

1.6.8.1: Practice Polarity

Exercise 1.6.8.1.1

Is the PCl_3 molecule non-polar or polar? Check the electronegativity table in the text to see if the bonds are polar. Then see if the shape is symmetrical. Then decide.

Answer

The bonds are polar. Cl is more electronegative than P. Cl atoms are partially negative and P is partially positive.

The molecule is not entirely symmetrical, because the lone pair is causing the 3 Cl atoms to be slightly bent away from it, causing a pull of electrons toward the opposite side. The side of the molecule with the lone pair is slightly positive, the side with the chlorines is slightly negative. (See drawing of NH_3 molecule in text.)

It is polar.

Exercise 1.6.8.1.1

Is the CH_2O molecule non-polar or polar? Check the electronegativity table in the text to see if the bonds are polar. Then see if the shape is symmetrical. Then decide. (C and O have double bond. H atoms are attached to C with single bonds.)

Answer

The bonds between C and H are considered non-polar because the electronegativity difference is small (0.4). The bond between C and O is polar. The C is partially positive and the O is partially negative.

The molecule is not symmetrical because the oxygen is on one side of the carbon and the hydrogens are on the other side. The side of the molecule with the oxygen is slightly negative, and the side with the hydrogens is slightly positive.

It is polar.

Exercise 1.6.8.1.1

Is the H_2O molecule non-polar or polar? Check the electronegativity table in the text to see if the bonds are polar. Then see if the shape is symmetrical. Then decide.

Answer

The bonds between H and O are polar. The H are partially positive and the O is partially negative.

The molecule is not symmetrical because it is bent. The side with the lone pairs is slightly negative, and the side with the hydrogens is slightly positive.

It is polar.