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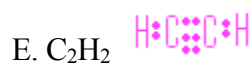
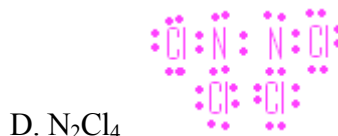
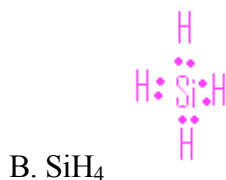
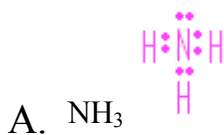
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Chemistry 20 BONDING Midterm Review KEY

1. Complete the following table.

Atom	Group	# Valence Electrons	# Valence Orbitals	Lewis Diagram	# Lone Pairs	# Bonding Electrons
Br	17	7	4		3	1
Ga	13	3	4		0	3
Ca	2	2	4		0	2
P	15	5	3		1	3
H	1	1	1		0	1

2. For the following draw and build its structural diagram. Include the total number of electrons in each molecule. Give the stereometric shape around the central atom(s). Draw the bond dipoles.



3. What does the boiling point of a substance tell you?

That it has more electrons and different intermolecular forces.

4. What are the 3 intermolecular forces discussed in class, vs 2 intramolecular forces

Dipole-Dipole, Hydrogen bonding, VanDerWaals – intermolecular
Polarity, London Forces - intra

5. What are the three elements that form hydrogen bonds when combined with Hydrogen?

Fluorine, Oxygen, Nitrogen, Sulfur

6. What are the three compounds that form very strong network covalent bonds? Why are these compounds not considered to be ductile? C (Diamond), SiO₂, SiC. Their intermolecular forces are the strongest of any other molecule. Additionally, their network covalent bonds are very difficult to break, or bend.

7. For each of the following which substance would have the higher boiling point? Why?

List the intermolecular forces present in each.

A. H₂O or BrF

H₂O- LD, HB, DD forces are present in H₂O. BrF only has LD and DD forces. H₂O has the higher boiling point.

B. C₂H₆ or NCl₃

C₂H₆ -LD, VDW forces only. NCl₃ -LD, VDW forces. NCl₃ has the higher boiling point due to higher number of e-

C. CO₂ or C₂F₂

CO₂ -LD forces only. C₂F₂ -LD forces only. C₂F₂ is stronger as it has a higher difference in electro negativity, so a stronger bond and higher boiling point.

D. NaCl or HF

HF- LD, DD, HB forces. NaCl- I, LD, DD forces. NaCl has the higher boiling point. Ionic bonds are stronger than hydrogen bonds.

E. SiO₂ or Al₂O₃

SiO₂ LD, NC forces. Al₂O₃ LD, DD, I forces. SiO₂ has highest boiling point as the network covalent bonds are very strong.

F. Mg or Cl₂

Mg- LD M forces. Cl₂ -LD forces only. Mg has the higher boiling point as it has stronger bonds than Cl₂.

8. Arrange the following substances in a list in order of increasing boiling points. List beside each substance the type of bonding present. For the molecular substances, also list the number of electrons per molecule. Predict the probable state at room temperature

SiC

Network covalent
20 electrons
Solid

C₃H₇OH

London dispersion
hydrogen bonding
dipole
34 electrons
Gas

Al₂O₃

Ionic bonding
London Dispersion
50 electrons
solid

Al

Metallic bonding
13 electrons
solid

C₃H₈

London Dispersion
26 electrons
Gas

C₃H₇Cl

London dispersion
dipole
42 electrons
solid

9. Write the oxidation, reduction and net ionic equations for the following combinations

A. Li and Cl₂

Oxidization $\text{Li} \longrightarrow \text{Li}^+ + \text{e}^-$

Reduction $2 \text{e}^- + \text{Cl}_2 \longrightarrow 2 \text{Cl}^- + 2 \text{e}^-$

Net ionic- $2 \text{Li} + \text{Cl}_2 \longrightarrow 2 \text{Li}^+ + 2 \text{Cl}^-$

B. Mg and O₂

Oxidization $\text{Mg} \longrightarrow \text{Mg}^{2+} + 2 \text{e}^-$

Reduction $\text{O}_2 + 4 \text{e}^- \longrightarrow 2 \text{O}^{2-}$

Net Ionic $2 \text{Mg} + \text{O}_2 \longrightarrow 2 \text{O}^{2-} + 2 \text{Mg}^{2+}$

C. Al and S₈

Oxidization $Al \longrightarrow Al^{3+} + 3e^{-}$

Reduction $S_8 + 16e^{-} \longrightarrow S_8^{2-}$

Net Ionic $16 Al + 3 S_8 \longrightarrow 16 Al^{3+} + 3 S_8^{2-}$

10. Complete the following table

Molecular Formula	Lewis Dot Diagram of Molecule	Structural Diagram	Stereometric Shape around Central Atom(s)
HCl			Linear
CF ₄			Tetrahedral
OBr ₂			Bent tetrahedral
NH ₃			Trigonal pyramidal
C ₂ H ₄			Trigonal Planar (x2)
HCN			linear
CH ₃ -NH-CH ₃			Tetrahedral Pyramidal tetrahedral
HOCCOOH			 trig planar bent tetrahedral O-H

11. How does the number of electrons affect the boiling point?

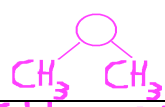
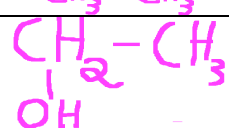
The more electrons, the higher the boiling point will be.

12. Explain the difference in boiling points between Cl_2 (-35°C) and $\text{C}_2\text{H}_5\text{Cl}$ (13°C) by completing the chart and writing a sentence explaining the chart.

This chart shows that as the molecule gets different intermolecular forces it becomes stronger and has a higher boiling point

Compound	# of electrons	Intermolecular Forces
Cl_2	34	LD, VDW
$\text{C}_2\text{H}_5\text{Cl}$	34	LD, DP, VDW, Hbonding

13. Dimethyl ether has a boiling point of -24.9°C and ethanol has a boiling point of 78°C complete the chart and writing a sentence explaining the chart

Structural Diagram	# of electrons	Intermolecular Forces
	26	LD, DP
	26	LD, DP, HB

Ethanol has a higher boiling point because it has hydrogen bonding, while Dimethyl ether only has Dipole-Dipole.