

Name: _____

Period: _____

Date: _____

Ms. Randall

Unit 4 Bonding Constructed response practice

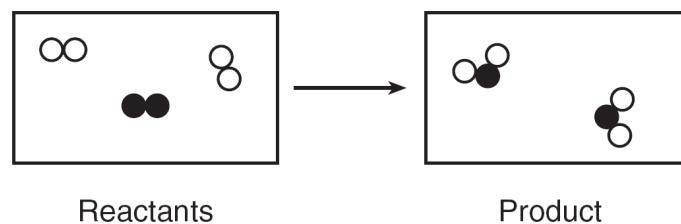
2013-2014

1. Explain, in terms of electronegativity, why a P–Cl bond in a molecule of PCl_5 is more polar than a P–S bond in a molecule of P_2S_5 .

Base your answers to questions **2** and **3** on the information below.

The particle diagrams below represent the reaction between two nonmetals, A_2 and Q_2 .

Key
● = Atom of element A
○ = Atom of element Q

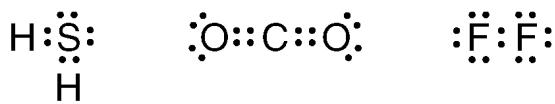


2. Identify the type of chemical bond between an atom of element A and an atom of element Q .

3. Using the symbols A and Q , write the chemical formula of the product.

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4. Draw a Lewis electron-dot diagram for a molecule of phosphorus trichloride, PCl_3

5. Base your answer to the following question on your knowledge of chemical bonding and on the Lewis electron-dot diagrams of H₂S, CO₂, and F₂ below.



Explain, in terms of electronegativity, why a C–O bond in CO₂ is more polar than the F–F bond in F₂.

6. Base your answer to the following question on the information below.

Each molecule listed below is formed by sharing electrons between atoms when the atoms within the molecule are bonded together.

Molecule A: Cl₂ Molecule B: CCl₄ Molecule C: NH₃

Explain how the bonding in KCl is different from the bonding in molecules A, B, and C.

7. Draw an electron-dot diagram for *each* of the following substances:

a calcium oxide (an ionic compound)

b hydrogen bromide

c carbon dioxide

8. Base your answers to the following questions on the information given below.

Testing of an unknown solid shows that it has the properties listed below.

- (1) low melting point
- (2) nearly insoluble in water
- (3) electricity
- (4) relatively soft solid

a State the type of bonding that would be expected in the particles of this substance.]

b Explain in terms of attractions between particles why the unknown solid has a low melting point.

c Explain why the particles of this substance are nonconductors of electricity.

Base your answers to questions **9** and **10** on
the table below.

Physical Properties of Four Gasses				
Name of Gas	hydrogen	hydrogen chloride	hydrogen bromide	hydrogen iodide
Molecular Structure	H-H	H-Cl	H-Br	H-I
Boiling Point (K) at 1 Atm	20.	188	207	237
Density (g/L) at STP	0.0899	1.64	?	5.66

9. Explain, in terms of intermolecular forces, why hydrogen has a *lower* boiling point than hydrogen bromide.

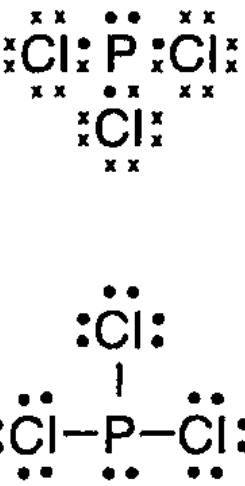
10. Explain, in terms of electronegativity difference, why the bond in H-Cl is more polar than the bond in H-I.

IV.CHEMICAL BONDING (10)

IV.4.Constructed Response IV (10)

Answer Key

Unit 4 Bonding and Naming Constructed response practice

1. A P–Cl bond is more polar than a P–S bond because the electronegativity difference for P–Cl is 1.0 and the electronegativity difference for P–S is 0.4.
2. Examples: — polar covalent — covalent
3. Examples: — AQ_2 — Q_2A
4. 
5. Responses include, but are not limited to: The electronegativity difference in a carbon-oxygen bond is greater than the electronegativity difference in a fluorine-fluorine bond. The EN difference for C and O is 0.9 and the EN difference for F and F is 0.
6. Examples:
 – KCl — ionic bond;
 A, B, C — no ionic bonds
 – Atoms do not share electrons when bonding.
 – There is a transfer of electrons from K to Cl.
 – KCl forms by electrostatic attraction.
 – Bonding involves a metal with a nonmetal.
7. a. $\text{Ca}^{2+} [\ddot{\text{:O:}}]^{2-}$
 $\text{Ca} \rightarrow \ddot{\text{:O:}}$
 $\text{Ca} \quad \ddot{\text{:O:}}$
 b. $\text{H}:\ddot{\text{Br}}:$
 $\text{H}-\ddot{\text{Br}}:$
 c. $\ddot{\text{:O:}}=\text{C}=\ddot{\text{:O:}}$
 $\ddot{\text{:O:}}\text{C}\ddot{\text{:O:}}$
8. a covalent or molecular or nonpolar covalent
 b Examples: -The intermolecular attractions between the particles of the solid are weak. -Weak intermolecular attractions.
 c Example: -There are no freely moving charged particles