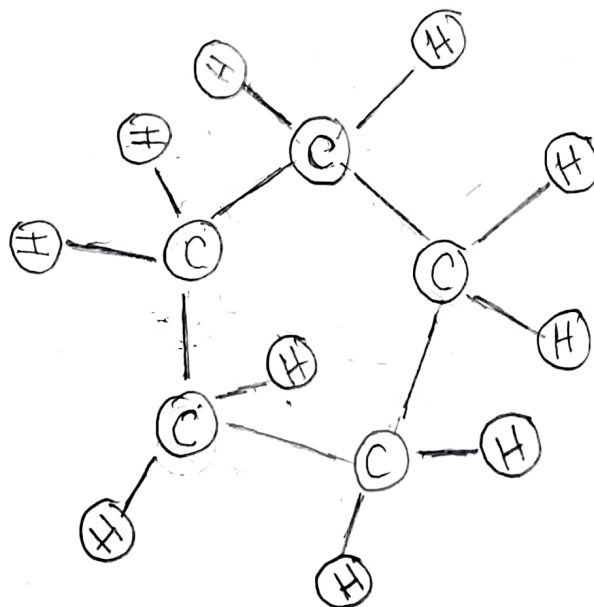


Molecular Geometry =

Valence electrons =

30

3-D drawing here



Individual student's Name: Md. Safayat ID: 2012551692
Jabbar

Name and Formula of the molecule/species: $\text{H}_2\text{N}\text{N}\text{H}_2$ (Hydrazine)

Lewis Structures:

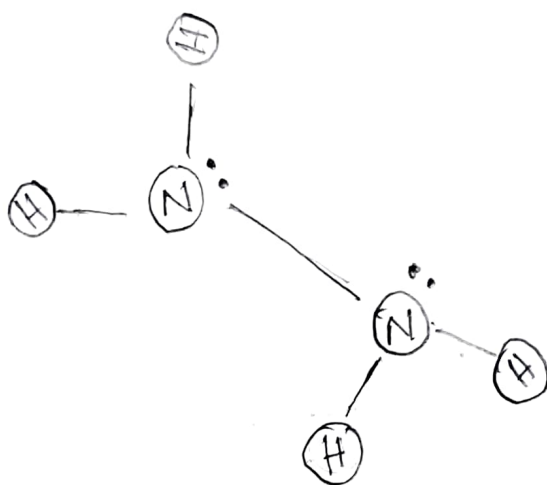


Molecular Geometry =

Trigonal Pyramidal

Valence electrons = 14

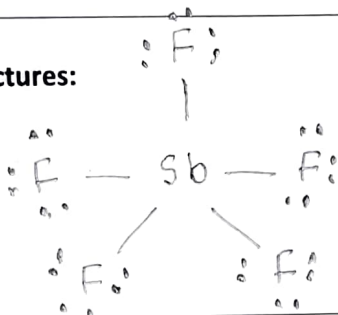
3-D drawing here



Individual student's Name: md. Sayat ID: 2012551642
Jabbers

Name and Formula of the molecule/species: SbF₅ (Antimony
Pentafluoride)

Lewis Structures:

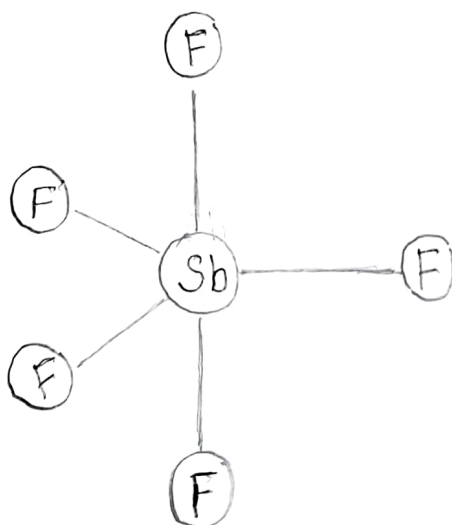


Molecular Geometry =

Trigonal Bipyramidal

Valence electrons = 40

3-D drawing here

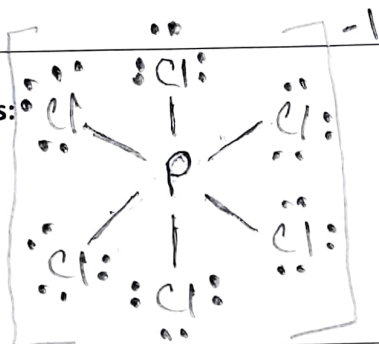


Individual student's Name: md. Safayat
Jabbar

ID: 2012551642

Name and Formula of the molecule/species: PCl_6^- (Phosphorus hexachloride ion)

Lewis Structures:

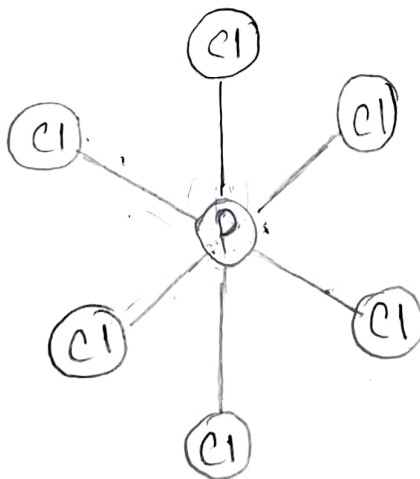


Molecular Geometry =

Octahedral

Valence electrons = 48

3-D drawing here

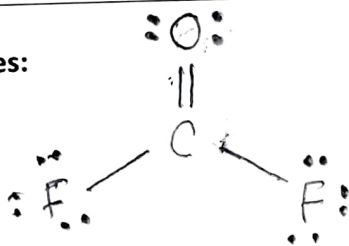


Individual student's Name: Md. Sayat Jabben

ID: 2012551642

Name and Formula of the molecule/species: COF₂ (Carbonyl fluoride)

Lewis Structures:



Molecular Geometry =

Trigonal planar

Valence electrons = 24

3-D drawing here

