

Unit 4b Homework Questions

Ionic vs covalent bonding

Use the following types of substances to answer the next three (3) questions

- a. Nonpolar covalent substance
- b. Polar covalent substance
- c. Ionic substance
- d. Network covalent substance

1. Carbon dioxide gas (CO_2)

2. Diamonds ($\text{C}_{\text{diamond}}$)

3. Epsom Salt (MgSO_4)

4. Which of the following statements regarding chemical bonding is FALSE?

- a. Ionic solids are held together by electrostatic forces
- b. Covalent molecules are held together by sharing electrons
- c. The total number of valence electrons for CCl_4 is 34
- d. Covalent molecules may not share electrons equally

5. Which of the following compounds contains both ionic and covalent bonds

- a. PO_4^{3-}
- b. NH_3
- c. MgF_2
- d. MgSO_3

Covalent Nomenclature

1. What is the formula of a compound whose nomenclature is silicon disulfide?

- a. Si_2S
- b. SiS_2
- c. 2SiS
- d. Si_2S_2

2. What is the formula of diarsenic heptoxide?

- a. As_7O_2
- b. As_2O_6
- c. As_6O_2
- d. As_2O_7

3. Which of the following compounds is INCORRECTLY paired

- a. NO_2 – mononitrogen dioxide
- b. Se_5O_{10} – pentaselenium decoxide
- c. PCl_3 – phosphorous trichloride
- d. SF_6 – sulfur hexafluoride

4. What is the formula of ammonia?

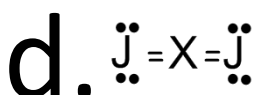
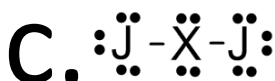
- a. NH_4^+
- b. NH_3
- c. Am
- d. NH_2

5. Which of the following names does not describe H_2O (HOH)?

- a. Dihydrogen monoxide
- b. Hydrogen dioxide
- c. Hydrogen hydroxide
- d. water

Drawing Lewis Structures

Use the following choices to answer the next four (4) questions



1. CO_2
2. O_2
3. F_2
4. SiO_2
5. All of the following guidelines apply to drawing Lewis structures of covalent compounds EXCEPT:
 - a. Only elements C, N, O, P, & S may form double bonds
 - b. H can never be the central atom of a covalent compound
 - c. Elements with a principle quantum number greater than 3 may have an expanded octet
 - d. Halogens are never the central atom of a covalent compound

Covalent bond theory

Use the following answers for the next two (2) questions

- a. F_2
 - b. N_2
 - c. CS_2
 - d. NO_2^-
1. Contains bonds longer than a double bond but shorter than a single bond
 2. Contains 2 sigma and 2 pi bonds
 3. Which of the following contains a triple bond?
 - a. F_2
 - b. N_2
 - c. CS_2
 - d. NO_2^-
 4. How many sigma and pi bonds does ethyne (C_2H_2) have?
 - a. 4σ & 2π
 - b. 5σ & 2π
 - c. 3σ & 2π
 - d. 4σ & 2π
 5. Which of the following does NOT satisfy the octet rule?
 - a. H_2O
 - b. BI_3
 - c. NO_2
 - d. CH_4

VSEPR model

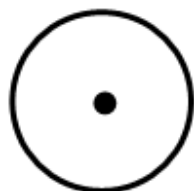
- Which of the following molecules is trigonal pyramidal?
 - CF₄
 - SCl₆
 - PF₃
 - PCl₅
- What shape best describes a BrF₄⁻ ion?
 - Tetrahedral
 - Square planar
 - See saw
 - Trigonal planar
- What type of hybridization is S exhibiting in the SCl₄ molecule?
 - sp
 - sp²
 - sp³
 - dsp³
- Which of the following molecules is INCONSISTANT with the hybridization state?
 - NH₃, sp³
 - PI₅, sp³d
 - XeS₄, sp³
 - SO₂, sp³
- The H-O-H bond angle in a water molecule, H₂O, is closest to:
 - 180°
 - 120°
 - 109°
 - 107°

