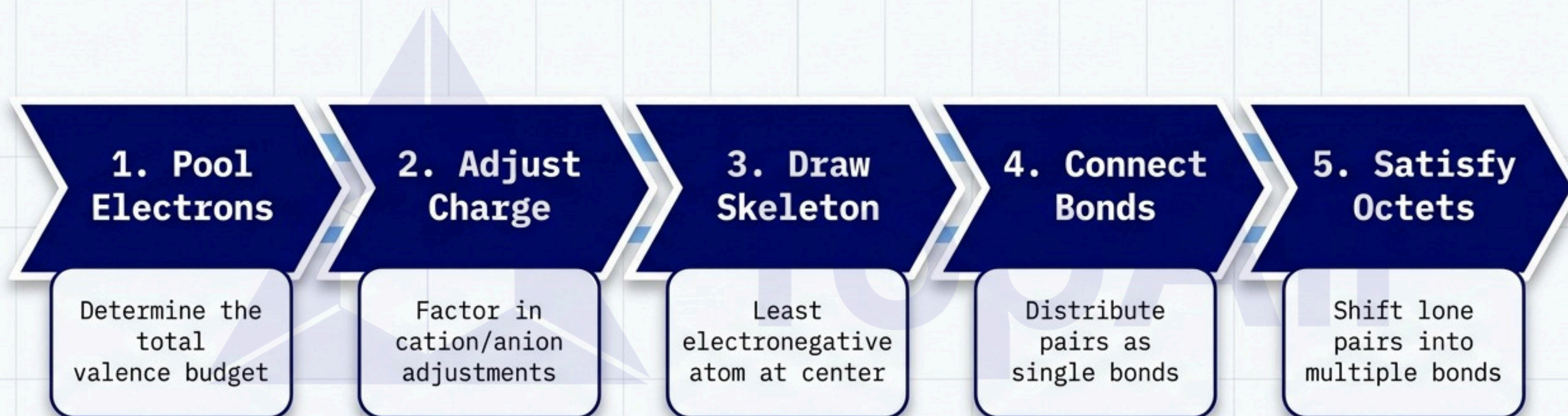


The Molecular Blueprint: Lewis Structures



A 5-step algorithmic approach to molecular mapping.



Every system tends to be more stable by lowering the energy. The Lewis dot structure is our roadmap to visualizing this stability.

Step 1: Establish Your Electron Budget



Carbon



Nitrogen



Oxygen

Valence Cheat Code

Group 14	= 4e ⁻
Group 15	= 5e ⁻
Group 16	= 6e ⁻
Group 17	= 7e ⁻

Methane (CH₄) Ledger



$$\mathbf{C (4e^{-}) + [H (1e^{-}) \times 4] = 8}$$

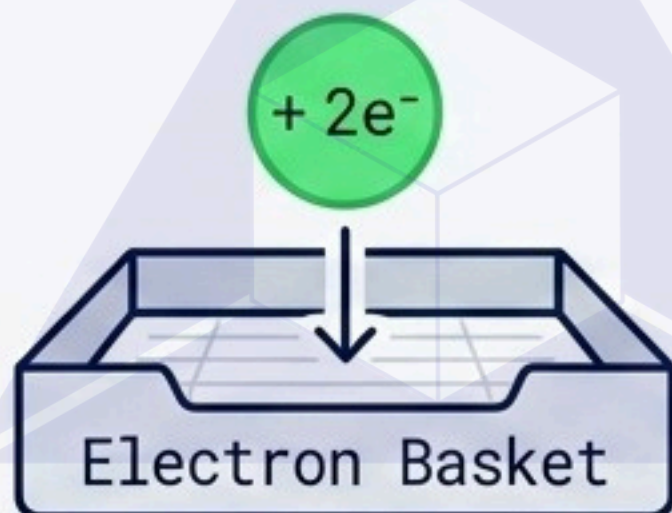
Total Valence
Electrons Available

Step 2: Factor in the Ionic Charge

Anions (Negative Charge)

Gain of Electrons

Example: Carbonate Ion (CO_3^{2-})



