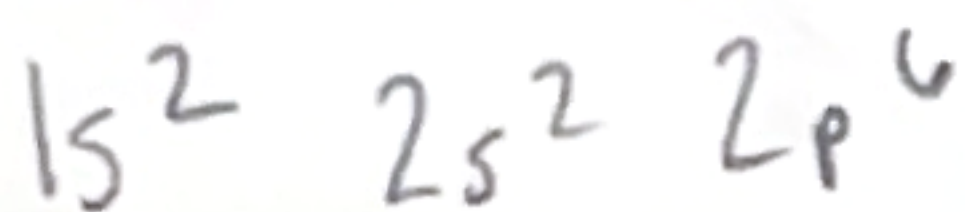


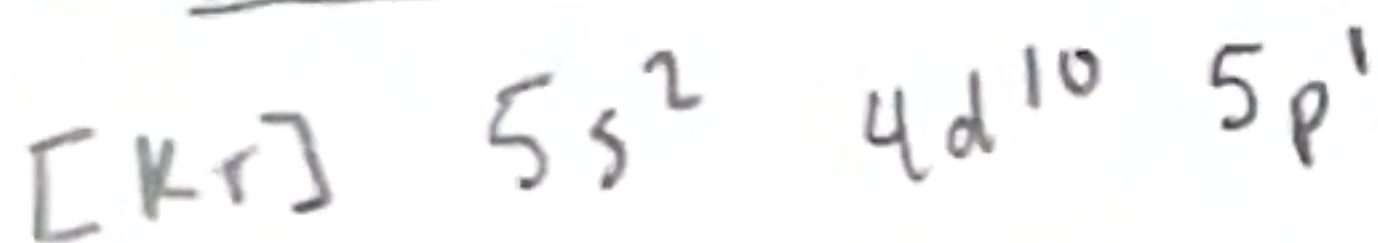
Key

Exam 3 Test Prep

Write the electron configuration for Mg^{2+} - cation lost 2 e^-



Write the condensed electron configuration for Sb^{2+} - cation lost e^-



What is the element with the electron configuration $[\text{Ne}] 3s^2 3p^3$?

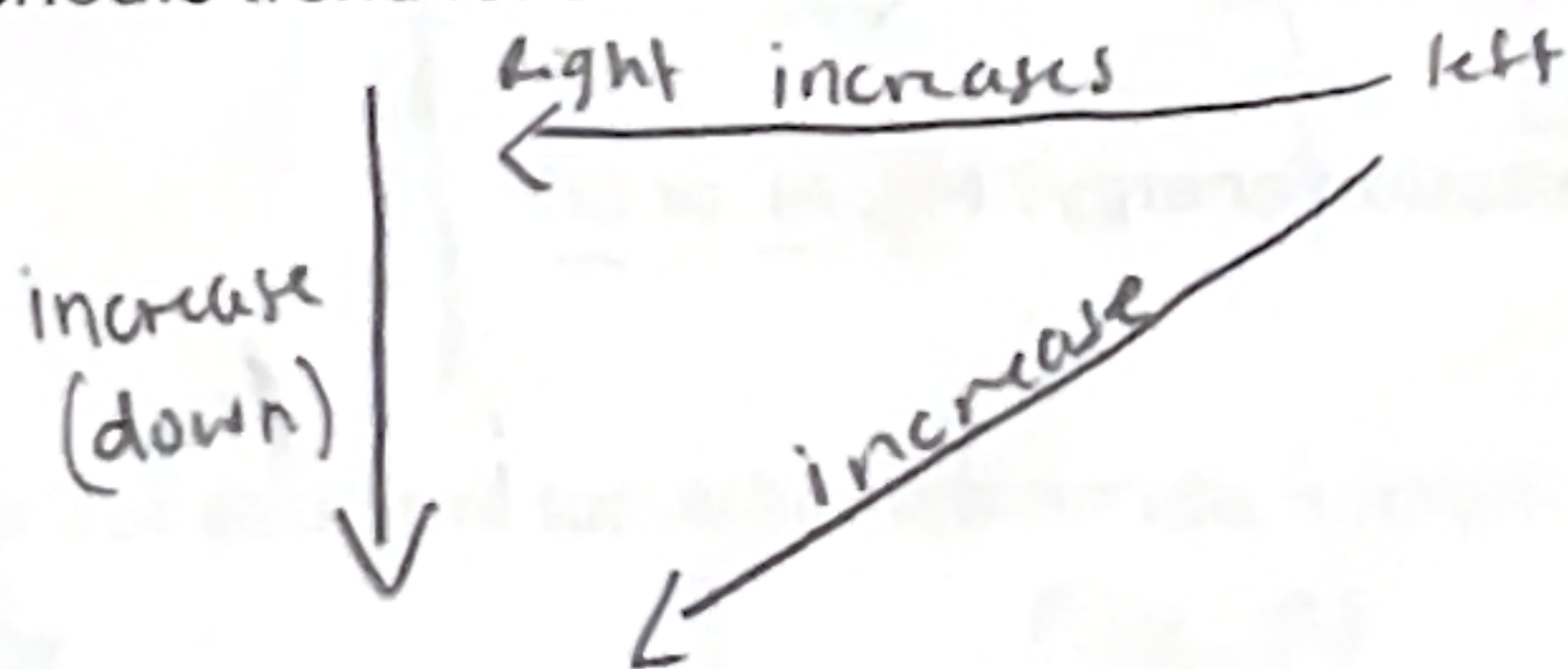
Phosphorus

What letter applies to the transition metals for writing electron configuration?

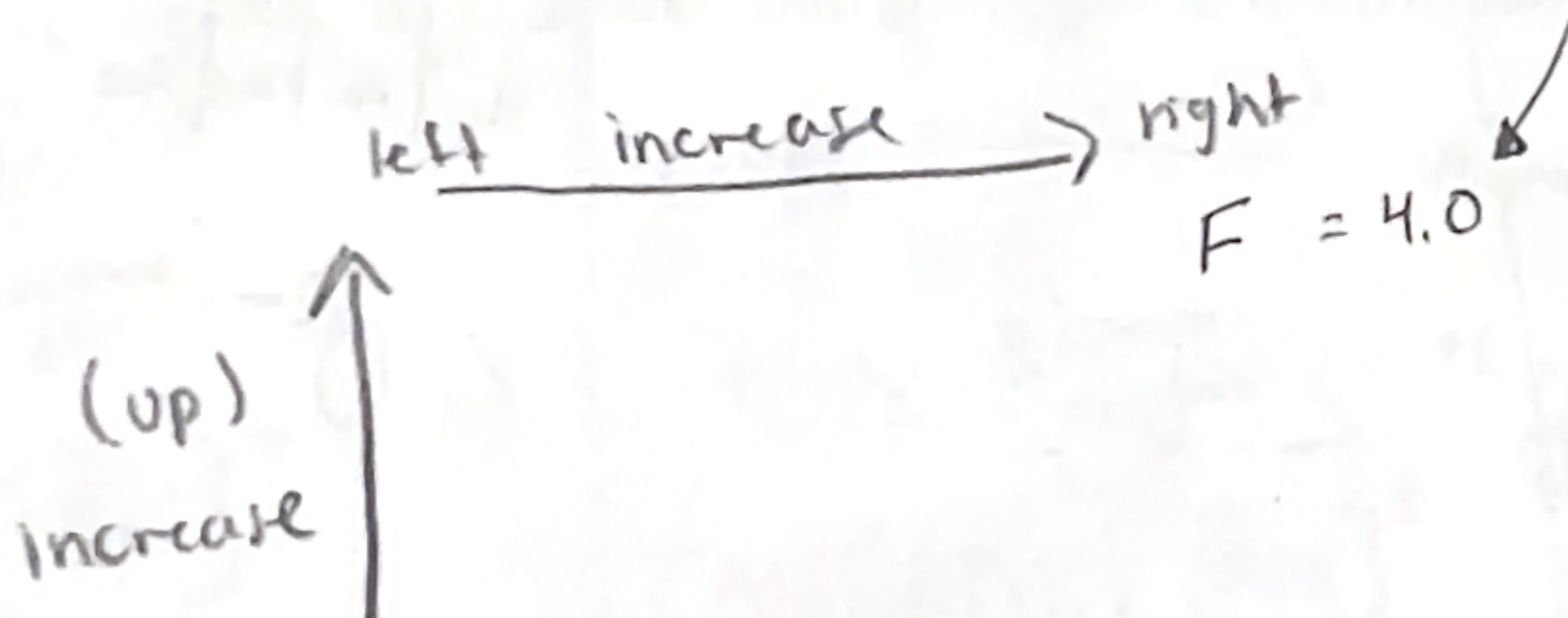
d block

s	-	$\boxed{1}$
p	-	$\boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1}$
d	-	$\boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1}$
f	-	$\boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1}$

What is the periodic trend for atomic radius and ionic radius?



