Cold Call

Get the following:

- A white board
- A marker
- A piece of paper towel
- Your notes on electrons

Questions: 34

Phone a friend: 2

Notes: 12

Did you ever want to shoot Doc?

Now is your chance!

Sunday, May 19, 2019
9:00 AM - 1:00 PM
$65

Just remember: the Captain will avenge me!

1) **What is a chemical bond?**

A force that holds two atoms together.

2) **Why do atoms form bonds?**

Atoms form bonds with the goal of getting a closed shell with a formal charge of zero. When this is not achievable, atoms will aim to get as close as possible to these goals.

3) **What is an ionic bond?**

A chemical bond caused by electrostatic attraction between two oppositely charged ions that usually result from the transfer of electrons

4) **What is a covalent bond?**

A chemical bond where electrons are shared.

5) **For B, Se, Ar, He & P, draw the Lewis Dot structure and indicate the number of bonds expected to form**

3 2 0 0 3

6) Complete the electron accounting for SO_4^{-2}

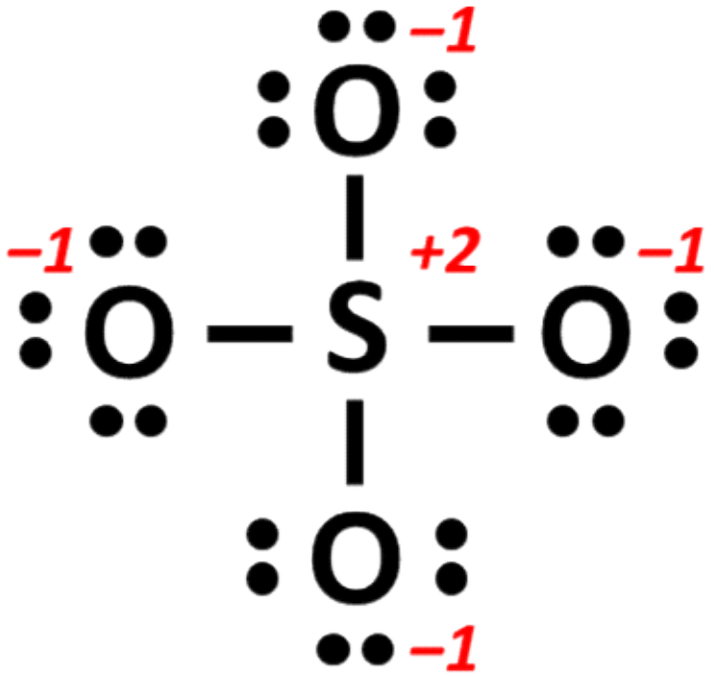
CSe = 5(8) = 40 electrons

Ve= 6 + 4(6) +2 = 32 electrons

Be= 40-32 = 8 electrons 4 bonds

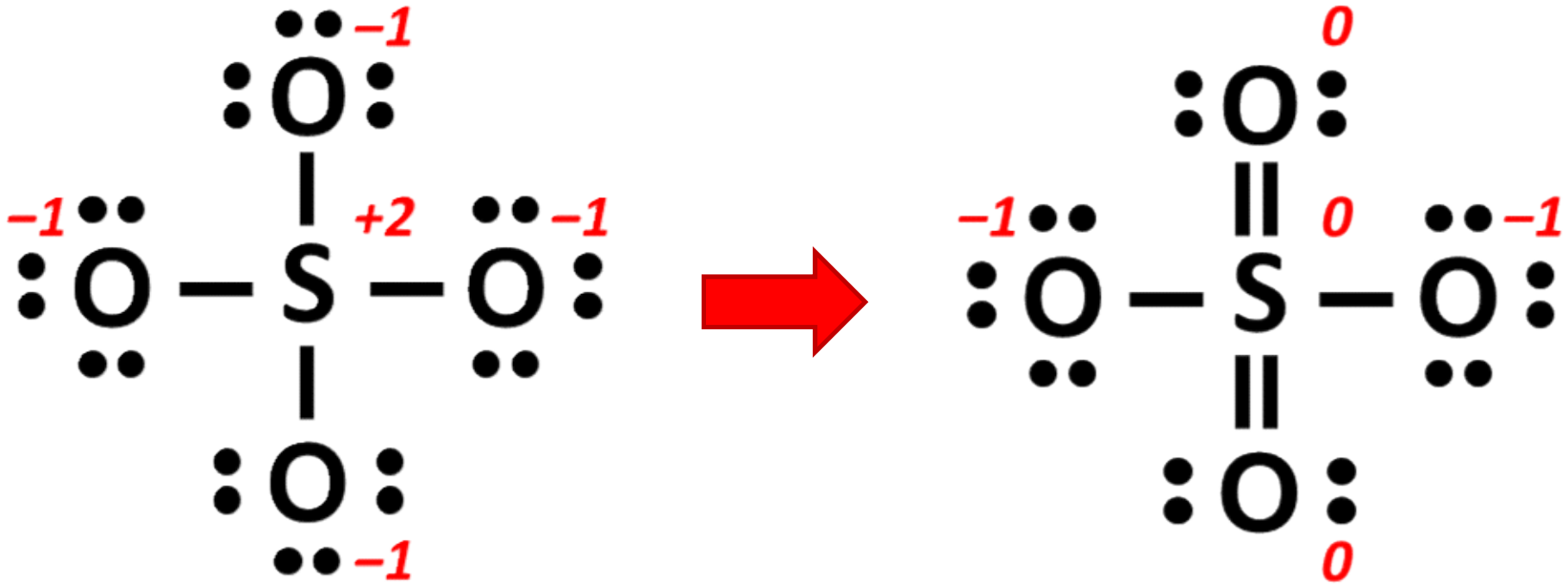
LP= 32 - 8 = 24 electrons 12 pairs

7) Draw the Lewis Dot structure based on this electron accounting.



8) What is the Σ|FC| for this structure?