Polarity

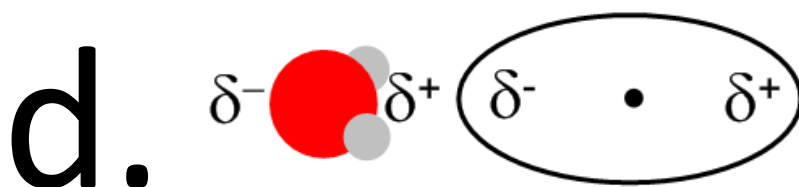
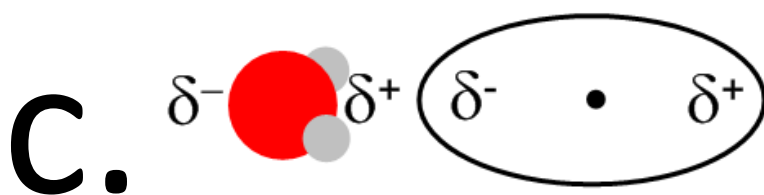
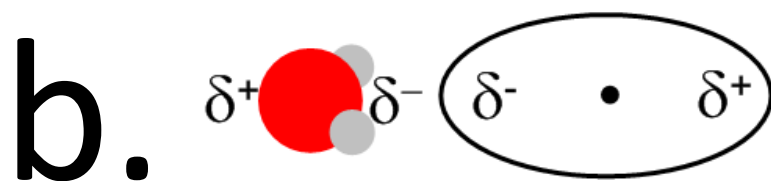
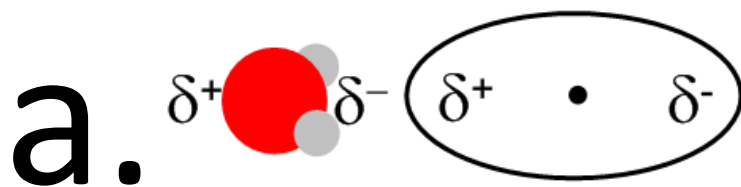
- Which of the following has the LEAST polar bond
 - F₂
 - HCl
 - CH₃Br
 - NCl₃
- Which of the following is both linear & polar?
 - HCN
 - CCl₄
 - N₂
 - H₂S
- Which of the following is nonpolar?
 - H₂O
 - BF₃
 - NF₃
 - HF
- All of the following are true of polar compounds EXCEPT:
 - They usually have higher boiling points than nonpolar substances
 - They dissolve polar compounds as well as ionic salts
 - They have areas of high electron density
 - They are comprised of metals and nonmetals
- Polar compounds can dissolve all of the following except:
 - Polar compounds
 - Ionic salts
 - Nonpolar compounds
 - Alcohols

