

How to draw Lewis structures to help build molecular models

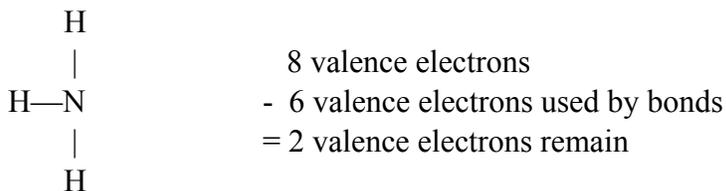
1) Count the total number of valence electrons available from all atoms in the molecule (Ex: NH_3 has 8 valence electrons, 5 from nitrogen and 3 from the 3 hydrogen atoms each contributing one) Anions add one to the electron count for each negative charge. Cations deduct one from the electron count for each positive charge.

2) Pick least electronegative atom as the central atom. Use the electronegativity table provided to pick the least electronegative atom. Hydrogen is never the central atom. If a noble gas forms a molecule, it will always be the central atom according to this rule. (Ex: in NH_3 , nitrogen is the center because hydrogen cannot be the central atom)

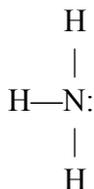
3) Use the structural formula in the problem for clues as to how the rest of molecule is put together (e.g. HONO , HCO_2H). Some molecules are straightforward. (Ex: in NH_3 the structure would be:



4) Connect the molecule with bonds, deducting 2 electrons from the valence electron count for each bond.



5) Give remaining valence electrons to most electronegative atoms first (F, O, N, Cl, ...), and then to the central atom to satisfy the octet rule. (Assign any extra electrons beyond an octet to the central atom.)



6) Check that each atom have an octet (8) of valence electrons, and if not, form double and triple bonds using lone pairs from electronegative atoms. (This step is not needed because N has an octet with 6 electrons from the 3 bonds and 2 from the lone pair). Remember that hydrogen only gets 2 valence electrons.

7) The preferred Lewis structure will also satisfy the following requirements about the number of bonds formed by each atom:

Group IA elements form 1 bond

Group IIA elements form 2 bonds

Group IIIA elements form 3 bonds

Group IVA elements form 4 bonds

Group VA elements form 3 bonds

Group VIA elements form 2 bonds

Group VIIA elements form 1 bond