Σ|FC| = 6

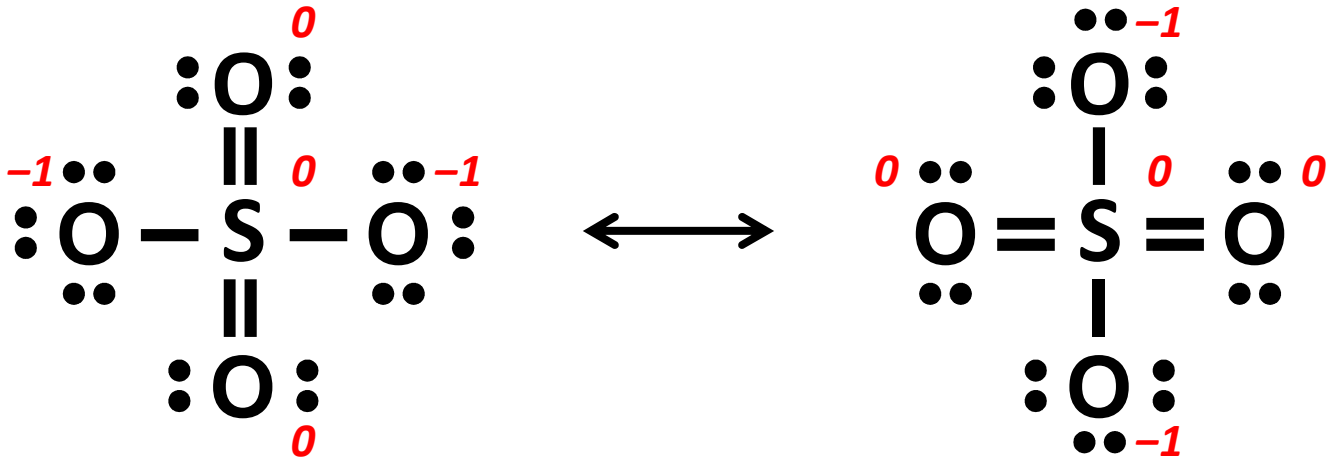


9) Change the structure to minimize Σ|FC|

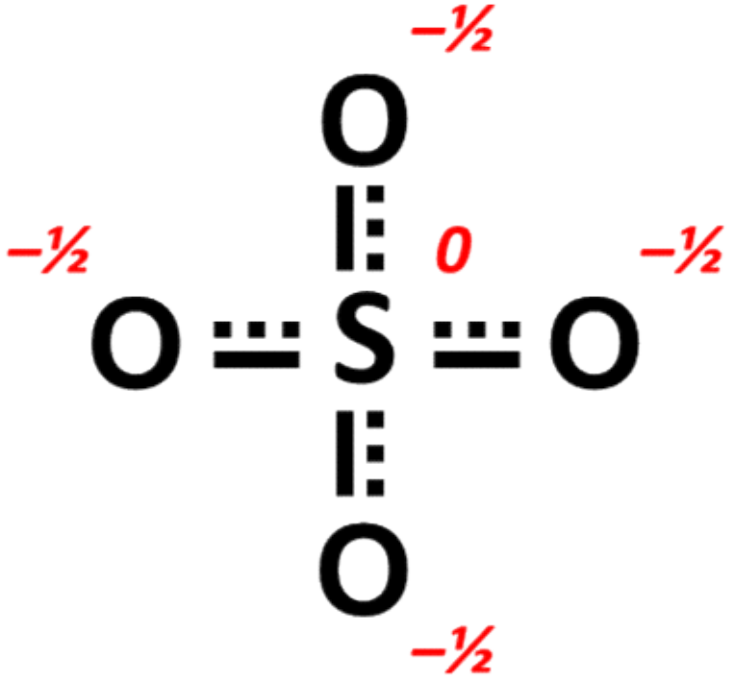
10) What kind of octet violator is this?

Expanded octet

11) Draw 2 of the 6 resonance structures for SO_4^{-2}



12) Draw the hybrid resonance structures for SO_4^{-2}



PUT NOTES AWAY

14) **Ethanol and dimethyl ether both have a molecular formula of C_2H_6O, but have different structures. What do we call pairs like this?**

Isomers - compounds with the same molecular formula but different structural formulas

15) **What is a formal charge?**

The charge assigned to an atom in a molecule assuming that all bonding electrons are shared equally regardless of electronegativity

16) **Name the atoms that do not need 8 valence electrons to have close shell? Explain why this is so.**

Hydrogen and helium need only 2 electrons to have a closed shell because period 1 has no p-orbitals

17) **What is an expanded octet?**

Stable structure with >8 valence electrons on 1 atom

18) Draw three Lewis Dot structures for SCN^{-1} and rank them from 1 (best) to 3 (worst). Note that carbon is the central atom and nitrogen is the most electronegative atom.

