Chemistry 20

Unit A: Matter and chemical bonding

Lewis structures and the bonding continuum

A line formula can hide electrons

- H-O-H shows two shared pairs and leaves the rest of oxygen's electrons unstated.
- A full pair drawing puts those remaining electrons on the oxygen atom as lone pairs.

Electron pairs and the continuum

- C, N, O, and F are checked for 8 electrons, and H is checked for 2.
- NaCl, HCl, and Cl_2 will sit at three different positions on one sharing scale.

Key terms

Lewis structure

A drawing that places every valence electron as a bonding pair or a lone pair so each required octet or duet is visible. (pairs around atoms)

structural formula

A formula that uses a line for each shared pair, as in H-O-H or O=C=O. (one line, one pair)

octet

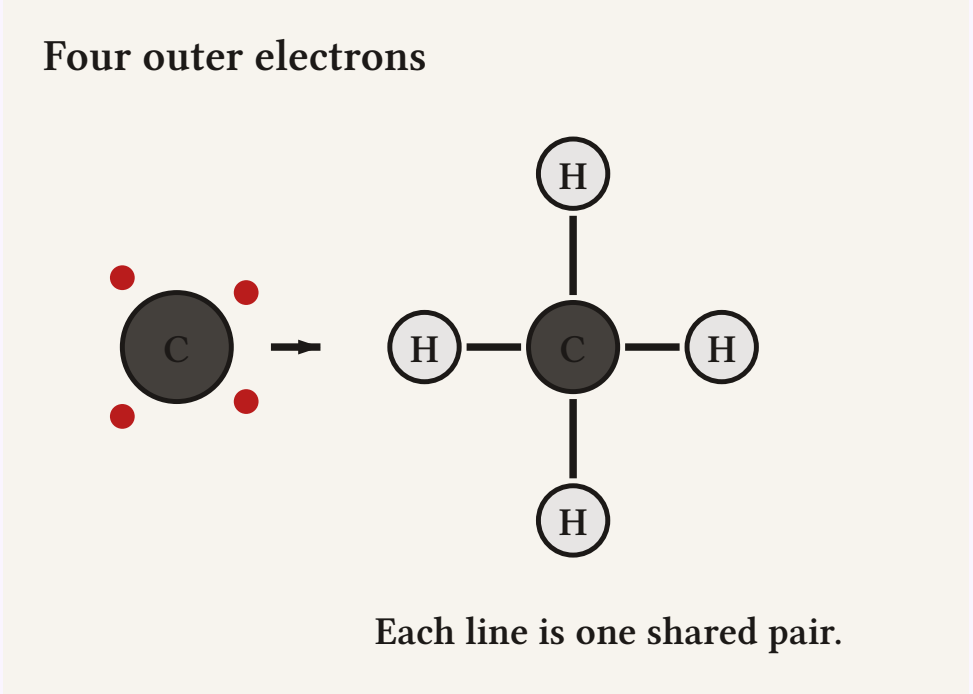
Eight valence electrons around C, N, O, or F in the finished drawing. (8 electrons)

bonding continuum

The range from complete electron transfer, through unequal sharing, to equal sharing. (NaCl, HCl, Cl_2)

Four outer electrons become four Lewis pairs

- Carbon has four outer electrons. In methane each one pairs with a hydrogen electron, so you draw four bonding pairs.
- Each Lewis pair is two electrons, drawn as two dots or one line, and each hydrogen holds only that pair.



Water and carbon dioxide side by side

- Water uses two bonding pairs and two lone pairs on oxygen.
- Carbon dioxide uses two double bonds and two lone pairs on each oxygen.

Ammonia on the model kit

- Nitrogen starts with 5 valence electrons and ammonia adds three hydrogens.
- The model needs three sticks and one lone-pair flag on nitrogen.

Three positions

- NaCl sits at complete transfer, HCl at unequal sharing, and Cl_2 at equal sharing.
- The Pauling differences for those three cases are 2.1, 0.9, and 0.