What is the periodic trend for electron affinity, ionization energy, and electronegativity?

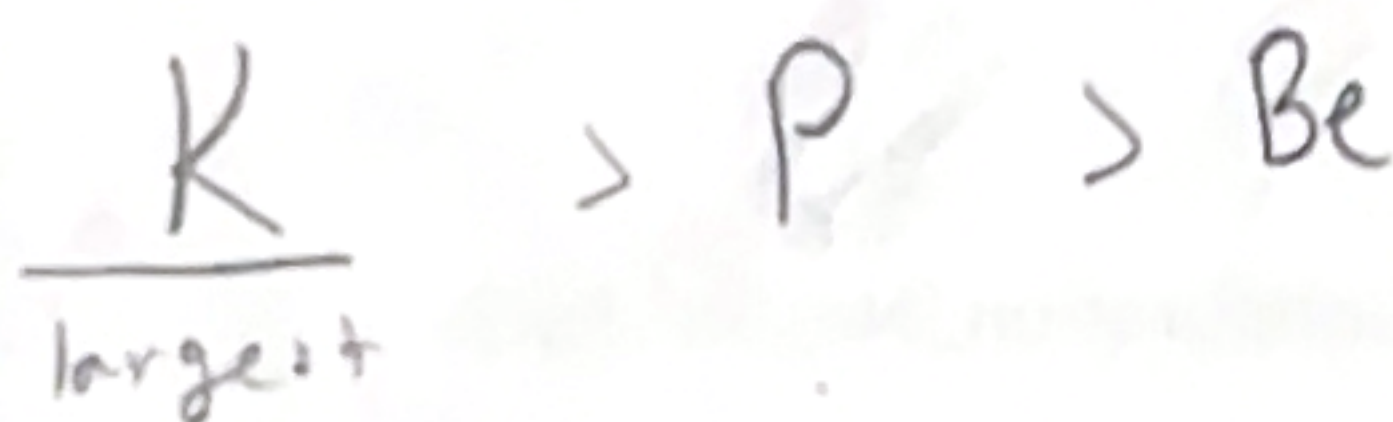


Draw a line to match the terms with the correct definition:

- | | | |
|---|-------------------|--|
| 1 | Atomic radius | Remove an electron from the ground state of gaseous atom |
| 2 | Ionization energy | Attract shared electrons |
| 3 | Electron affinity | Distance between the nucleus and a ring |
| 4 | Electronegativity | Addition of an electron to a gaseous atom (exothermic) |

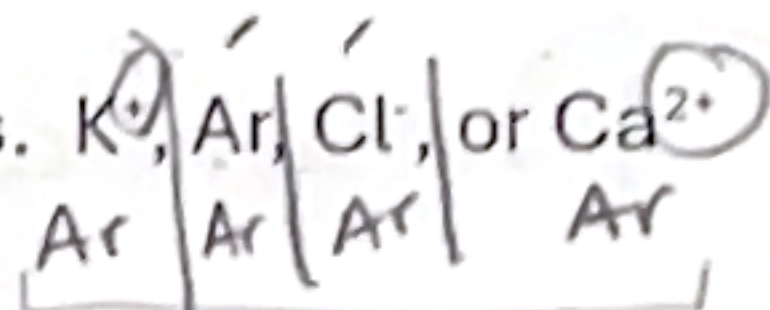
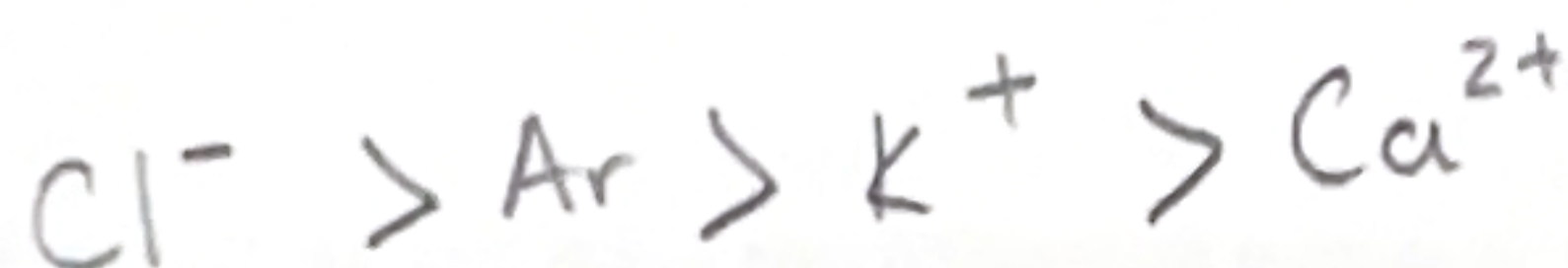
Which has the largest atomic radius? K, Be, or P?

← increasing
↓



Rank the following from largest to smaller atomic radius. K^+ , Ar, Cl^- , or Ca^{2+}

← increasing
↓



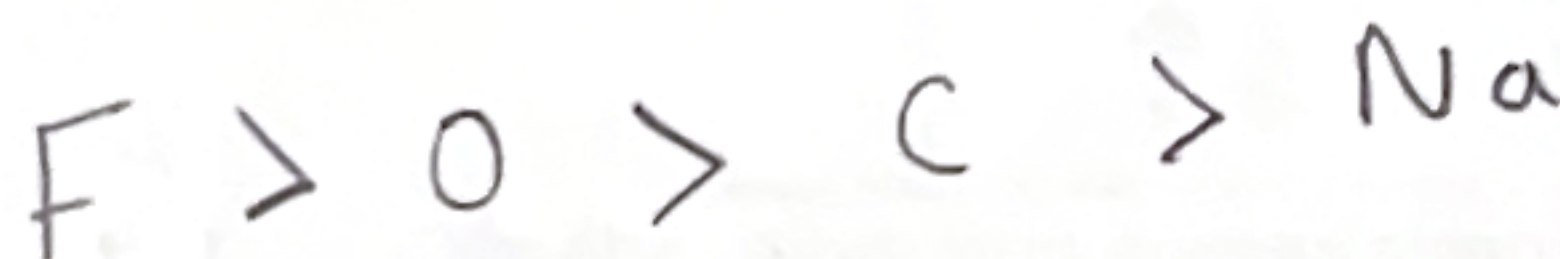
Anion.
Neutral
Cation

Biggest
↓
smallest

Arrange the elements in decreasing electron affinity: C, O, Na, F

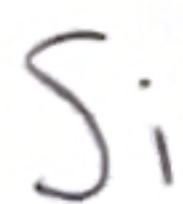
← increase
↑

largest → small



Which element has the highest ionization energy? Mg, Al, or Si?

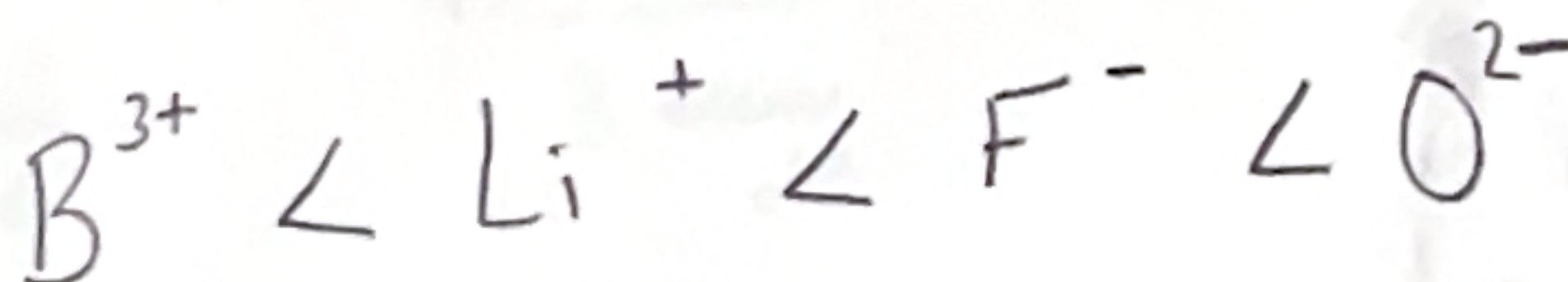
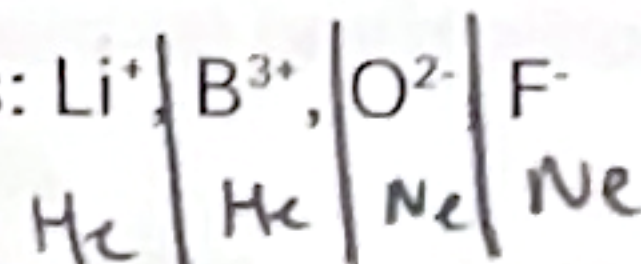
← increasing
↑



