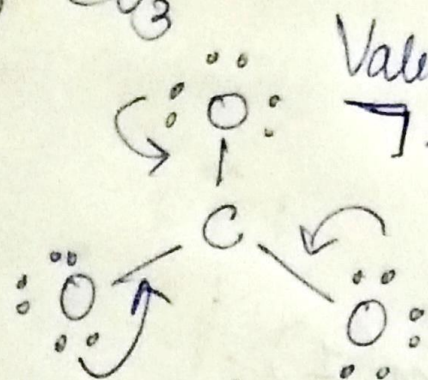


Resonance Structures

• Resonance is a way of describing bonding in certain molecules or polyatomic ions by the combination of several contributing structures (like resonance or canonical structures) into a resonance hybrid.

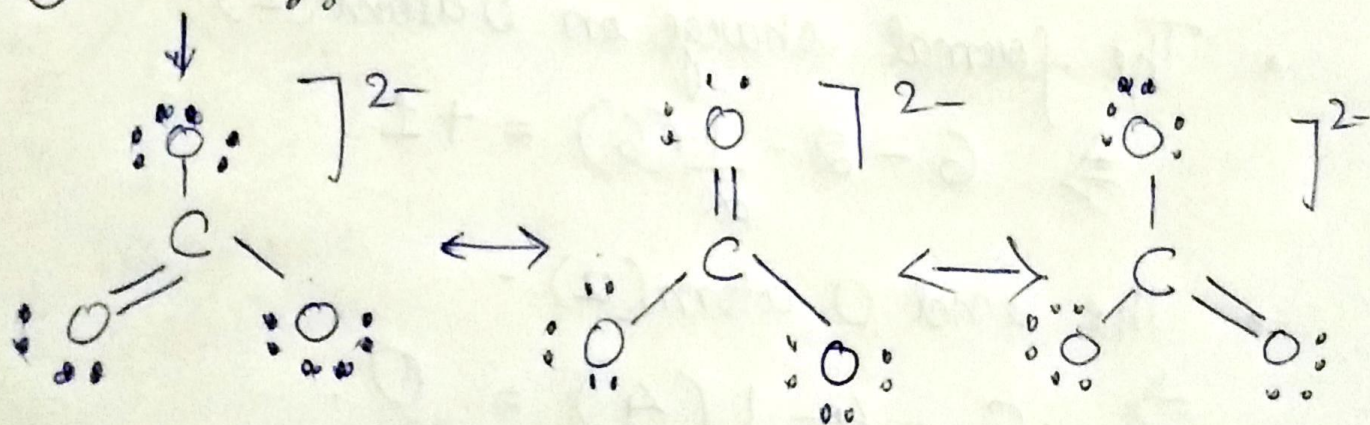
• It has a particular value for analyzing delocalized electrons where the bonding cannot be expressed by one single Lewis structure

ex, CO_3^{2-}



$$\text{Valence } e^- = C + 3 \times O + 2$$

$$= 4 + 3 \times 6 + 2 = 24 \text{ v.e.}$$
$$\frac{-6}{18e}$$

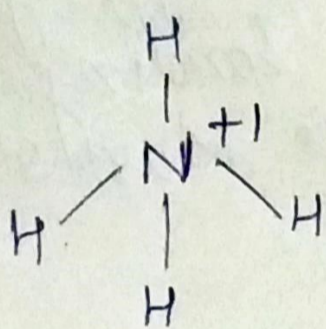


* Formal charges on an atom in Lewis structure.

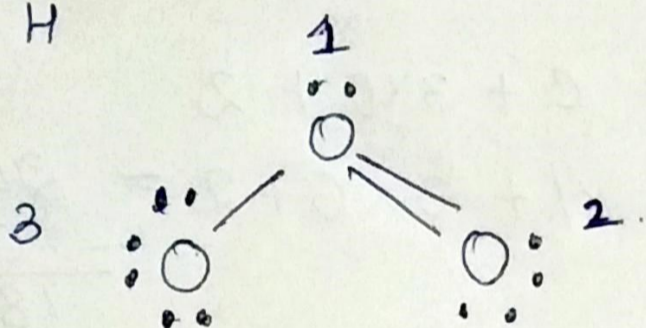
$$\text{Formal charge} = \left[\text{Total no. of valence electrons in free atom} \right] -$$

$$\left[\text{total no. of non bonding electrons} \right] - \frac{1}{2} \left[\text{total no. of bonding electrons} \right]$$

ex.



