

Ch 6 Notes on Lewis Diagrams and Covalent Bonds

$$\text{Number of bonds} = \frac{(\text{total valence } e \text{ needed} - \text{total valence } e \text{ provided})}{2}$$

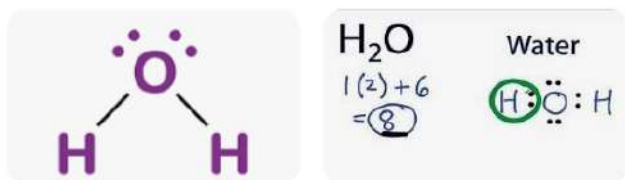
Example 1: H₂O

H needs 2 (has 1)

O needs 8 (has 6)

$$\text{Number bonds} = \frac{(\text{needed} - \text{provided})}{2} = \frac{[(2)2 + 8] - [2(1) + 6]}{2} = \frac{12 - 8}{2} = \frac{4}{2} = 2$$

So water molecules have 2 single bonds:



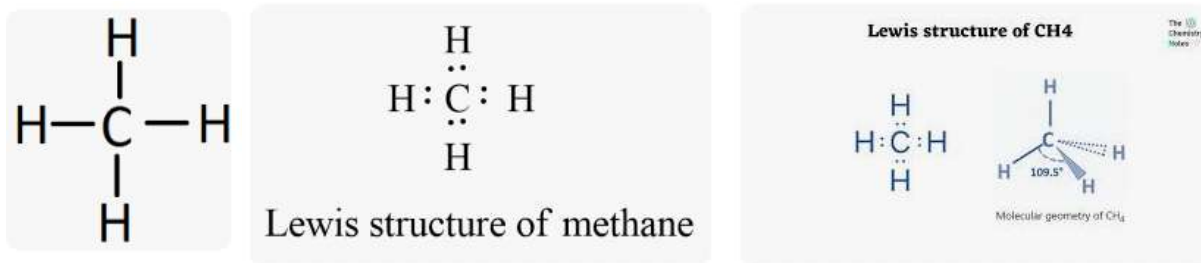
Example 2: CH₄

C needs 8 (has 4)

H needs 2 (has 1)

$$\text{Number bonds} = \frac{(\text{needed} - \text{provided})}{2} = \frac{[(4)2 + 8] - [(4)(1) + 4]}{2} = \frac{16 - 8}{2} = \frac{8}{2} = 4$$

So methane molecules have 4 single bonds.



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Now, double and triple bond examples show the power of this relationship.

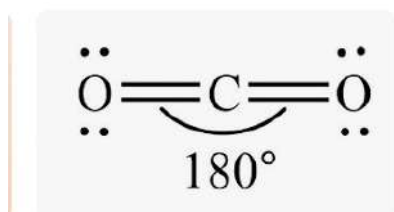
Example 3: CO₂

C needs 8 (has 4)

O needs 8 (has 6)

$$\text{Number bonds} = \frac{(\text{needed} - \text{provided})}{2} = \frac{[8 + 2(8)] - [4 + 2(6)]}{2} = \frac{24 - 16}{2} = \frac{8}{2} = 4$$

So carbon dioxide molecules have 4 bonds, 2 double bonds:



Example 4: CO

C needs 8 (has 4)

O needs 8 (has 6)

$$\text{Number bonds} = \frac{(\text{needed} - \text{provided})}{2} = \frac{[8 + 8] - [4 + 6]}{2} = \frac{16 - 10}{2} = \frac{6}{2} = 3$$

So carbon monoxide molecules have 3 bonds, a triple bond:

