Problem 41

a) A polar molecule has one end which has a partial positive charge and another end which has a partial negative charge.

b) Yes. The elect shared electrons will be shifted closer to the more electronegative atom, making that end of the molecule partially negatively charged. The other end of the molecule will develop a partial positive charge of the same magnitude.

c) The electronegativity difference between the two atoms (which determines the partial charges on the atoms) and the distance between atoms.

Problem 46

\[ \Delta X \]

a) FeF₂

Electronegativity Difference = 4.0 - 1.8 = 2.2

Ionic bonding

b) CrO₂

\[ \Delta X = 3.5 - 1.6 = 1.9 \] → Closer to the ionic model

c) AsBr₅

\[ \Delta X = 2.8 - 2.0 = 0.8 \] → More covalent in bonding

d) Sulfur tetrafluoride \[ \Delta X = 4.0 - 2.5 \times 1.5 \] → Borderline, but probably more covalent

e) Molybdenum (IV) chloride \[ \Delta X = 3.0 - 1.8 = 1.2 \] Predominantly covalent

f) Scandium (III) chloride \[ \Delta X = 3.0 - 1.3 = 1.7 \] Borderline, tending toward ionic bonding

Problem 48

a)

\[ \text{[O=O=O]} \]

b) \[ [\text{O}=\text{O}]=^2^- \]

c) \[ [\text{O}=\text{N}=\text{O}]=^1^+ \]

d) \[ [\text{O}=\text{P}=\text{O}]=^3^- \]

e) \[ \text{H} \text{C} \text{H} \]

f) \[ \text{H} \text{C} \text{C} \text{H} \]