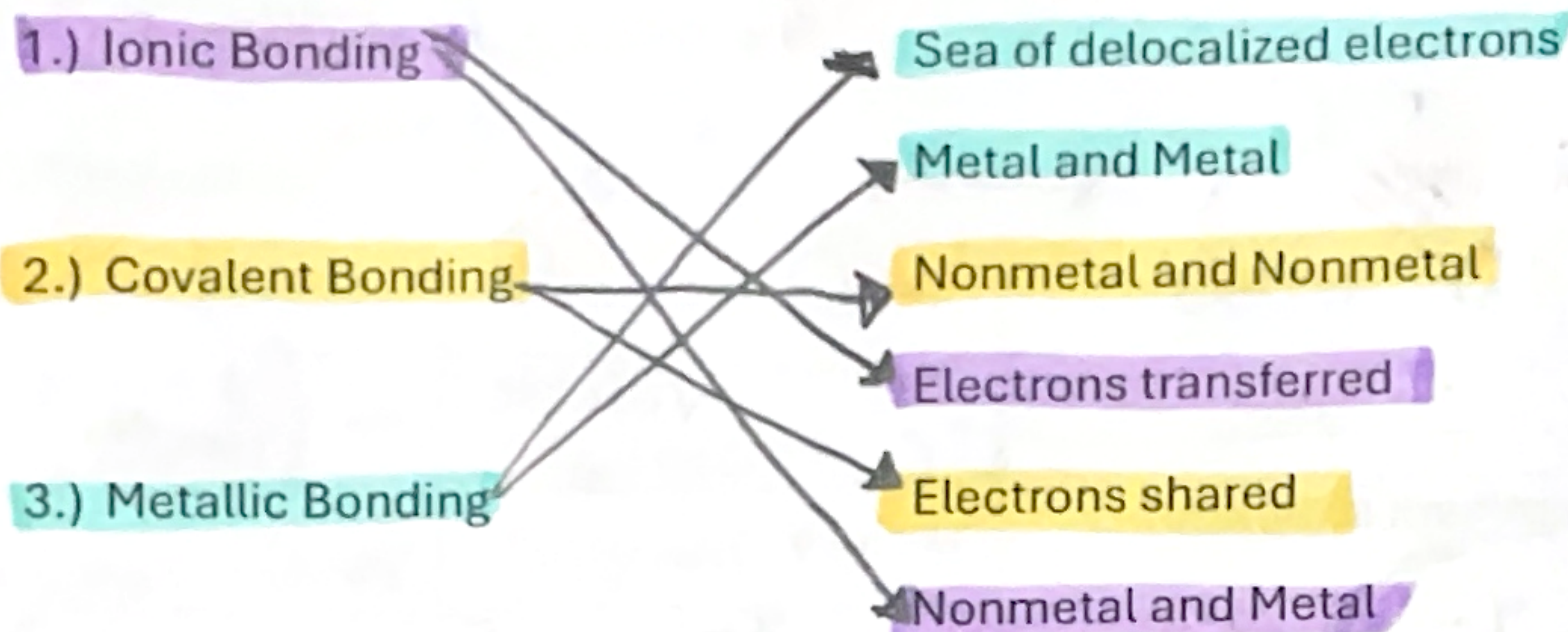
Arrange the following ions in order of increasing ionic radius: Li^+ , B^{3+} , O^{2-} , F^-

← increasing
↓

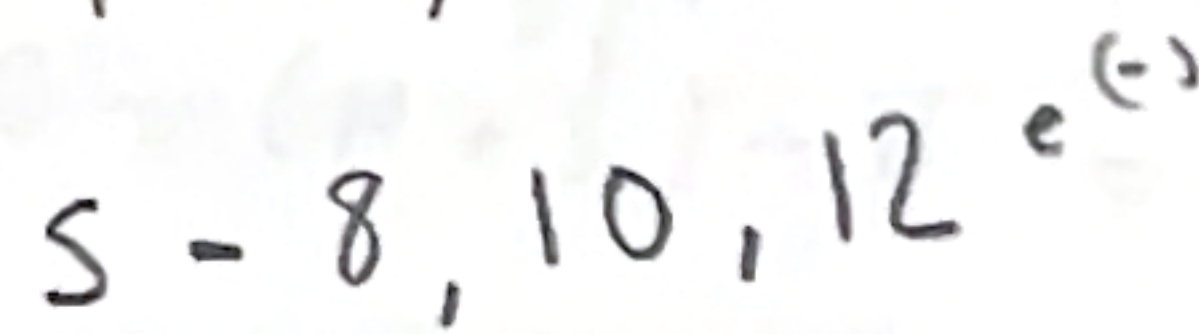
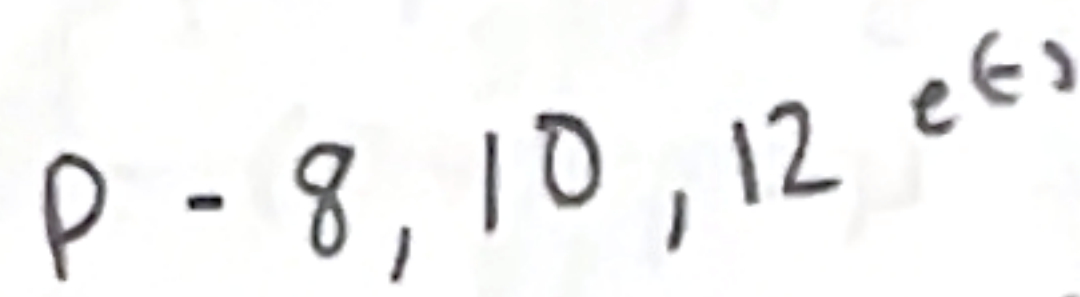
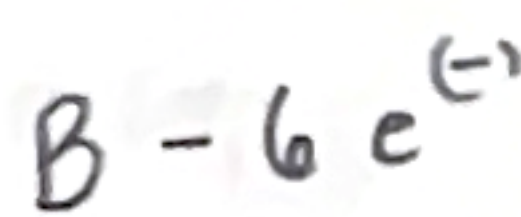
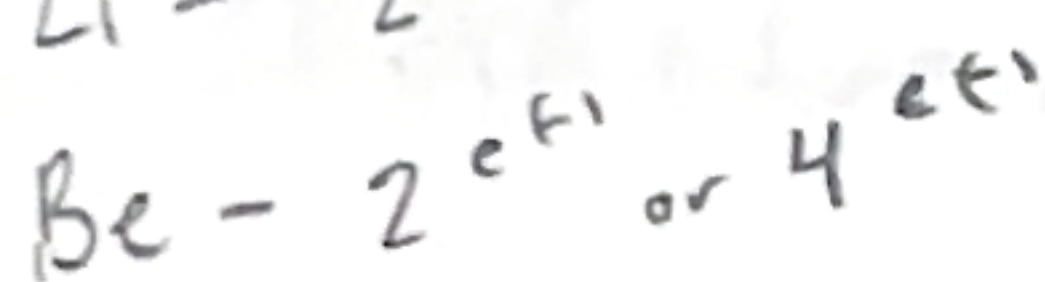
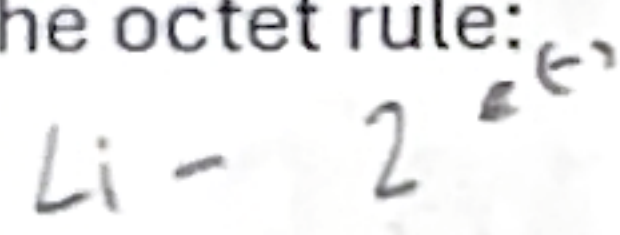
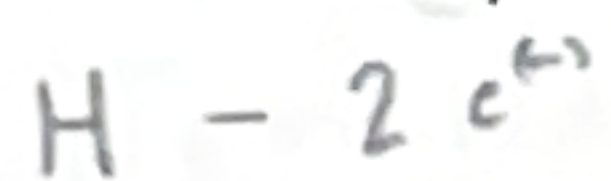
small → large



