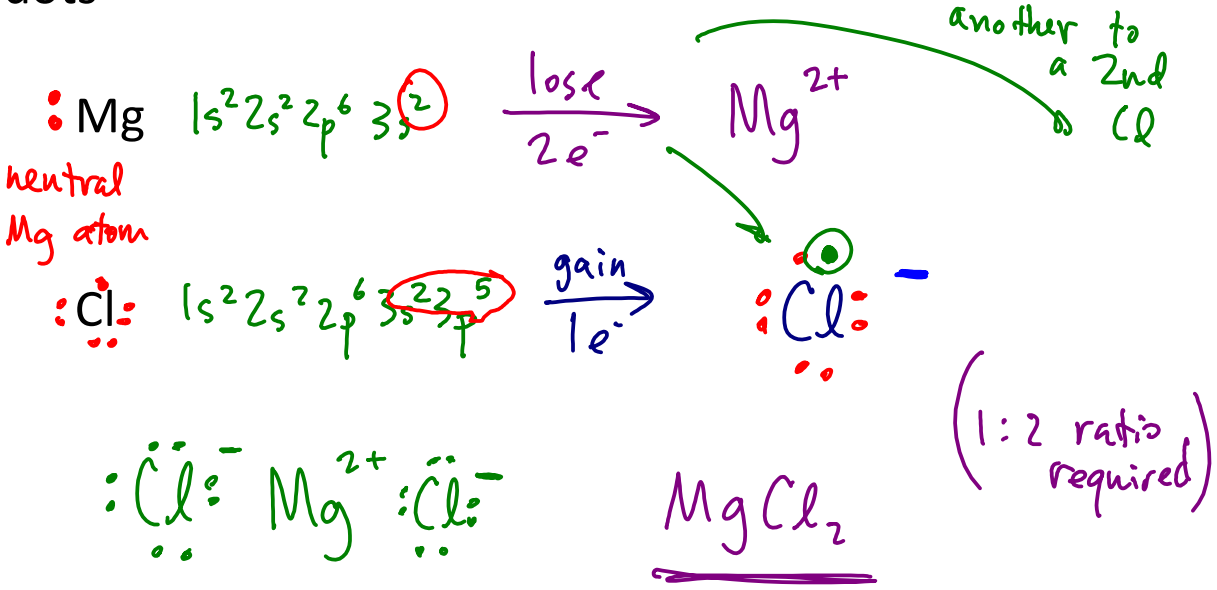
<u>Lewis electron-dot structures</u>: show valence electrons as dots

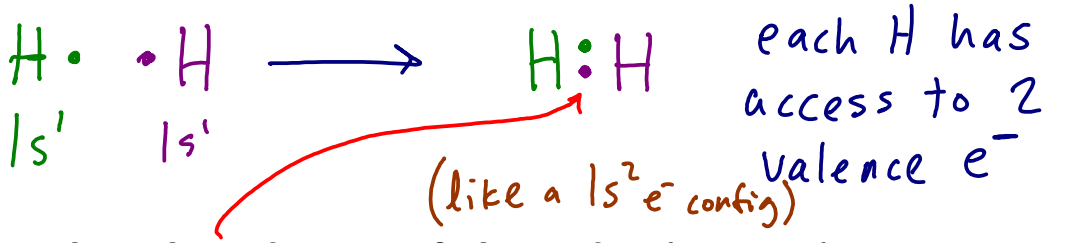


Ionic bonding: attraction between oppositely-charged ions

Molecule: atoms bonded in a group

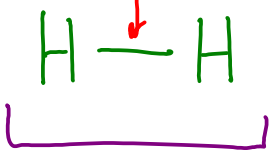
contain… nonmetals only

an H_2 molecule contains two H atoms **covalently** bonded:

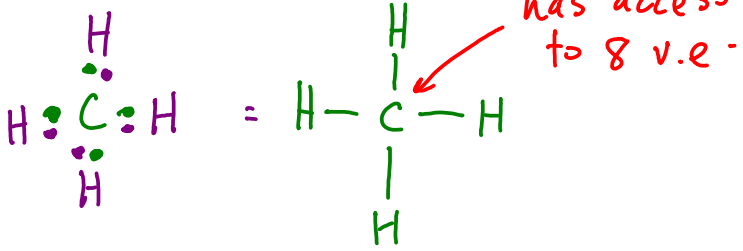


Covalent bond: pair of **shared** valence electrons

drawn as a line

H_2 

an H_2 molecule

CH_4 

- Noble gases have 8 valence electrons
- Stable main-group ions have 8 valence electrons
- Covalently bonded atoms have access to 8 valence electrons

Octet rule: atoms want to have 8 valence electrons to be stable

Lewis electron-dot structures of molecules

	H	C	N	O	F
# valence e⁻:	1	4	5	6	7
# covalent bonds:	1	4	3	2	1

only applies to neutral molecules

duet rule → H/He need 2 v.e.

