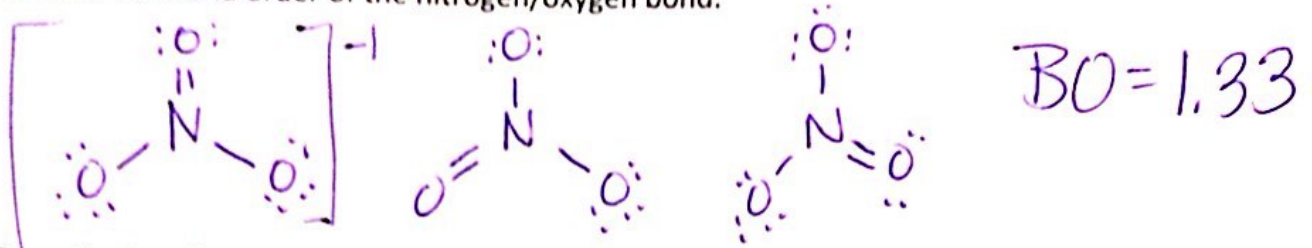
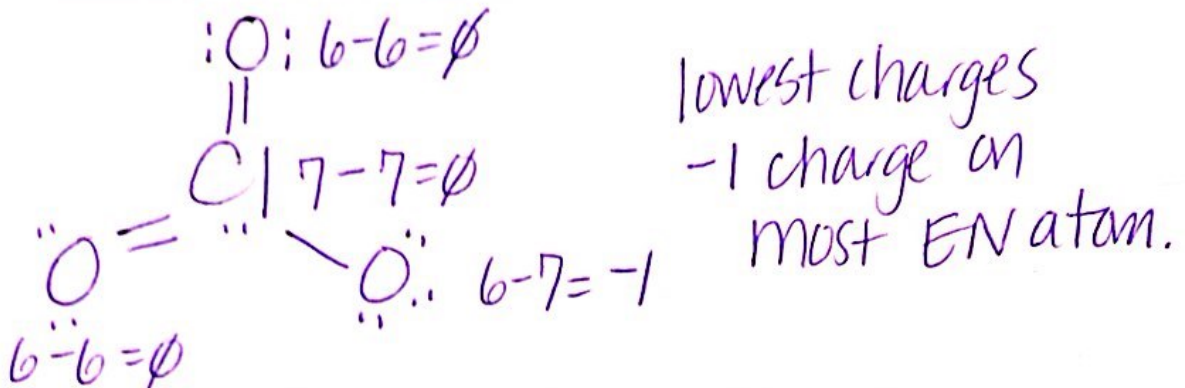


8. Draw the Lewis structure of the nitrate polyatomic anion and any resonance forms. Indicate the bond order of the nitrogen/oxygen bond.

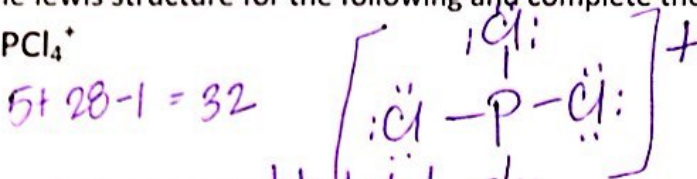


9. Draw the best Lewis structure of chlorate,  $\text{ClO}_3^-$ . Indicate the formal charges on every atom. Indicate why it is the best structure.



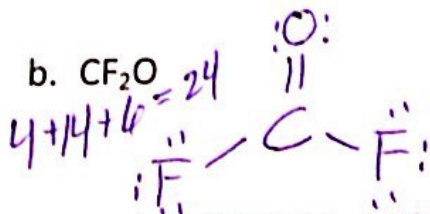
10. Draw the Lewis structure for the following and complete the following questions.

a.  $\text{PCl}_4^+$



- i. E-geometry tetrahedral
- ii. Molecular geometry tetrahedral
- iii. Hybridization of central  $sp^3$
- iv. Polarity of P/Cl bond (also show calc)?  $3.0 - 2.1 = 0.9$  polar
- v. Polarity of molecule? nonpolar (symmetrical)