Intermolecular forces

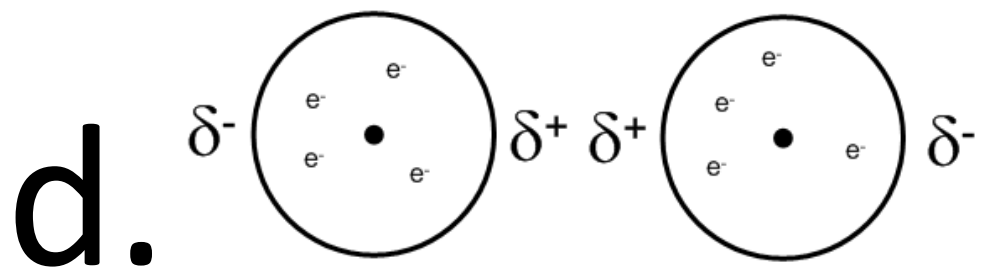
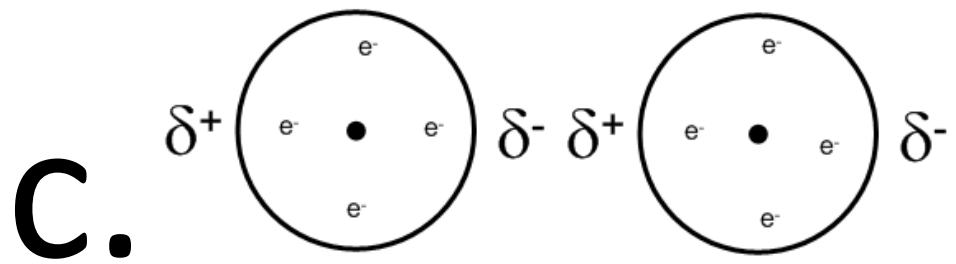
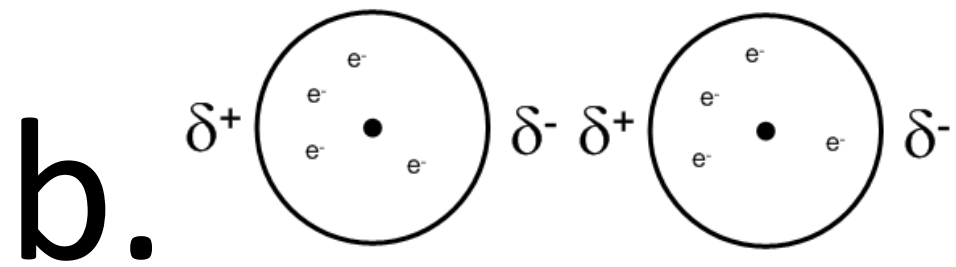
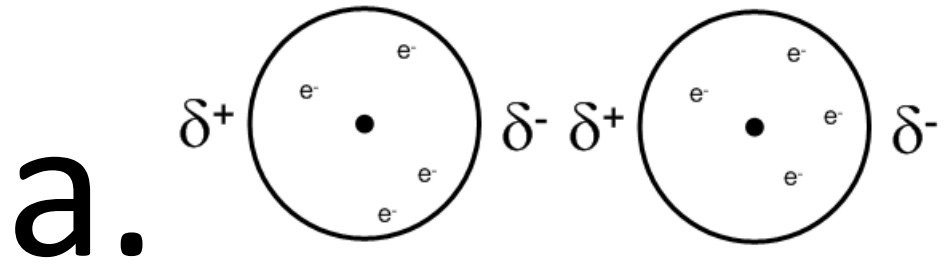
The next Two (2) questions refer to monoatomic molecule pictured below having no dipole moment. The dot indicates the location of the nucleus in all diagrams



1. The molecule is placed near a water molecule and experiences a dipole-induced dipole intermolecular force as a result. Which of the following best represents this interaction?



2. The molecule is placed near an identical molecule and experiences an induced-dipole (London dispersion) intermolecular force. Which of the following best represents this interaction?



3. Which of the following exhibits hydrogen bonding?

- a. BH_3
- b. HCl
- c. NF_3
- d. $\text{C}_2\text{H}_5\text{OH}$

4. What is the strongest attractive force being overcome when liquid water boils?

- a. Ionic bonds
- b. Covalent bonds
- c. Hydrogen bonds
- d. Dipole-dipole bonds

5. Which of the following would you expect to have the highest boiling point?

- a. Ne
- b. F_2
- c. CO_2
- d. CH_4

Unit 4b Lecture Homework

Name: _____

Ionic vs covalent bonds

1. A B C D
2. A B C D
3. A B C D
4. A B C D
5. A B C D

Covalent nomenclature

1. A B C D
2. A B C D
3. A B C D
4. A B C D
5. A B C D

Drawing Lewis Structures

1. A B C D
2. A B C D
3. A B C D
4. A B C D
5. A B C D

Covalent Bond Theory

1. A B C D
2. A B C D
3. A B C D
4. A B C D
5. A B C D

VSEPR Model

1. A B C D
2. A B C D
3. A B C D
4. A B C D
5. A B C D

Polarity

1. A B C D
2. A B C D
3. A B C D
4. A B C D
5. A B C D

Intermolecular forces

1. A B C D
2. A B C D
3. A B C D
4. A B C D
5. A B C D