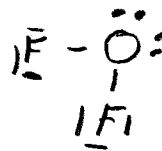


1. (3 Pts) Write a Lewis structure for OF₂.

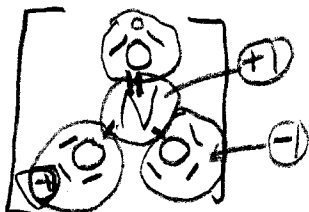
$$\begin{array}{l} 2 \times 7 = 14 \\ 1 \times 6 = 6 \\ \hline 20 \text{ v.e.} \end{array}$$



2. (2 Pts) What type of bonding is present in the compound Al(ClO₃)₃ (ionic, covalent, or both)?
 ionic between Al³⁺ and ClO₃⁻ and covalent within ClO₃⁻

3. (4 Pts) Write a Lewis structure for the nitrate ion, NO₃⁻, showing all non-zero formal charges.

$$\begin{array}{l} \text{NO}_3^- \\ 3 \times 6 = 18 \\ 1 \times 5 = 5 \\ \hline 24 \text{ v.e.} \end{array}$$



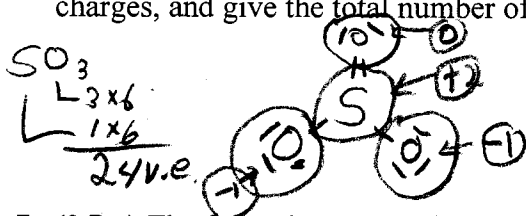
Note: N can't exceed octet.

4. (2 Pts) Which species has the greater radius, an I⁻ ion or an I atom? Briefly explain your choice of answer.

I⁻ more e⁻s than I atom

5. (2 pts) Briefly explain why the atomic radius decreases within a period when moving from left to right.

6. (4 Pts) Write a Lewis structure for SO₃ that obeys the octet rule, showing all non-zero formal charges, and give the total number of resonance structures for SO₃ that obey the octet rule.



3 resonance that obey the octet rule

7. (2 Pts) The following successive ionization energies correspond to an element in the third row of the periodic table: I₁ = 786.3 kJ/mol, I₂ = 1,580 kJ/mol, I₃ = 3,230 kJ/mol, I₄ = 4,360 kJ/mol, I₅ = 16,000, and I₆ = 20,000 kJ/mol. Based on this pattern of ionization energies, identify the element.

Big jump between I₄ and I₅
 so I₅ must be a core e⁻.

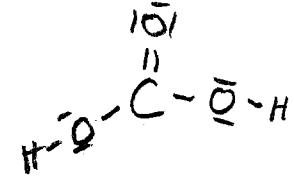
Si

8. (2 Pts) Why is the Mg²⁺ ion smaller than F⁻, even though they are isoelectronic (have the same electron configuration)?

Mg²⁺ 12 protons 10 e⁻
 F⁻ 9 protons 10 e⁻

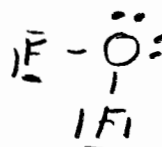
9. (4 Pts) Carbonic acid, H₂CO₃, is a weak acid that contributes to the taste and produces the carbon dioxide bubbles in all carbonated beverages. Write a Lewis structure for H₂CO₃,

$$\begin{array}{l} \text{H}_2\text{CO}_3 \\ 3 \times 6 = 18 \\ 1 \times 4 = 4 \\ 2 \times 1 = 2 \\ \hline 24 \text{ v.e.} \end{array}$$



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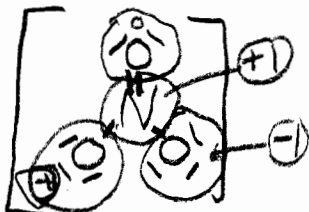
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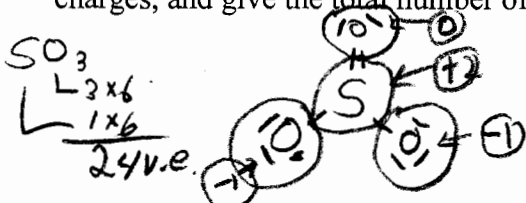
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more protons are being added to the nucleus, while electrons are being added to shell.

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