Bond Polarity and Partial Charges

New Regents original practice • Name: _____ Date: _____
Show your work for written answers.

Electronegativity describes an atom’s attraction for shared electrons. In a polar covalent bond, the atom with greater electronegativity is labeled δ−.

1 Which bond shares its electron pair equally in the simple model?

(1) H–H

(2) H–Cl

(3) H–O

(4) H–F

2 In H–F, F has greater electronegativity than H. Place δ+ and δ− on the atoms and explain. [1]

Answer and work

3 What does a δ− symbol on an atom in a polar bond mean?

(1) The atom has gained exactly one electron as a separate ion.

(2) The atom has lost all its valence electrons.

(3) The bond has greater electron density near that atom.

(4) The nucleus has gained a neutron.

4 Carbon dioxide has two polar C=O bonds, and the molecule is linear. Explain why the two bonds do not produce a permanent molecular dipole. [1]

Answer and work

A Set of Bond Labels

Use the information below to answer the questions.

Use the electronegativity values to compare four covalent bond models. Each model has H bonded to one listed atom. Compare bond polarity using the absolute difference in electronegativity.

Atom	Electronegativity
H	2.20
N	3.04
Cl	3.16
O	3.44
F	3.98

5 Which bond in the set has the greatest electronegativity difference?

(1) H–N
(2) H–Cl
(3) H–O
(4) H–F

6 Calculate the electronegativity difference for H–O. Identify which atom carries δ−. [1]

Answer and work

7 Which bond has the smallest electronegativity difference in the set?

(1) H–N
(2) H–Cl
(3) H–O
(4) H–F

8 A display places δ− on H in H–Cl. Correct the label and use the supplied data to explain. [1]

Answer and work