

KEY

Chapter 8 Quiz Study Guide

1. Which element is more electronegative?

a. Zn or Br -

b. Li or Cs -

c. Au or Al -

2. Order the following pairs of atoms in order of **increasing** bond polarity:

a. H-I 0.56

b. H-Cl 1.06

c. H-F 1.88

a → b → c

all polar covalent (.5 > x > 2.1)

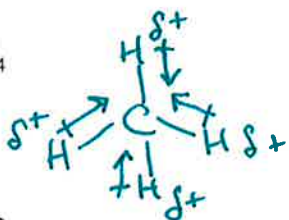
3. Draw the structural formula and place a partial positive and a partial negative charge on each **atom** in these molecules. Which **molecules** are polar? Why?

a. HCl



polar b/c overall dipole

b. CH₄



nonpolar b/c no side/end is more neg/pos than any other.

c. H₂O



polar b/c overall dipole

4. At cold temperatures, hydrogen bromide, HBr, is a liquid.

a. Draw the Lewis Dot Diagram for HBr. Add dipole arrow



b. Would HBr be attracted to a charged wand? Would it form a round drop on waxed paper? Explain your reasoning.

Yes - wand

Yes - bead up/round drop

Polar, so has high

intramolecular forces

c. In HBr, what type of bond exists between H and Br?

attracted to e⁻ charge (wand)

$$2.96 - 2.10 = 0.86 \rightarrow \text{polar covalent}$$

$$\text{b/c } .5 > .86 > 2.1$$

d. Do you expect HBr to have a smell? Explain.

Yes, it is small & polar

will add for
semester review

5. Use what you know about molecules to explain why you can't smell perfume while the bottle is closed, but can smell it once the bottle is open.

6. Which can you smell better, cold bread, or warm bread right out of the oven? Explain.

7. For the molecules in the table on the next page, do the following steps:

- Draw Lewis Dot Diagrams. DON'T forget lone pairs!! (think HONC1234 and octet rules)
- Draw the actual molecular shape. Use electron domains and lone pairs to help you.
- Draw dipole arrows for each bond between 2 atoms.
- Draw overall dipole for the molecule if it is polar
- Name the shape of each molecule. Note: some might be multiple shapes combined. Remember that a single shape is organized around one center atom. If there is more than one atom to use as a center, there are multiple shapes.
- Write Y if polar, N if nonpolar

#e⁻ domains

2

3

4

4

4

3 on each C

4 on C,
4 on O

Molecular Formula	Lewis Dot Diagram (a)	Molecular Shape + Dipoles (b, c, d)	Shape Name (e)	Polar Y/N?(f)
CO ₂			linear	N
CH ₂ O			trigonal planar	Y
CF ₄			tetra-hedral	N
PCl ₃			Pyramidal	Y
H ₂ S			bent	Y
C ₂ H ₄			trigonal planar x2 (around each C)	N
CH ₃ OH			tetrahedral around C AND bent around O	Y

8. For the following molecules:

- Calculate degree of polarity
- Draw molecule with the direction of polarity (dipole arrow)
- Determine if the molecules are ionic, polar covalent, or nonpolar covalent

Molecule	Degree	Direction	I/PC/NPC?
HF	1.88	$\text{H} \rightarrow \text{F}$	PC
HCl	1.06	$\text{H} \rightarrow \text{Cl}$	PC
NaF	3.05	$\text{Na} \rightarrow \text{F}$	I
CsCl	2.37	$\text{Cs} \rightarrow \text{Cl}$	I

9. For the following molecules, predict if they will smell, and EXPLAIN the reasoning behind your prediction:

Molecule	Smell ? Y/N	Reasoning
Hydrogen cyanide, HCN (gas)		
Carbon dioxide, CO ₂ (gas)		
Geraniol C ₁₀ H ₁₈ O (liquid)		
Zinc, Zn (solid)		
Fentanyl, C ₂₂ H ₂₈ N ₂ O (liquid)		
Vanillin, C ₈ H ₈ O ₃ (liquid)		
Magnesium chloride, MgCl ₂ (solid)		

will add for semester review

10. If you are looking at a Lewis Dot Structure of a molecule, how do you determine the shape? What do you look at/for?

- Count the e^- domains (groups of e^- that are independent from each other)
- arrange e^- domains around central atom as far apart as possible
- delete lone pairs & see what shape remains.

Topics Covered:

- Molecule shape (knowing names of all shapes and determining shapes of a molecule given a molecular structure
 - Linear
 - Bent
 - Pyramidal
 - Tetrahedral
 - Trigonal planar
 - Molecules with more than one shape (ex. tetrahedral around one atom, and bent around another atom, 2 trigonal planar shapes connected, a series of tetrahedra, etc)
- Electron domains (as far as using them to determine molecular shape)
- Polarity:
 - Drawing dipoles (arrow with plus end) on bonds between two atoms
 - Determining overall molecule polarity
 - Determining ends with partial negative and partial positive ends
 - Describing behavior of polar/nonpolar molecules with respect to a charged wand, and tendency to bead up.
 - Determining degree of polarity of a bond between two atoms
 - Determining if bonds are ionic, polar covalent, or nonpolar covalent
 - Explaining difference between ionic, polar covalent, or nonpolar covalent bonds
- Using phase, polarity, size, and bonding type to predict smell (flowchart attached)

Resources: You may use your periodic table and your electronegativity scale on the quiz. You will NOT have a copy of the smell/no smell flowchart.