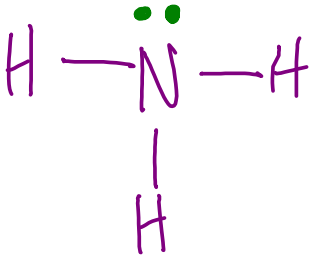
octet rule → 8 ve⁻

A proper Lewis structure for a molecule:

- shows all valence electrons
  - covalent bonds = lines (each cov. bond has 2 e⁻)
  - unshared electrons = dots
- has full octets or duets
- has the correct number of bonds on each atom

ammonia

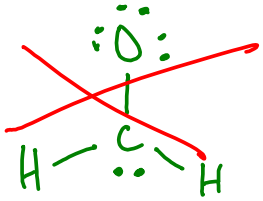
NH_3: total # valence e⁻ in molecule: $5 + 3(1) = 8$ ve total



tot # ve ✓
oct/duets ✓
bonds ✓

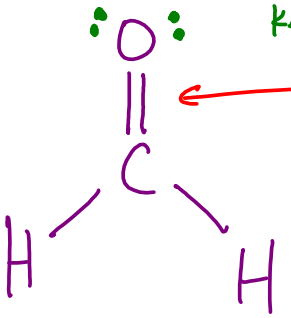
CH_2O: total # valence e⁻ in molecule: $4 + 2(1) + 6 = 12$ ve total

try element w/ most bonds in center



this is CH_2O^{2-}

keep unshared electrons paired



tot # ve ✓
oct/duets ✓
bonds ✓

Bonding overview

Ionic

Na^+ / Cl^-

e^- transferred

metal/nonmetal

from transfer of valence e^-

Polar covalent

$\delta+ H—Cl \delta-$

both nonmetals

unequal sharing

(nonpolar)

Covalent

Cl—Cl

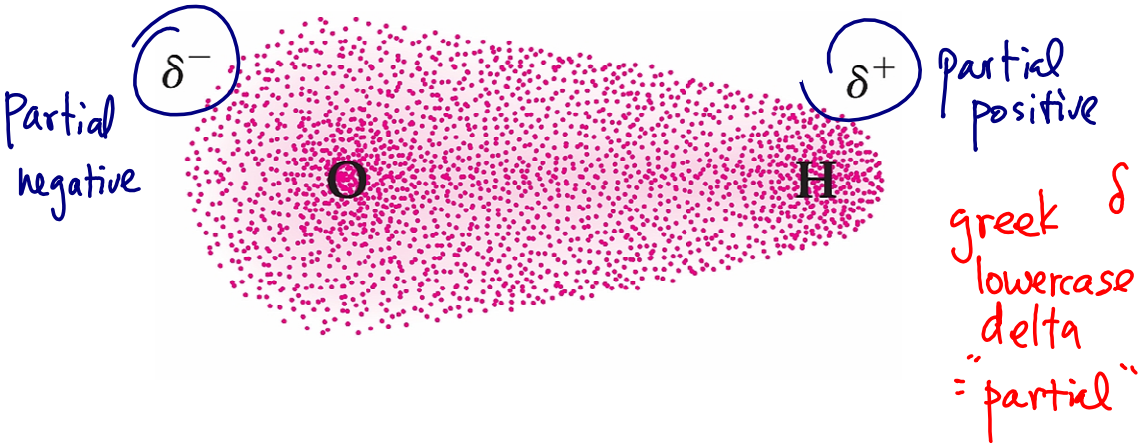
e^- shared equally

2 nonmetals

w/ equal electronegativities

Electronegativity: tendency of an atom to claim more shared electron density

Oxygen is more electronegative than hydrogen:



Fluorine is the most electronegative element: