Drawing Lewis Structures

1. Lewis Rules
2. Guidelines for connecting atoms
3. Examples

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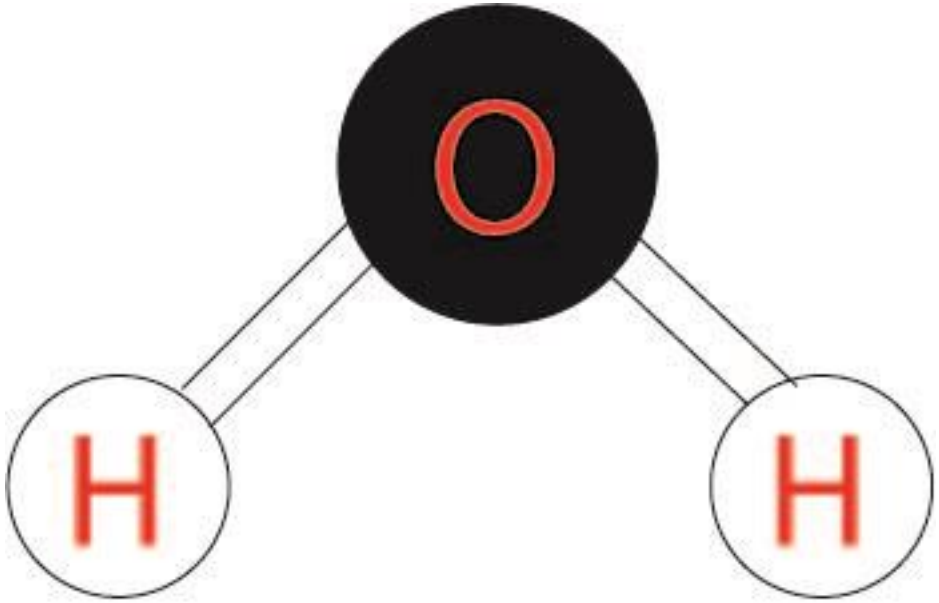


Molecule

Lewis Structure

Lewis Rules

1. The total number of electrons = sum of all the valences

    valence electrons include both *s* & *p* electrons

    in the outermost shell (or Principal energy level)

    (+ any charge)

2. **Octet Rule**: all atoms end up with 8 electrons

    (or 4 pairs of electrons)

    except H which ends up with 2 electrons (1 bond).

In Lewis Structures:

— single bond, or 2 shared electrons

= double bond, or 4 shared electrons

≡ triple bond, or 6 shared electrons

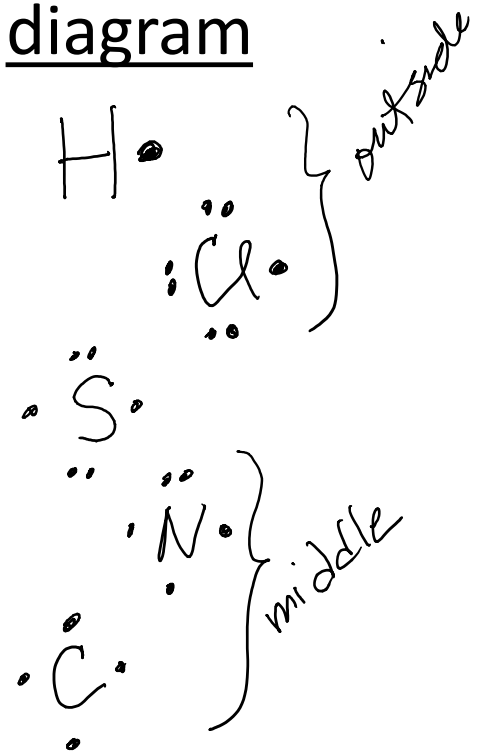
} Count towards both atoms

. . lone pair, or 2 unshared electrons

} Count towards 1 octet

Lewis Guidelines for connecting atoms

Atom	Group	Valence	# of bonds	Electron dot diagram
H	1	1	1 always	
F, Cl, Br, I	17 (7A)	7	1 (usually)	
O, S, Se	16 (6A)	6	2	
N, P	15 (5A)	5	3	
C, Si	14 (4A)	4	4 always	



Other Guidelines

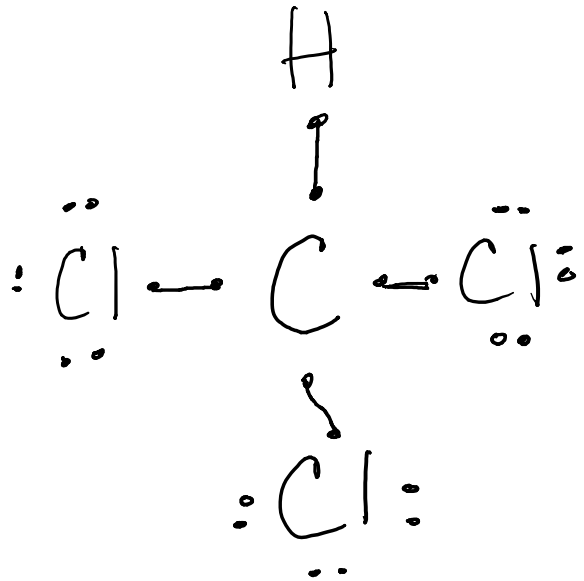
- Uh-oh Rule: No O – O bonds (except peroxides)

  In polyatomic ions, O's are on the outside and never bonded to each other.