CSe = 3(8) = 24 electrons

Ve= 6 + 4 + 5 + 1 = 16 electrons

Be= 24 - 16 = 8 electrons 4 bonds

LP= 16 - 8 = 8 electrons 4 pairs

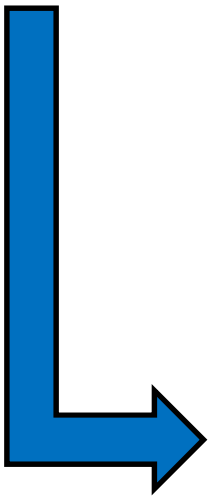
CSe = 3(8) = 24 electrons

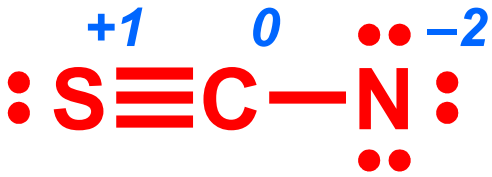
Ve= 6 + 4 + 5 + 1 = 16 electrons

Be= 24 - 16 = 8 electrons | 4 | bonds

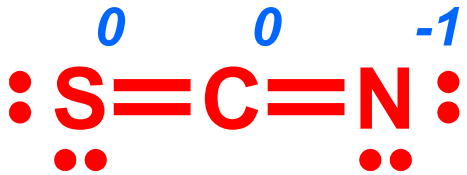
LP= 16 - 8 = 8 electrons | 4 | pairs

S—C—N

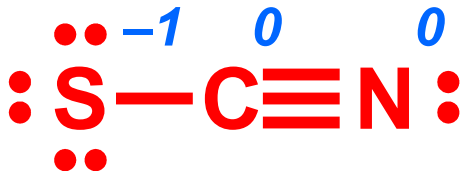




closed shell	Σ|FC|	(-) charge on most EN atom	Rank
yes	3	yes yes	3



yes	1	yes	1



yes	1	no	2

19) Complete the electron accounting for ethane (C_2H_6), ethylene (C_2H_4), and acetylene (C_2H_2).

DO NOT ERASE YOUR ANSWER WHEN DONE

CSe =	2(8) + 6(2) = 28
Ve=	2(4) + 6(1)= 14
Be=	28 - 14 = 14
LP=	14 - 14 = 0

C_2H_6

7 bonds

0 pairs

CSe =	2(8) + 4(2) = 24
Ve=	2(4) + 4(1)= 12
Be=	24 - 12 = 12
LP=	12 - 12 = 0

C_2H_4

6 bonds

0 pairs

CSe =	2(8) + 2(2) = 20
Ve=	2(4) + 2(1)= 10
Be=	20 - 10 = 10
LP=	10 - 10 = 0

C_2H_2

5 bonds

0 pairs

20) Draw the Lewis Dot structures for ethane (C_2H_6), ethylene (C_2H_4), and acetylene (C_2H_2).

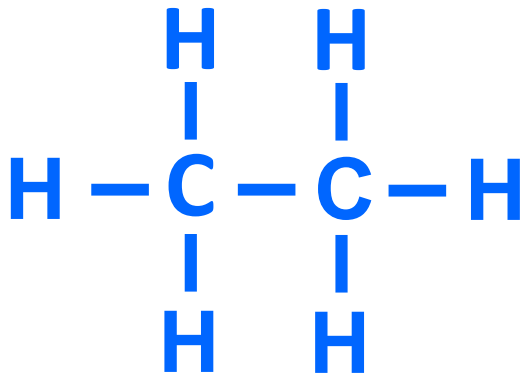
DO NOT ERASE YOUR ANSWER WHEN DONE

C_2H_6

7	bonds
0	pairs

6 x H—

1 bond left

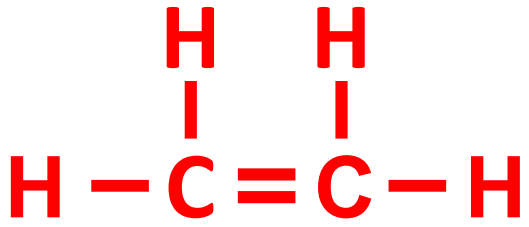


C_2H_4

6	bonds
0	pairs

4 x H—

2 bonds left



C_2H_2

5	bonds
0	pairs

2 x H—

3 bond left

21) Describe the formation of metal bonds

- **Many metal atoms collect into a large matrix**
- **The metal atoms release some of their valence electrons into the space between the atoms.**
- **This creates a cationic metal matrix with an anionic "sea of electrons" flowing within the matrix.**
- **The opposite charges provide an attraction without anchoring the electrons to one location.**

22) What type of elements will form a covalent bond?