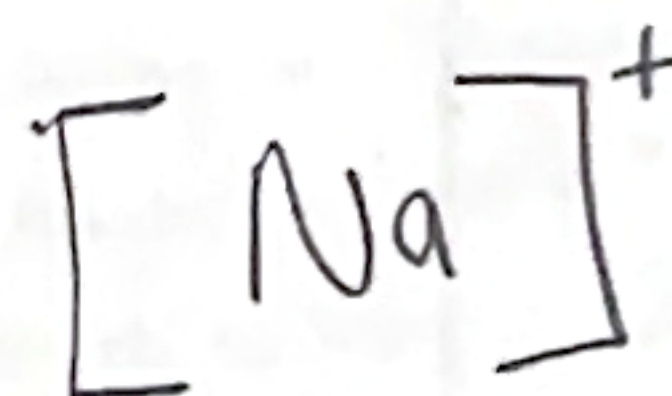
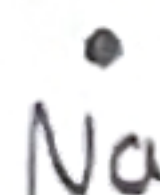
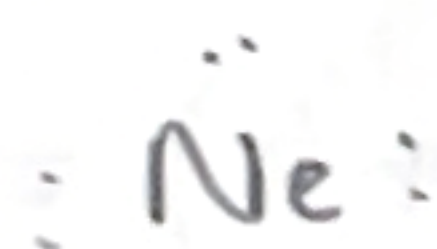
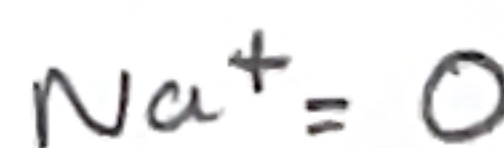
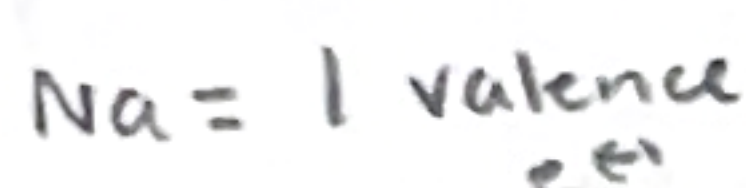
Draw a line to match the terms with the correct description:



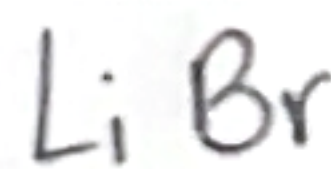
List the exceptions to the octet rule:



Draw the Lewis dot structures for following compounds: Ne, Na, Na⁺ cation
lost e^-

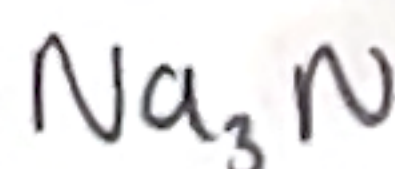
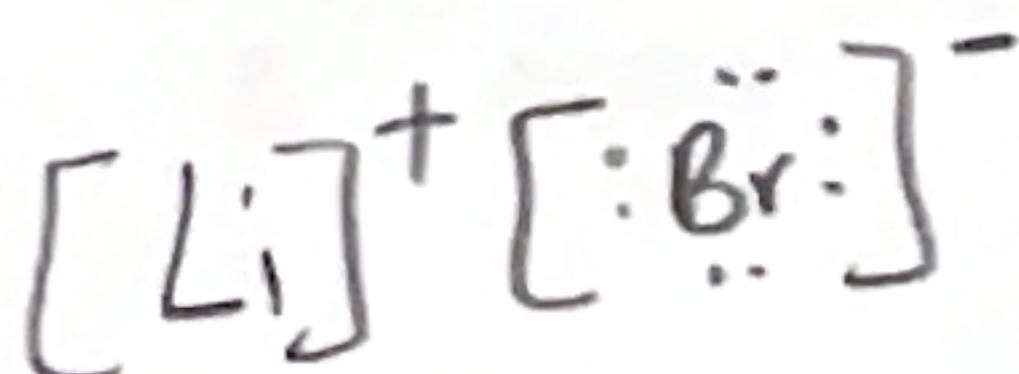
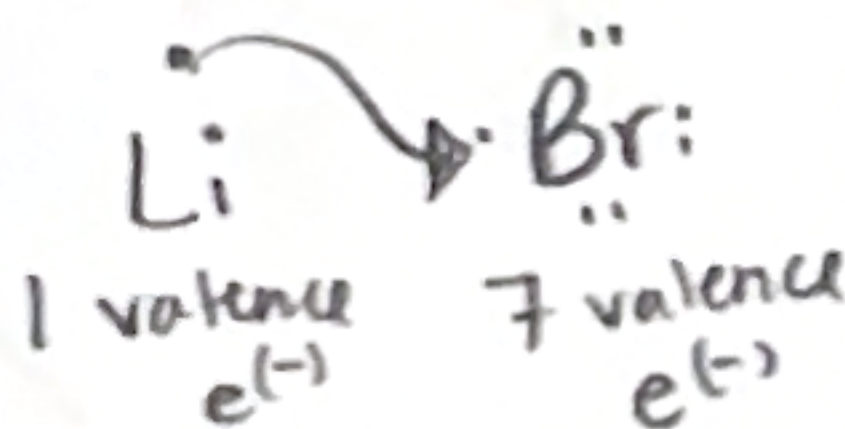


Draw the Lewis dot structure for: lithium bromide, sodium nitride, and tin (IV) oxide.



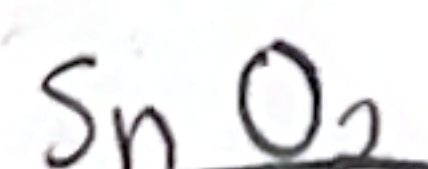
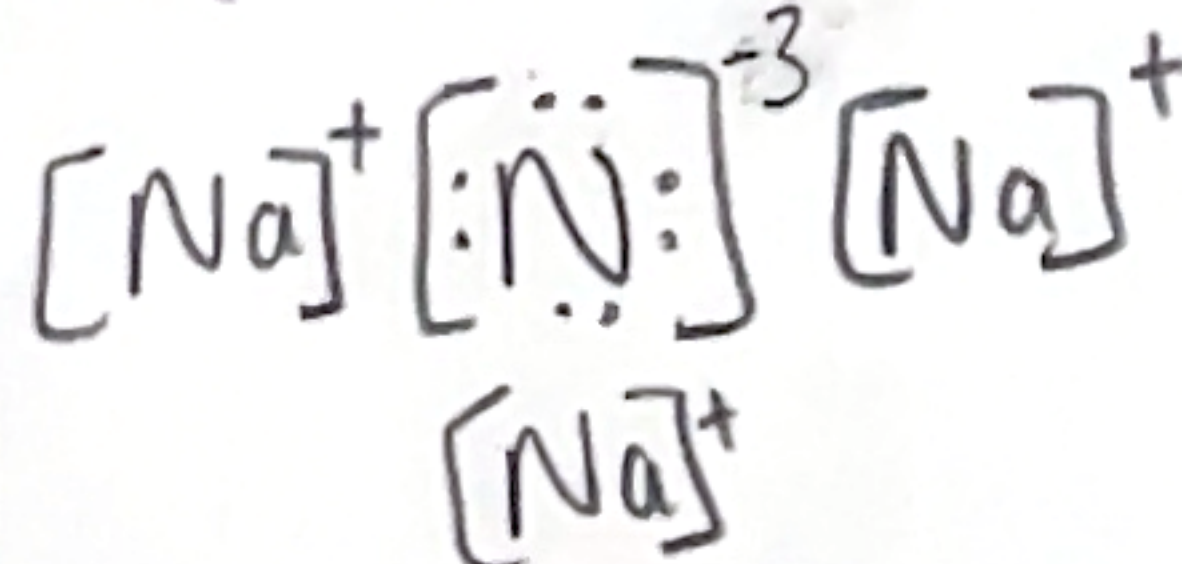
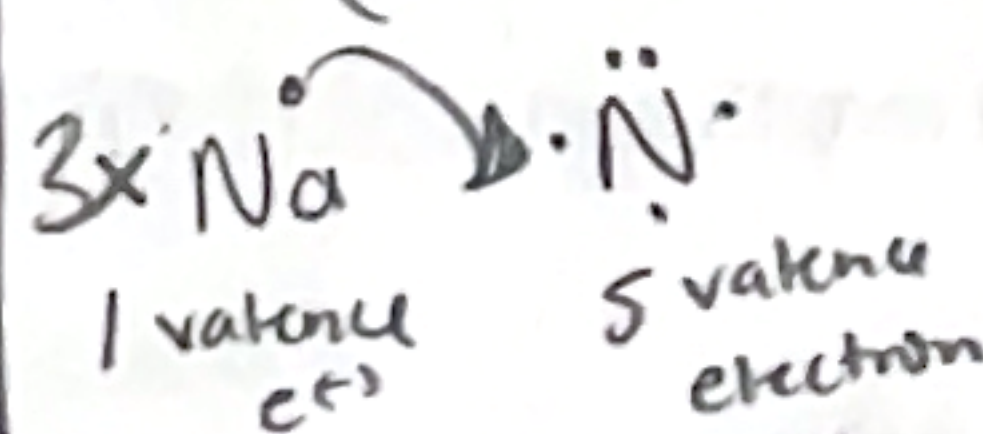
metal nonmetal