For N, $5 - 0 - 4 = +1$.



- The formal charge on O atom (1):-

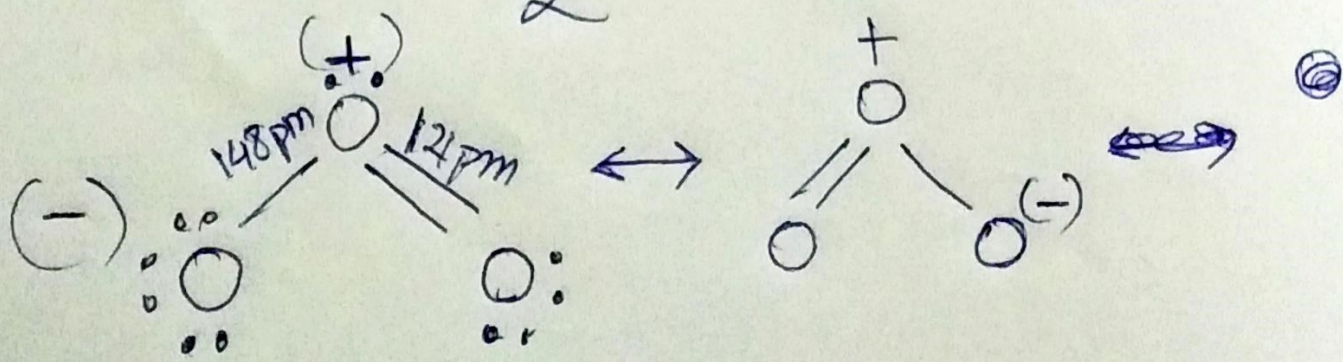
$$\Rightarrow 6 - 2 - \frac{1}{2}(6) = +1$$

- The end O atom (2):-

$$\Rightarrow 6 - 4 - \frac{1}{2}(4) = 0$$

- The end O atom (3):-

$$\Rightarrow 6 - 6 - \frac{1}{2}(2) = -1$$

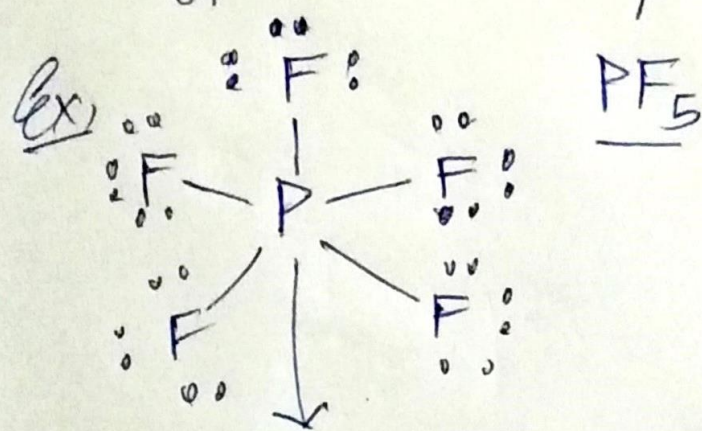


The best structure is decided by formal charges in resonance.

- 1) The structure with Formal charge of zero preferred.
- 2) The -ve charge should be on atom(s) at more electronegative atom.

* Hypervalent Compound

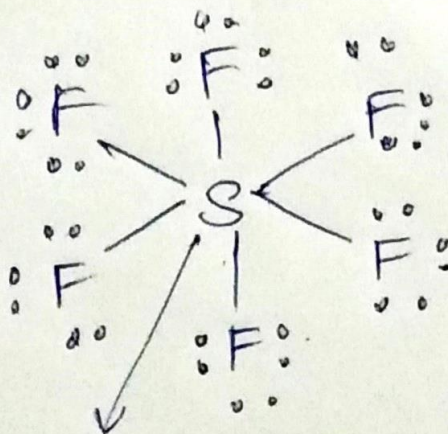
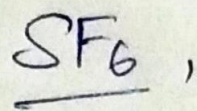
The species in which outermost shell contain more than 8 electrons is known as hypervalent compound.



$$P = 5 + 5 \times 7$$

$$= 5 + 35 = 40 \text{ V.E.}$$

10 valence electrons



12 valence electrons

$$S = 6 + 6 \times 7$$

$$= 6 + 42$$

$$= 48 \text{ V.E.}$$