Both elements will have a high electronegativity, so both will probably be non-metals

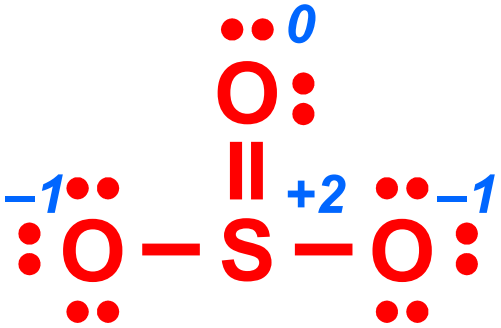
23) Write the Lewis dot structure with formal charges for SO_3 where all atoms have an octet.

CSe = 4(8) = 32 electrons

Ve= 4(6) = 24 electrons

Be= 32 - 24 = 8 electrons 4 bonds

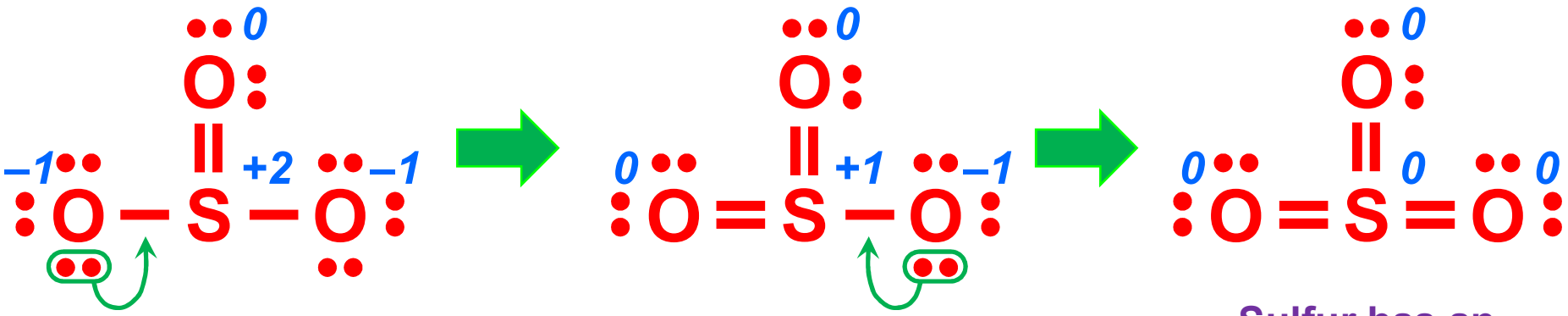
LP= 24 - 8 = 16 electrons 8 pairs



23) Write the Lewis dot structure with formal charges for SO_3 where all atoms have an octet.

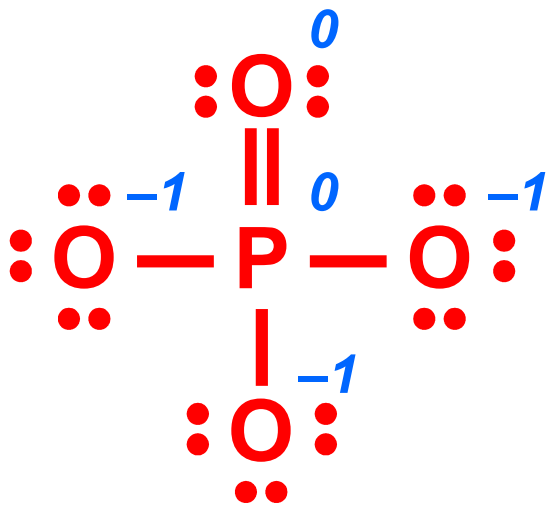
24) Explore alternative structures to improve the formal charges.

25) Your final structure contains an octet violator. What is the name of this type of violator?