Ionic bond
(transfer of e^-)



metal nonmetal

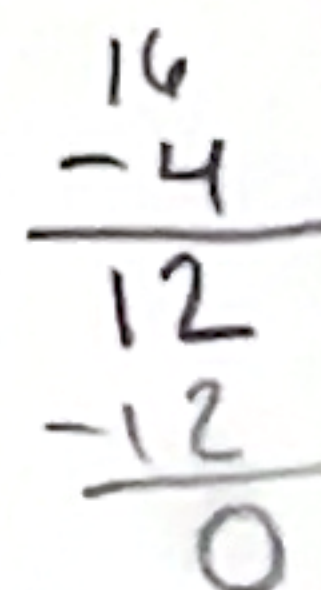
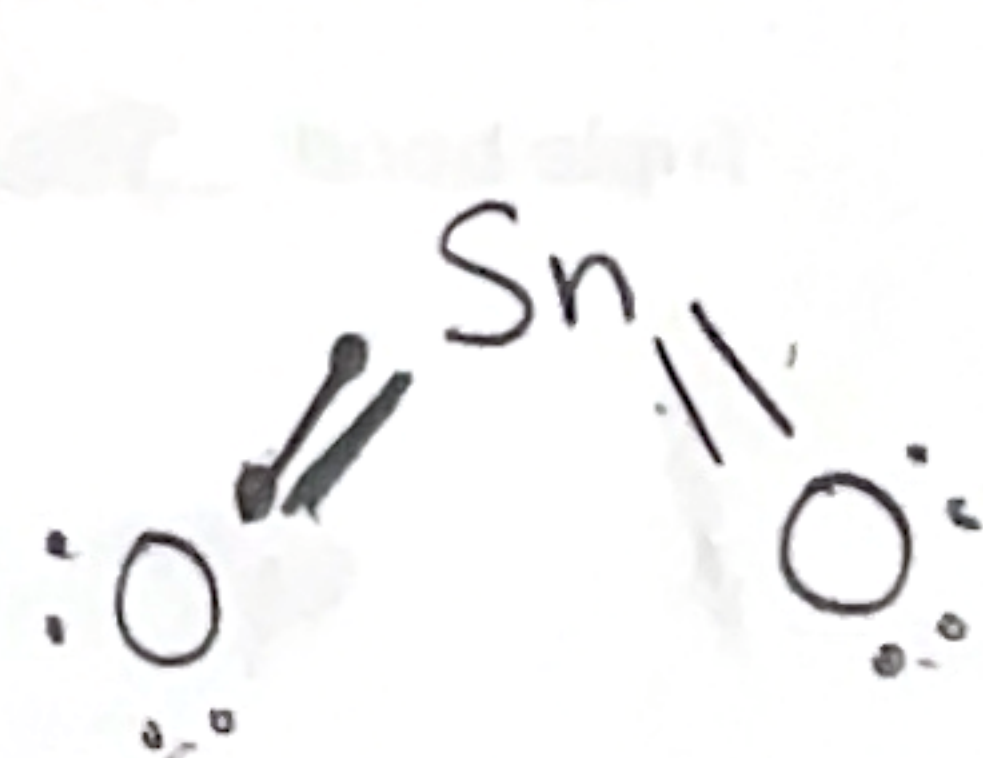
Ionic
(transfer of e^-)



non metal nonmetal

Covalent

sharing e^-



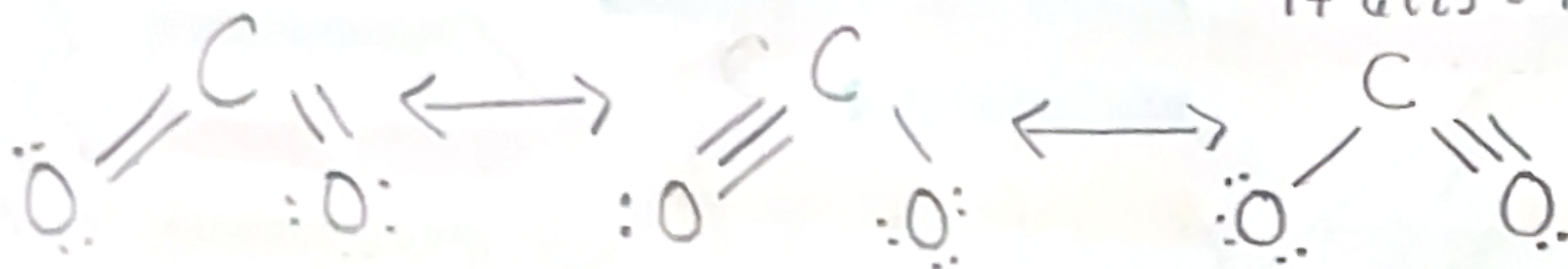
* Check that each element has full octet

H O N C
1 2 3 4

Draw the resonance structure of carbon dioxide $\rightarrow \text{CO}_2$

$$4 + 6(2) = 16 \text{ valence } e^{-}$$

$$\frac{16}{-4} = 12$$



$$\text{F.C} = \text{valence } e^{-} - (\# \text{ bonds} + \# \text{ lone pairs})$$

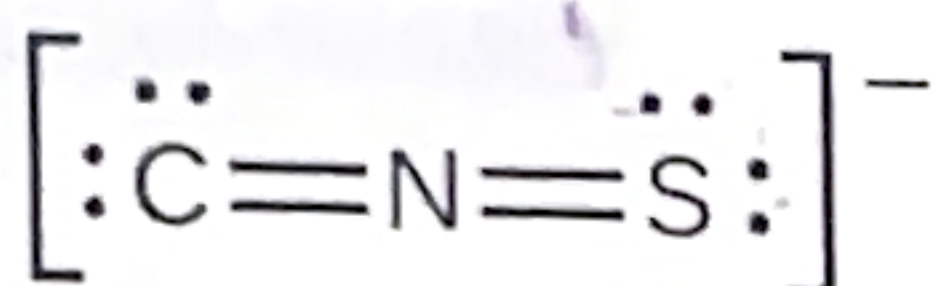
Which is the more dominant structure?