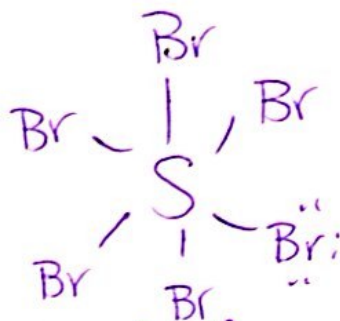
b.  $\text{CF}_2\text{O}$



- i. E-geometry trigonal planar
- ii. Molecular geometry trigonal planar
- iii. Hybridization of central  $sp^2$
- iv. Polarity of C/O bond (also show calc)?  $3.5 - 2.5 = 1.0$  polar
- v. Polarity of C/F bond (also show calc)?  $4.0 - 2.5 = 1.5$  polar
- vi. Polarity of molecule? polar

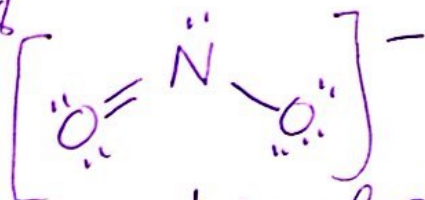
not symmetrical = 2 Fs + 1 O

c.  $\text{SBr}_6$   
 $6 + 4 \times 2 = 48$



- E-geometry *octahedral*
- Molecular geometry *octahedral*
- Hybridization of central  *$sp^3d^2$*
- Polarity of S/Br bond (also show calc)?  $2.8 - 2.5 = 0.3$  *nonpolar*
- Polarity of molecule? *nonpolar*

d.  $\text{NO}_2^-$   
 $5 + 12 + 1 = 18$



- E-geometry *trigonal planar*
- Molecular geometry *bent*
- Hybridization of central  *$sp^2$*
- Polarity of N/O bond (also show calc)?  $3.5 - 3.0 = 0.5$  *polar*
- Polarity of molecule? *Polar (not sym.)*

e.  $\text{HCCH}$   
 $1 + 8 + 1 = 10$



- E-geometry *linear*
- Molecular geometry *linear*
- Hybridization of central  *$sp$*
- Polarity of C/H bond (also show calc)?  $2.5 - 2.1 = 0.4$  *nonpolar*
- Polarity of molecule? *nonpolar*

Version 2 (green)  
 $N_2^+$   $N_2^{2+}$

11. Complete the following molecular orbital diagrams for  $N_2^-$  and  $N_2^{2-}$  and then answer the questions.

see attached

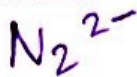
a. What is the bond order of  $N_2^-$ ? Show calc.

$$\frac{8-3}{2} = 2.5$$

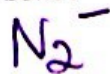
b. What is the bond order of  $N_2^{2-}$ ? Show calc.

$$\frac{8-4}{2} = 2$$

c. Which molecule has the weakest bond?



d. Which molecule has the shortest bond?



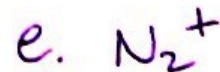
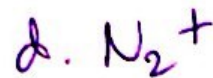
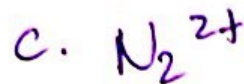
e. Are any molecules paramagnetic? If so, indicate which one.

both

(Green)  
Version 2

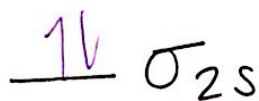
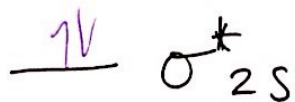
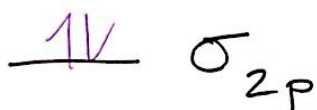
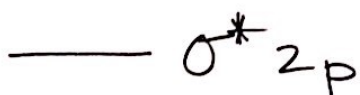
a.  $N_2^+$   $\frac{7-2}{2} = 2.5$

b.  $N_2^{2+}$   $\frac{6-2}{2} = 2.0$



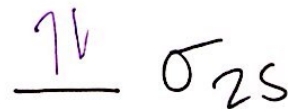
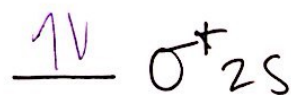
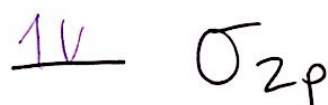
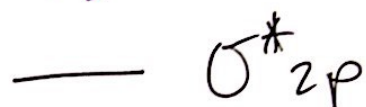
FOR MO QUESTION...