Base valence (C=4, O=18) = $22e^-$

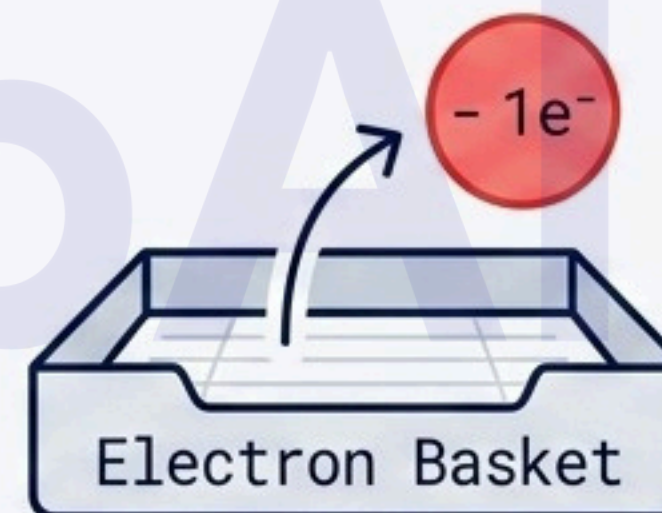
Charge Adjustment = $+ 2e^-$

Total Budget = $24e^-$

Cations (Positive Charge)

Loss of Electrons

Example: Ammonium Ion (NH_4^+)



Base valence (N=5, H=4) = $9e^-$

Charge Adjustment = $- 1e^-$

Total Budget = $8e^-$



You've Learned the Theory. Let's Test Them Now.

$$E=mc^2$$



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Key Highlights

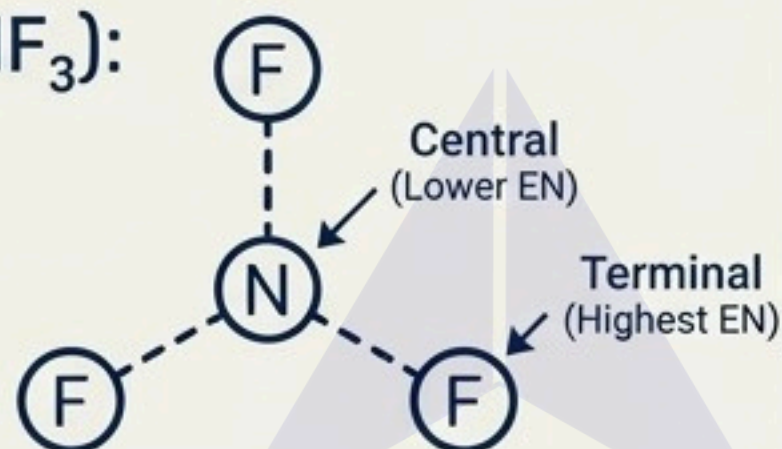
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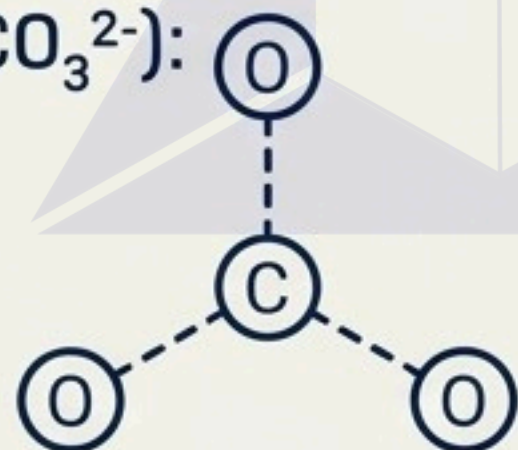
Steps 3 & 4: Define the Structural Hierarchy

RULE: The Least Electronegative (EN) atom always occupies the central position.

Model 1 (NF_3):



Model 2 (CO_3^{2-}):



Hydrogen is NEVER the central atom.

H																	He
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba		Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra		Rf	Sg	Bh	Hs	Mt	Ds	Rg	Cn	Nh	Fl	Mc	Lv	Ts	Og	
Low EN		La	Ce	Pr	Nd	Pm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu		
		Ac	Th	Pa	U	Np	Pu	Cm	Bk	Cf	Es	Fm	Md	No	Lr		

Worked Example: Carbon Monoxide (CO)

1. The Pool

C	(4e ⁻)
+ O	(6e ⁻)
Total Budget	= 10e ⁻

2. Skeleton & Balance

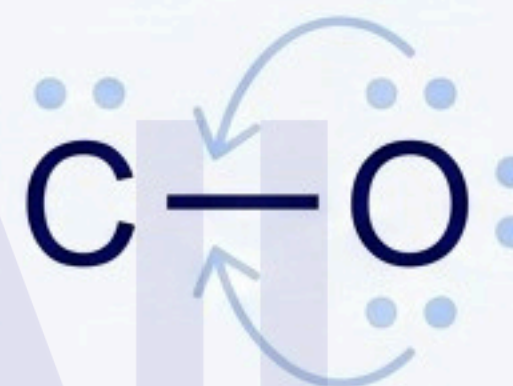


Single bond uses 2e⁻.