$$\text{N} = 5 - (2 + 4) = -1$$

$$\text{C} = 4 - (4 + 0) = 0$$

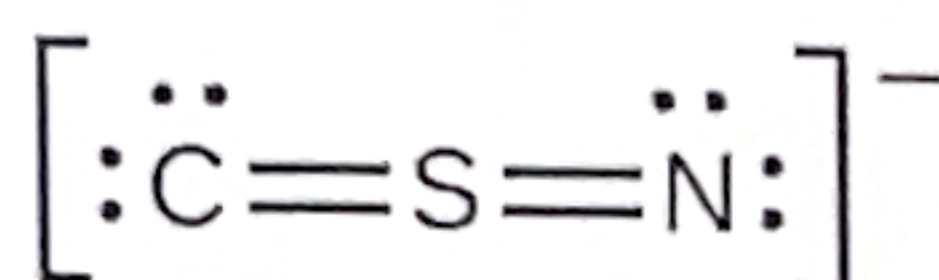
$$\text{S} = 6 - (2 + 4) = 0$$



$$\text{C} = 4 - (2 + 4) = -2$$

$$\text{N} = 5 - (4 + 0) = +1$$

$$\text{S} = 6 - (2 + 4) = 0$$

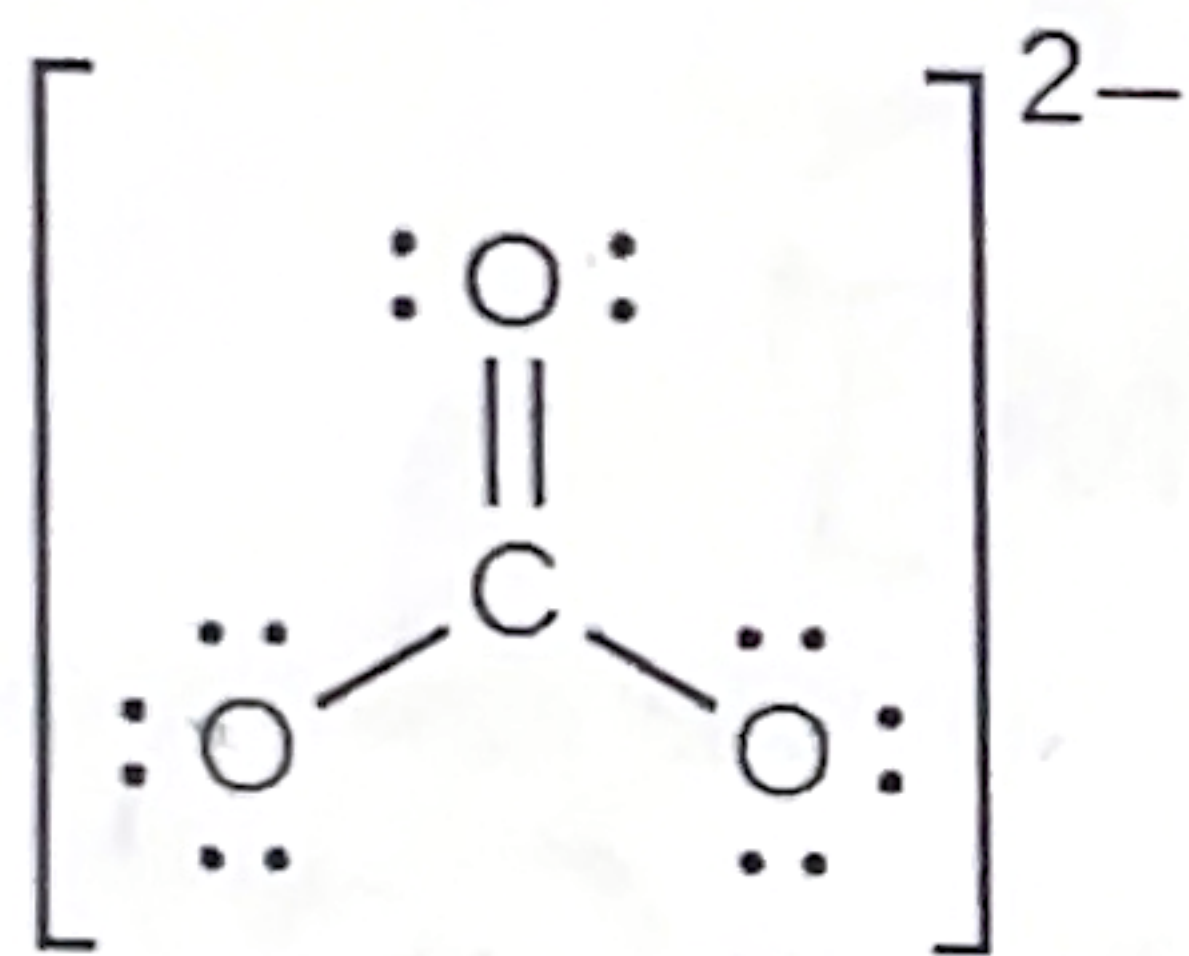


$$\text{C} = 4 - (2 + 4) = -2$$

$$\text{S} = 6 - (4 + 0) = +2$$

$$\text{N} = 5 - (2 + 4) = -1$$

The Lewis structure of carbonate anion CO_3^{2-} is shown. What is the formal charge of the single bonded oxygen atom?



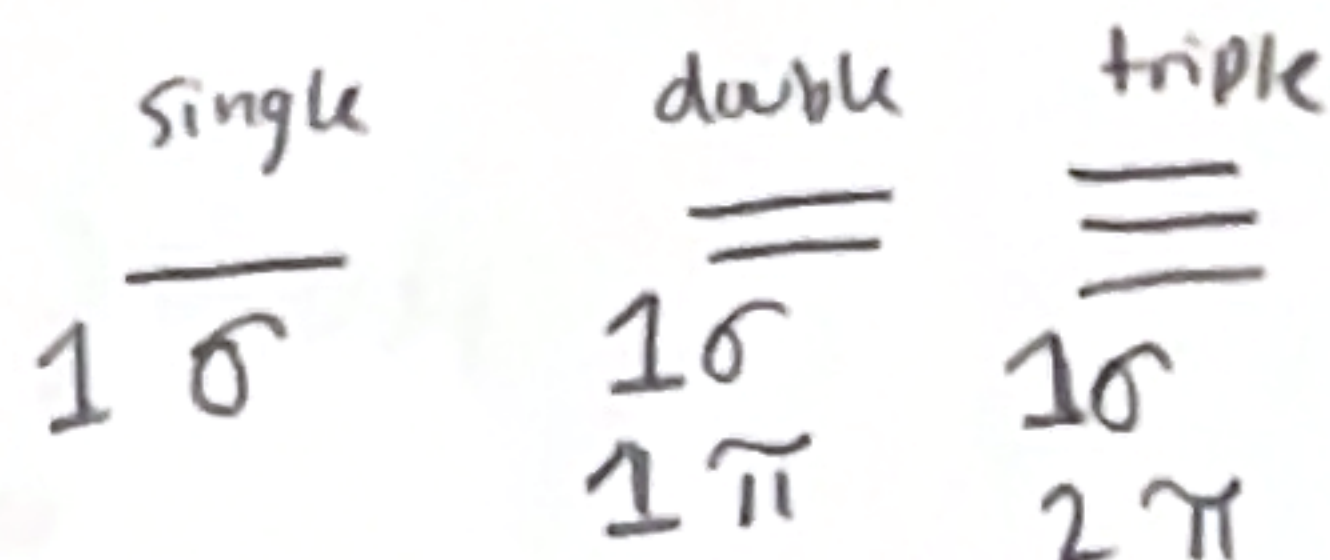
F.C

$$\text{O}_{\text{left}} = 6 - (1 + 6) = -1$$

Single bond: longest bond length and weakest

Triple bond: shortest bond length and strongest

σ - spherical shape



Sigma bonds are formed by head-to-head overlap

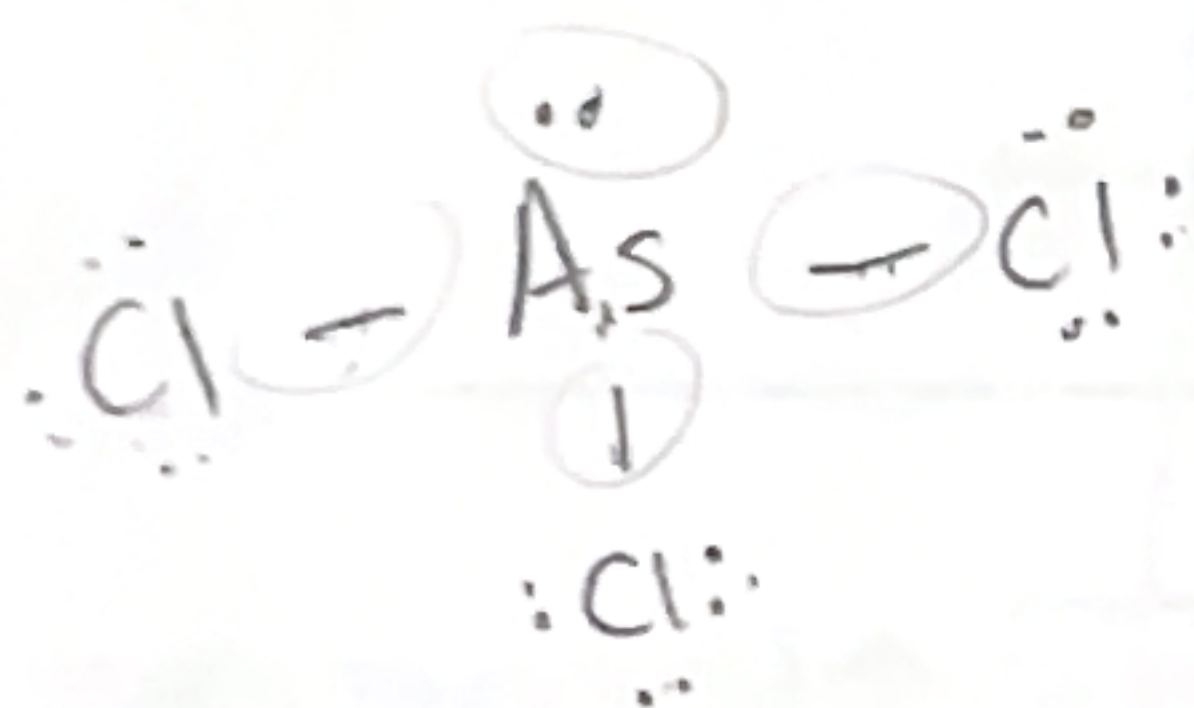
Pi bonds are formed by side-to-side overlap

π - dumbbell shape
hourglass

Fill in the chart:

e- domain geometry	Molecular geometry	Bond angle	Hybridization
Linear	Linear	180°	sp
Trigonal Planar	Trigonal Planar	120°	sp^2
Trigonal Planar	Bent	$<120^\circ$ $>180^\circ$	sp^2
Tetrahedral	Tetrahedral	109.5°	sp^3
Tetrahedral	Trigonal Pyramidal	107°	sp^3
Tetrahedral	Bent	105°	sp^3

Using the VSEPR model, give the molecular geometry, bond angles, and hybridization, and determine whether molecule is polar or nonpolar for $AsCl_3$.