- Use pencil!

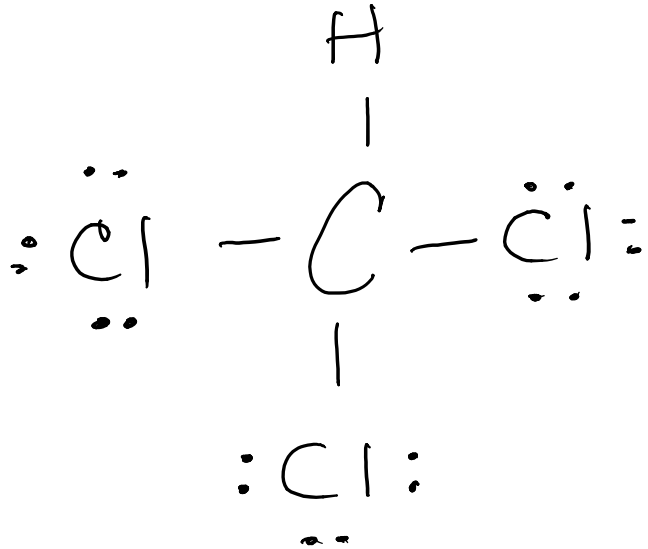
Examples

Connect the Dots



$CHCl_3$

Draw, Octets, Count

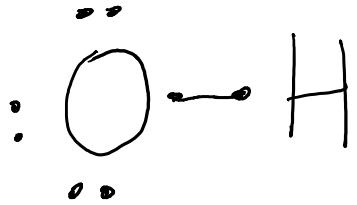


valence: $1 + 4 + 3(7) = 26e^-$

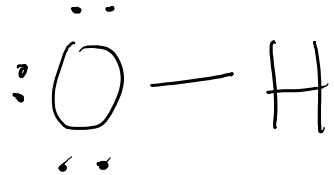
Another Example

Connect the Dots

OH^-



Draw, Octets, Count

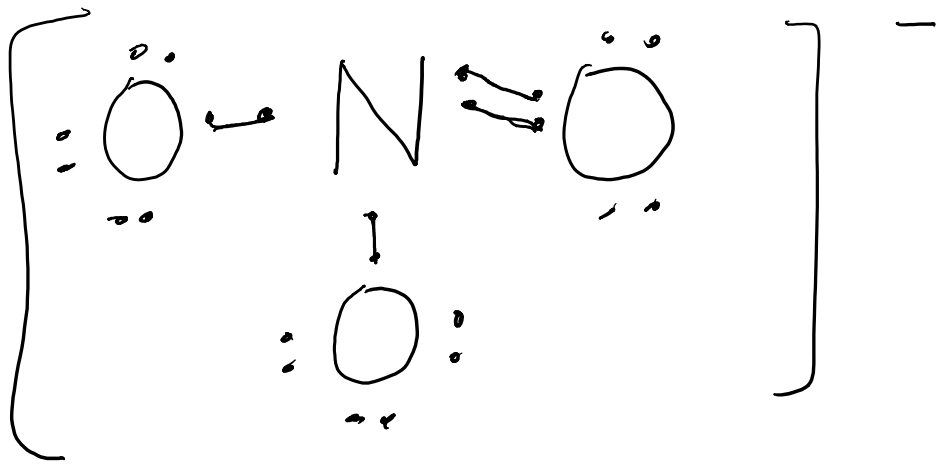


valences: $6 + 1 + 1 = 8\ e^-$

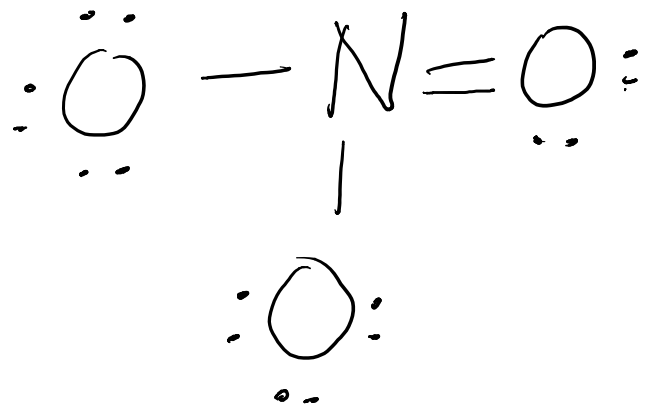
Another Example

Connect the Dots

NO_3^-



Draw, Octets, Count



valence: $5 + 3(6) + 1 = 24\ e^-$