$N_2^-$  11 val e<sup>-</sup>



Version 1 w/  $N_2^- + N_2^{2-}$

$N_2^{2-}$  12 val e<sup>-</sup>

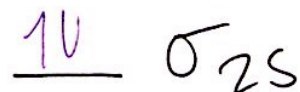
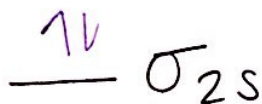
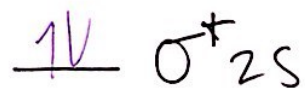
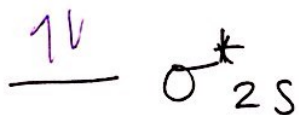
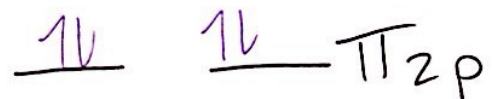
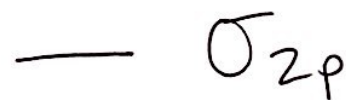
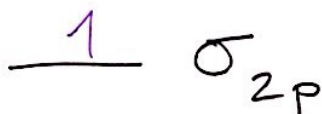
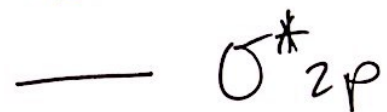
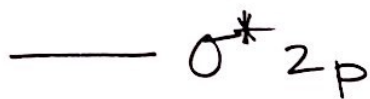


FOR MO QUESTION... Version 2 w/  $N_2^+$   $N_2^{2+}$

$N_2^+ = 9 \text{ val e}^-$

(green)

$N_2^{2+} = 8 \text{ val e}^-$



50 pts Name Key

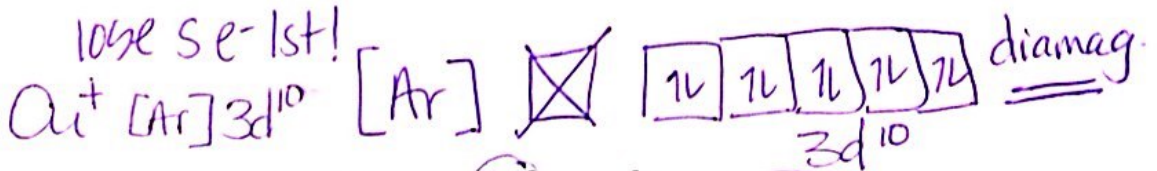
1. Give the full electronic configuration of silicon. Circle the valence electrons.



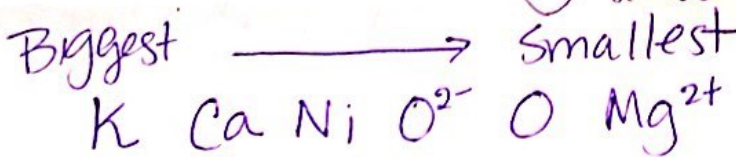
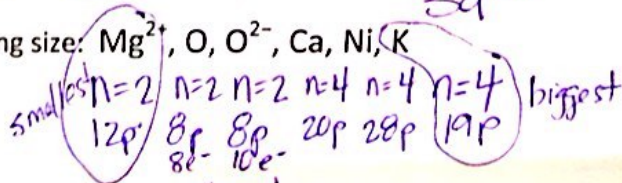
2. Give the noble configuration of copper.



3. Give the noble orbital diagram of copper (I). Label as paramagnetic or diamagnetic.



4. Put the following in order of decreasing size:  $Mg^{2+}$ , O,  $O^{2-}$ , Ca, Ni, K



5. Does Electronegativity increase or decrease from left to right? Explain.

Increases: smaller atoms have e<sup>-</sup> closer to nucleus & e<sup>-</sup> more

6. Does Electronegativity increase or decrease from top to bottom? Explain.

decreases: larger atoms have e<sup>-</sup> farther from nucleus

7. What atoms can have an expanded octet? Why?

period 3 + higher (4, 5, 6)  
 have d orbitals

(or period 3 + below on the periodic table)