$$5 + 7(3) = 26$$

$$\underline{-6}$$

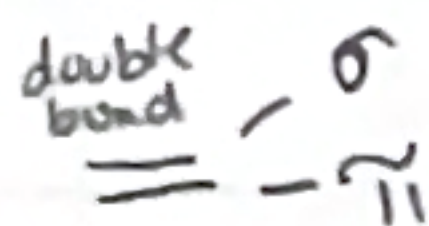
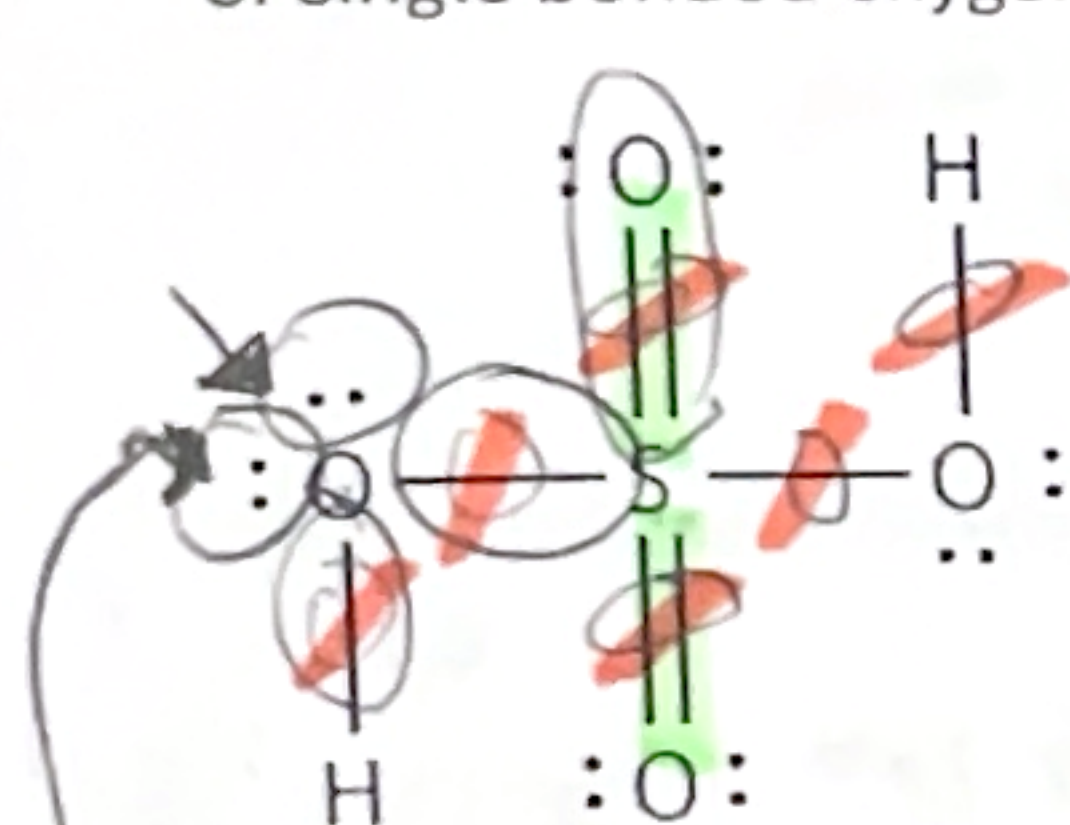
$$20$$

$$\underline{-18}$$

$$2$$

e^- domain - tetrahedral
Molecular Geometry - Trigonal Pyramidal
Bond Angle - 107°
Hybridization - sp^3

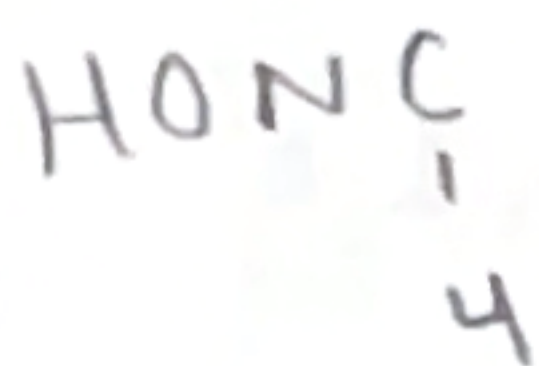
How many sigma and pi bonds are in sulfuric acid? What is the electron-domain geometry of single bonded oxygen?



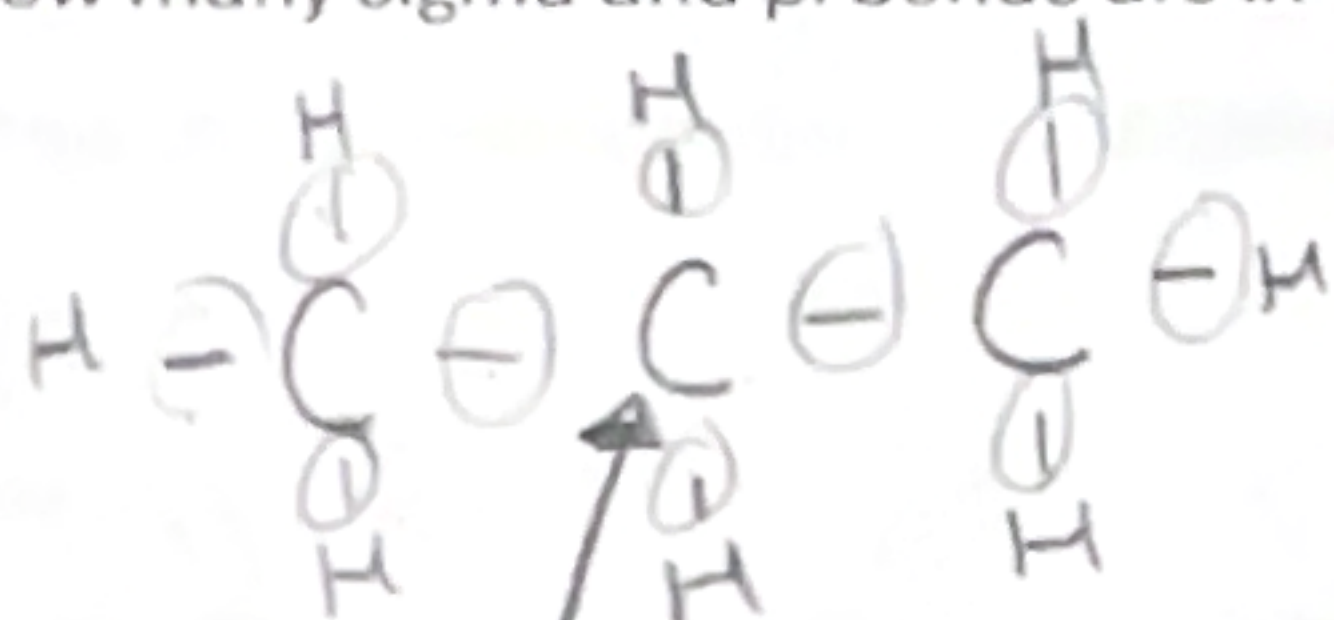
$\sigma = \frac{6}{2}$

$\pi = \frac{2}{2}$

e^- domain = tetrahedral



How many sigma and pi bonds are in C_3H_8 ? What is the hybridization of the second carbon?



e^- domain = tetrahedral
4

$$\sigma = 10$$

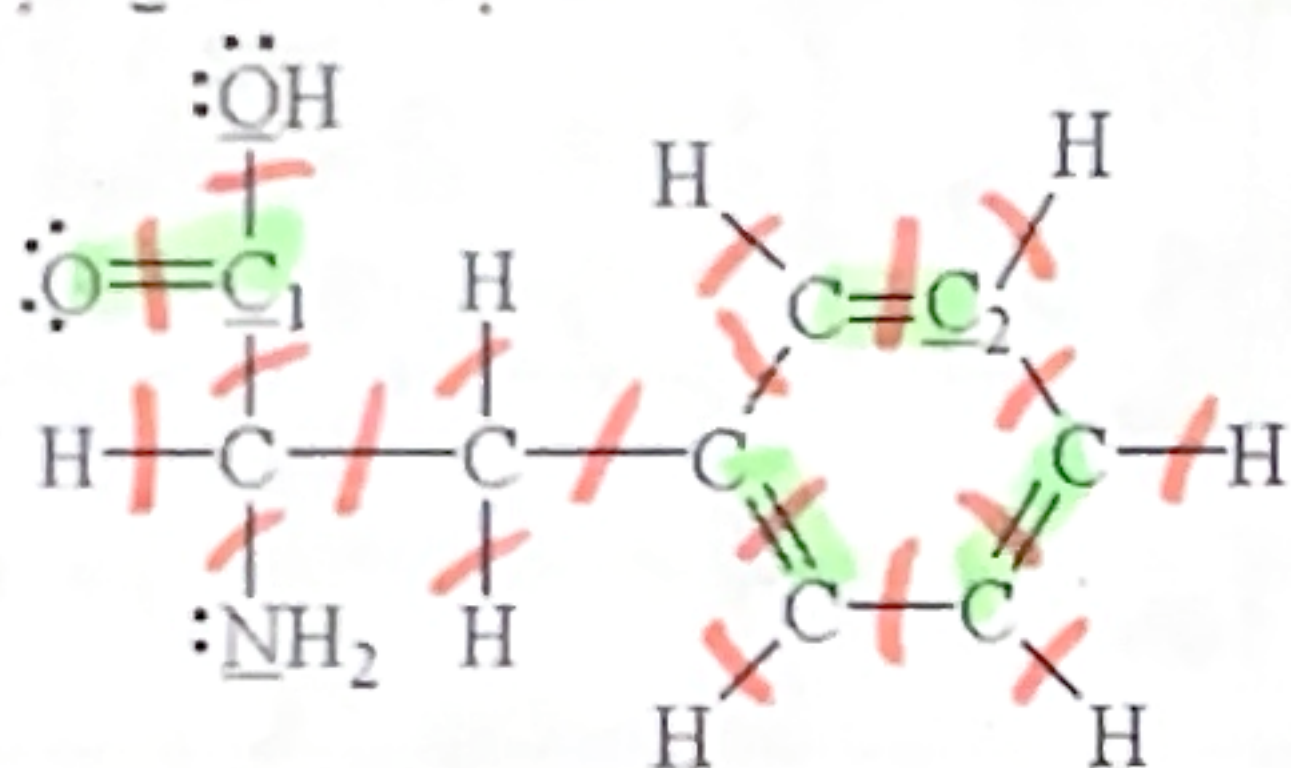
$$\pi = \text{none}$$

$$s^1 p^1$$

$$s^1 p^3 = 4$$

hybridization = sp^3

How many sigma and pi bonds are in the molecule given below?



$$\sigma = 20$$

$$\pi = 4$$

Which molecule will have the following valence molecular orbital energy level diagram?