Balance: 8e⁻ distributed as lone pairs.

Red Alert: Carbon only has 4e⁻ (incomplete octet).

3. The Octet Shift



Final Result: Both atoms possess 8e⁻.

Worked Example: Nitrite Ion (NO_2^-)

1. The Pool

$$\begin{array}{r} \text{N } (5e^-) \\ + \text{O } (12e^-) \\ + \text{Charge } (1e^-) \\ \hline \text{Total Budget} = 18e^- \end{array}$$

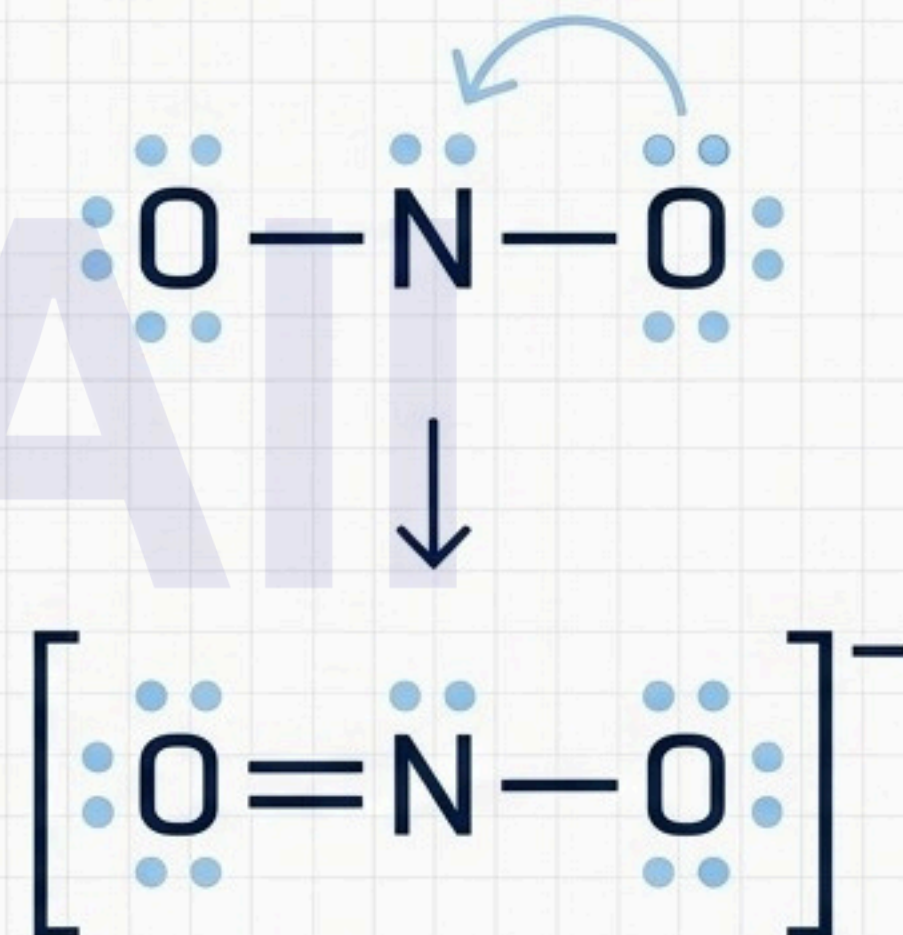
2. Skeleton & Balance



Bonds use $4e^-$.
Balance: $14e^-$ distributed.

Red Alert: Nitrogen only
has $6e^-$ (incomplete octet).

3. The Octet Shift



Final Result: All
atoms possess $8e^-$.

The Molecular Blueprint: Revision Frame

1. **COUNT:** Sum all valence electrons using group numbers (**The Electron Ledger**).
2. **CHARGE:** Add $1e^-$ for every negative charge; Subtract $1e^-$ for every positive charge.
3. **SKELETON:** Place the least electronegative atom in the center (Never Hydrogen).
4. **BONDS:** Draw single bonds to connect atoms, then subtract $2e^-$ per bond from your ledger.
5. **OCTET:** Distribute remaining e^- to terminal atoms first. Shift lone pairs to create multiple bonds if the center is deficient.



You've Learned the Theory.

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