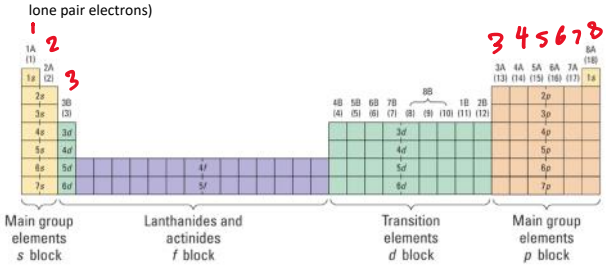
Lewis Dot Structures

Tuesday, November 10, 2020 11:30 PM

Introduction

- Definition: representation of the electron arrangement around individual atoms in a molecule
- Significance: can determine shape of molecule, dipoles, polarity, and formal charge
- Formal charge: (group # of atom) - (½ # of bonding electrons) - (# of lone pair electrons)



Steps

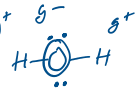
1) # of electrons
   - Number of valence electrons is the column number
   - Add that number for each atom together
2) Central atom
   - Can never be hydrogen
   - Many times it will be carbon
   - Place most electronegative atom in centre
3) Single bonds
   - Each bond equals two electrons
4) Lone pairs
   - Place extra valence electrons around central atom
5) Double/ triple bonds
   - If both central atom and adjacent atom do not have a full octet and can have double bonds, place a double bond
   - If a triple bond is allowed, place a triple bond (seen usually in molecule with two atoms)

Practice Problems

1) H_2O
2) CN^-
3) C_2H_2
4) SO_3
5) NH_3

① H_2O

$H_2 - 2$
$O - 6$
] 8 ve



Dipole, polar

② CN^-

$C - 4$
$N - 5$
] 9 + 1 = 10 ve

$:C \equiv N:$

$[C \equiv N]^-$

nonpolar

③ C_2H_2

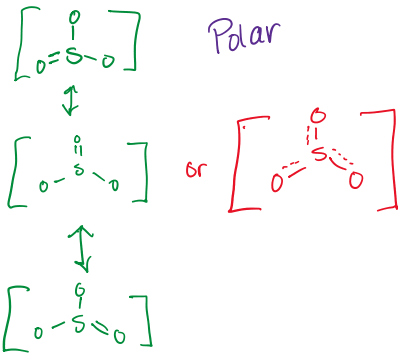
$C_2 - 8$
$H_2 - 2$
] 10 ve

$H - C \equiv C - H$

nonpolar

④ SO_3

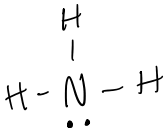
$S - 6 = 6$
$O_3 - 6 \cdot 3 = 18$
] 24 ve



Polar

⑤ NH_3

$N - 5$
$H_3 - 3$
] 8 ve



Polar

Dipoles