σ^*_{2p}

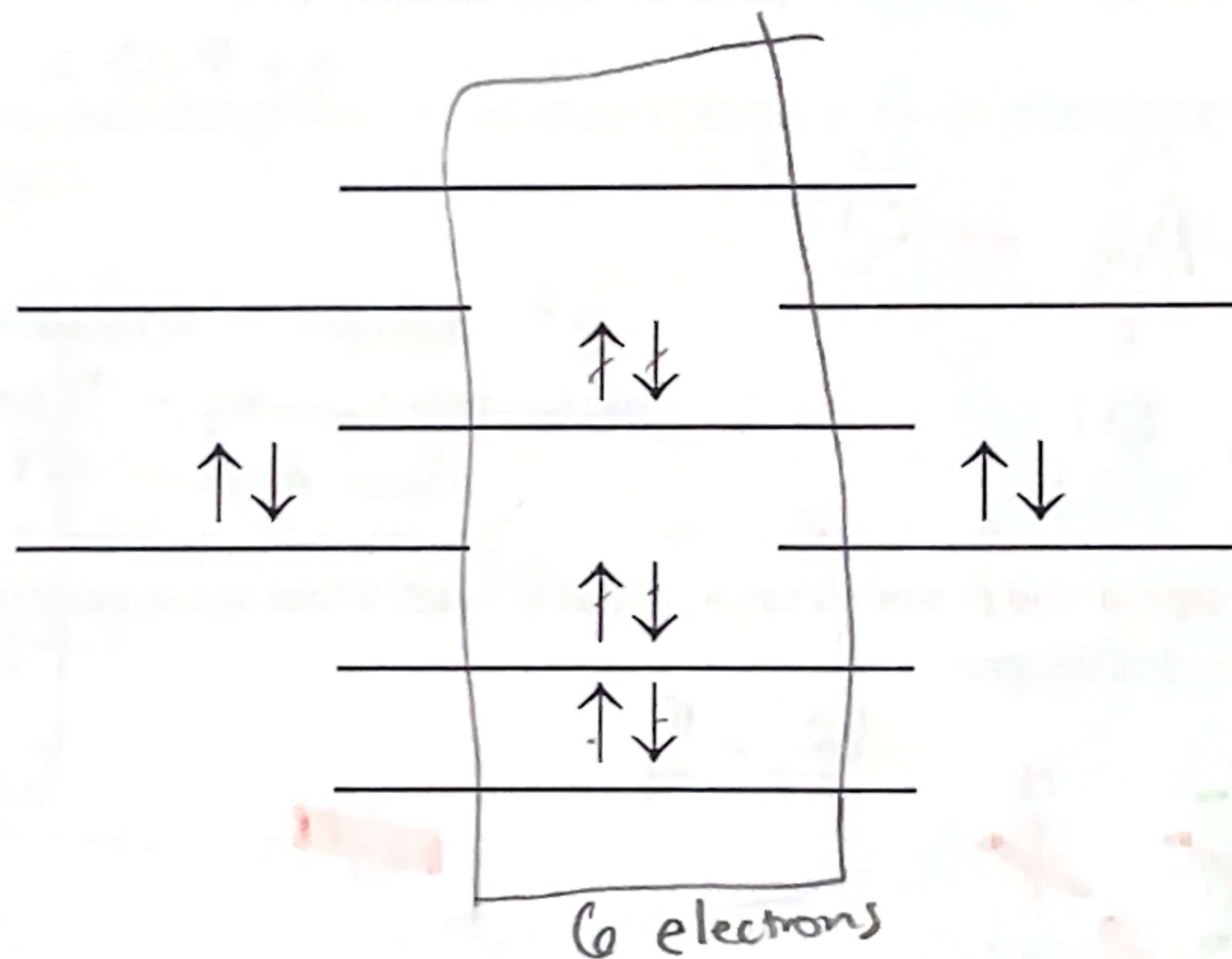
π^*_{2p}

σ_{2p}

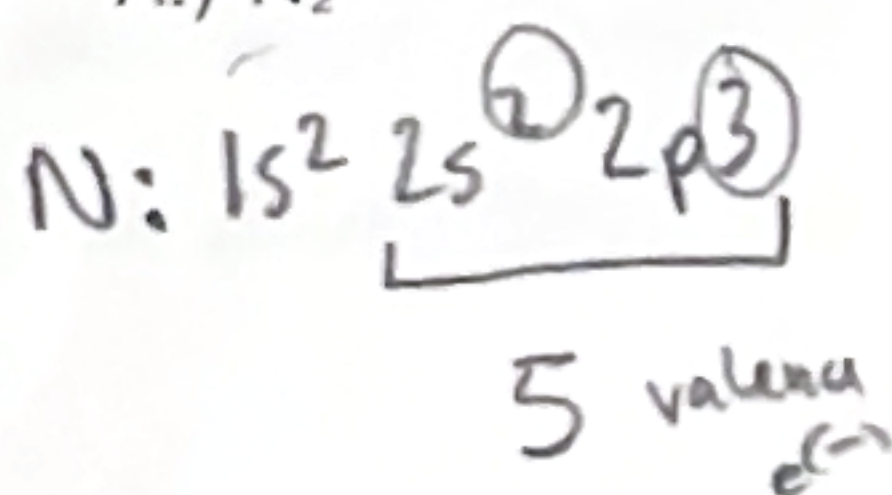
π_{2p}

σ^*_{2s}

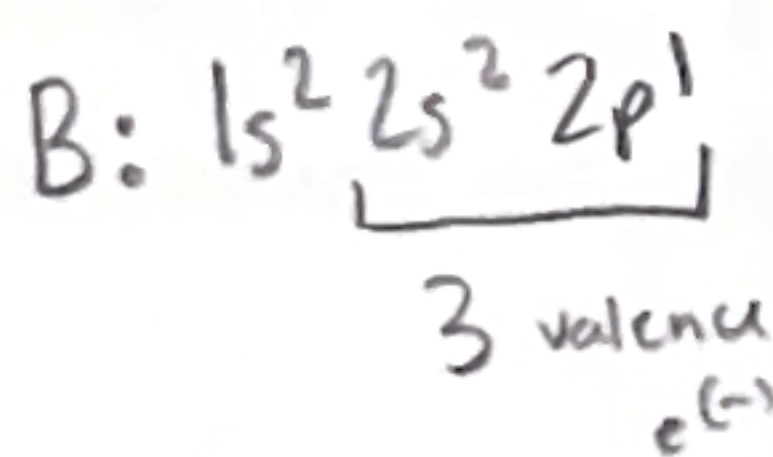
σ_{2s}



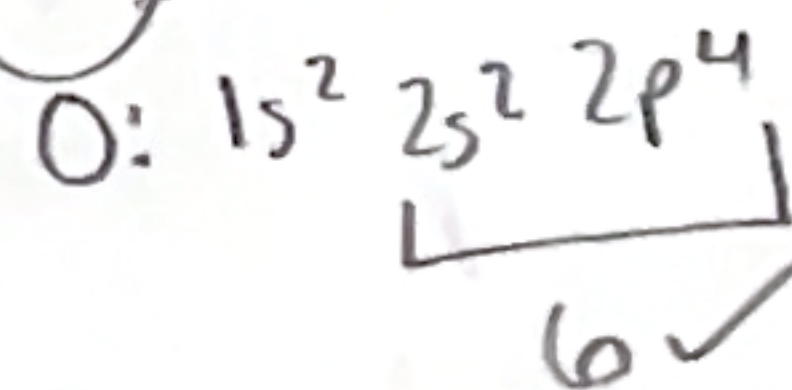
A.) N_2



B.) B_2



C.) O_2



D.) C_2