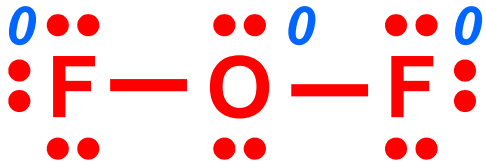


Sulfur has an expanded octet

26) Write one resonance structure for PO_4^{-3}.



27) Write the Lewis dot structure for OF_2.



28) What are resonance structures?

Two or more correct Lewis dot structures where the atoms are connected the same way but the electrons are distributed differently.

29) What are odd electron structures?

Structures where the total number of electrons is odd and it is impossible for all atoms to have octets.

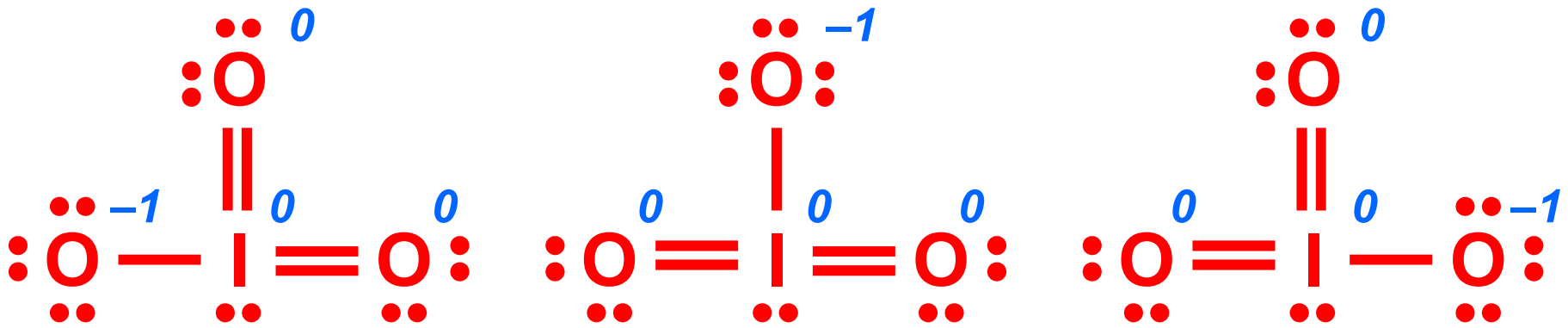
30) What is a metal bond?

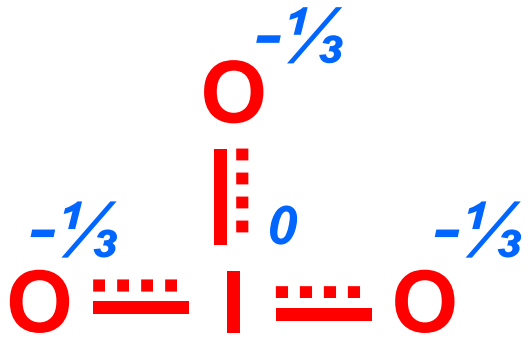
A chemical bond caused by the electrostatic attraction between metal cations and their delocalized "sea" of electrons.

31) What is a suboctet?

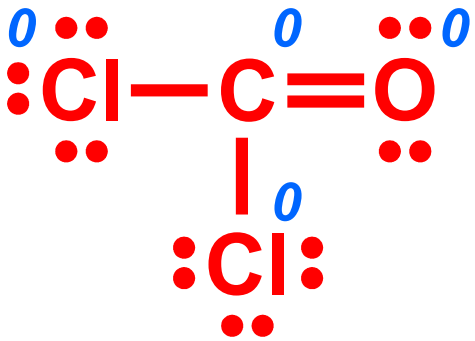
A stable configuration with fewer than 8 valence electrons around an atom

32) **Write the 3 resonance structures and 1 hybrid structure for IO_3^{-1}.**





33) Write the Lewis dot structure for $COCl_2$.



34) Write the Lewis dot structure for BeI_2.