CST: Chem 2e, f.

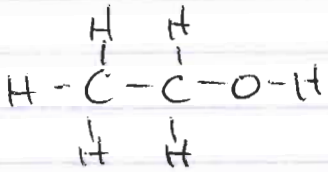
Let's Build It

101

Chem Catalyst:

Q: Examine the structural formula for ethanol. which is the correct ball & stick model?

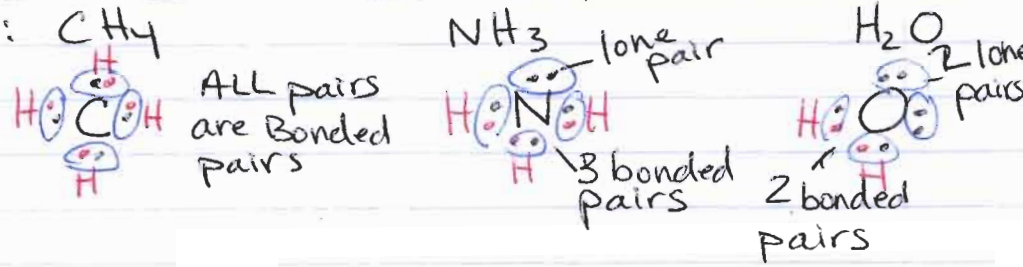
A:



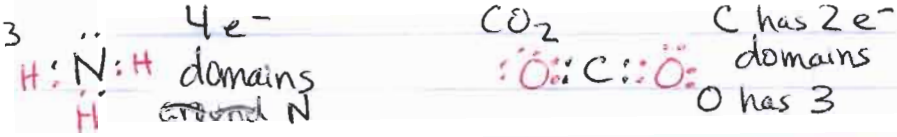
Notes:

* In table teams have students build model for CH_4, NH_3 & H_2O

- what types of e⁻ pairs are in a molecule?
  - atoms in a molecule can have 2 types of e⁻ pairs:
    1. Bonded pair = e⁻ pair involved in the bond btwn 2 atoms
    2. Lone pair = e⁻ pair NOT involved in bonding
  - * both types of e⁻ pairs (Bonded & Lone) want to be as far apart from each other as possible => VSEPR (Valence Shell Electron Pair Repulsion)
  - ex: CH_4 — ALL pairs are Bonded pairs; NH_3 — lone pair, 3 bonded pairs; H_2O — 2 lone pairs, 2 bonded pairs



- what are e⁻ domains?
  - the area around the atom that is occupied by a pair of e⁻ (either bonded or lone)
  - how many sides of an atom have e⁻ on it
  - ex: NH_3 — 4 e⁻ domains around N; CO_2 — C has 2 e⁻ domains, O has 3



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Let's Build It Activity

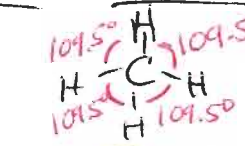
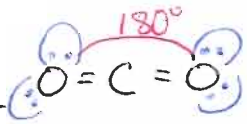
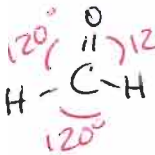
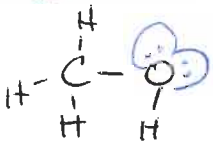
Molecular Formula	**Lewis Dot Structure**	**# of e- Domains** around the ***central*** atom(s)	**# of Bonded Pairs**	**# of Lone Pairs**	**Ball & Stick Model** ***Only for the molecules you are given***
Methane: CH_4					
Water: H_2O					
Ethane: C_2H_6					
Chloromethane: CH_3Cl					
Dichloromethane: CH_2Cl_2					
Methanol: CH_3OH					
Methyl amine: CH_3NH_2					
Formaldehyde: CH_2O					
Ethene: C_2H_4					
Hydrogen cyanide: HCN					
Ethyne: C_2H_2					

Making Sense Notes:

- How does VSEPR contribute to the shape of a molecule?

* all e⁻ pairs (bonded + lone) take up space around the atom + affect the shape of the molecule
  - lone pairs take up a bit more space than bonded pairs

- Molecule | Structure | # e⁻ domains | # Bonded pairs | # Lone Pairs | Shape | Bond Angle

Molecule	Structure	# e⁻ domains	# Bonded pairs	# Lone Pairs	Shape	Bond Angle
CH_4		4	4	0	tetrahedral	109.5°
NH_3		4	3	1	pyramidal	107.3°
H_2O		4	2	2	bent	104.5°
CO_2		2	4	0	linear	180°
CH_2O		3	4	0	triagonal planar	120°
CH_3OH		4	4 for C 2 for O	0 for C 2 for O	tetrahedral around C bent around O	109.5° around C 104.5° around O

*if there is more than one central atom, you must determine the shape around each one

Check-In:

Q: What is the shape of H_2S

A:  Bent!