ANSWER KEY.

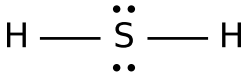
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Lewis Structures

Chemistry | ANSWER KEY

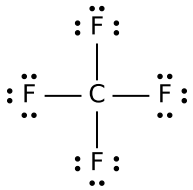
Use a periodic table. For each molecule, count the valence electrons first, then draw the Lewis structure. Every line is 2 electrons and every dot is 1. Your drawing must use exactly the number you counted.
Steps: count, connect with single bonds, fill the outer atoms, put leftovers on the central atom, then make double or triple bonds if the central atom is short of 8.

1. **Example (worked for you).** Hydrogen sulfide, H_2S.
   Valence electrons: S = 6, H = 1 × 2 = 2, total = **8**. Sulfur is central, and H goes on the outside.



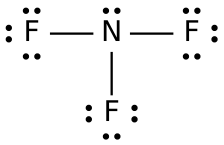
   Check: 2 lines × 2 = 4, plus 4 dots = 8. It matches the count. S has 8 and each H has 2.

2. Draw the Lewis structure for carbon tetrafluoride, CF_4.
   Count: **C = 4, F = 7 × 4 = 28, total 32**



   4 single bonds (8) + 12 lone pairs (24) = 32. C has 8; each F has 8.

3. Draw the Lewis structure for nitrogen trifluoride, NF_3.
   Count: **N = 5, F = 7 × 3 = 21, total 26**

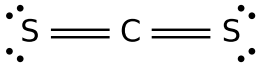


   3 single bonds (6) + 9 lone pairs on F (18) + 1 lone pair on N (2) = 26.

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4. Draw the Lewis structure for carbon disulfide, CS_2. Carbon is the central atom.

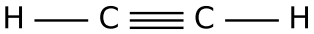
Count: **C = 4, S = 6 × 2 = 12, total 16**



S=C=S, 2 lone pairs on each S. Take one pair from each S, not two from one S.

5. Draw the Lewis structure for ethyne, C_2H_2. The two carbons bond to each other, and each carbon bonds to one hydrogen.

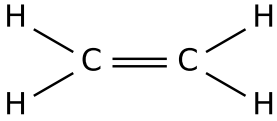
Count: **C = 4 × 2 = 8, H = 1 × 2 = 2, total 10**



A triple bond between the carbons: 2 C-H bonds (4) + C≡C (6) = 10.

6. Draw the Lewis structure for ethene, C_2H_4. The two carbons bond to each other, and each carbon bonds to two hydrogens.

Count: **C = 4 × 2 = 8, H = 1 × 4 = 4, total 12**

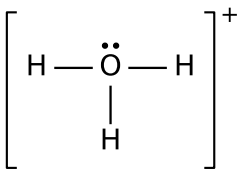


A double bond between the carbons: 4 C-H bonds (8) + C=C (4) = 12.

7. Water picks up a hydrogen ion to make the hydronium ion: $H_2O + H^+ \rightarrow H_3O^+$.

(a) Count the valence electrons. (b) Draw the Lewis structure. (c) Which atom supplied both electrons for the new bond?

(a) **O = 6, H = 1 × 3 = 3, minus 1 for the charge: 6 + 3 − 1 = 8.**



(b) **3 single bonds (6) + 1 lone pair on O (2) = 8, in brackets with + outside.**

(c) **Oxygen gave one of its lone pairs, so the new bond is a coordinate covalent bond.**

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