

## 1.7: Answers to Practice Questions Chapter 1

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### Answers to Practice Questions Chapter 1

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#### 1.1 Number of valence electrons:

B: 3 valence electrons

N: 5 valence electrons

O: 6 valence electrons

Cl: 7 valence electrons

Mg: 2 valence electrons

#### 1.2

- Identify the following bond is “polar” or “non-polar”?

C-C: non-polar C-H : non-polar (very close electronegativity for C and H)

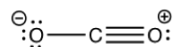
B-F : polar. O-O : non-polar C=N : polar

- Rank the following bonds in the order of increasing bonding polarity: C—S, C—O, C—F (referring to the trend of EN, no need to use the exact EN values).

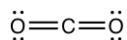
bonding polarity: C—S < C—O < C—F

#### 1.3 Draw the Lewis structure of N<sub>2</sub> molecule: :N≡N:

#### 1.4 Why following structure is not the best way to show the Lewis structure of CO<sub>2</sub>?

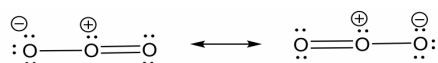


Because the formal charges are not minimized in above structure. The formal charge in the best Lewis structure of CO<sub>2</sub> are all zero, and the best Lewis structure of CO<sub>2</sub> is shown here:

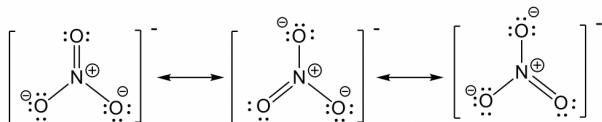


#### 1.5 Draw all the equivalent resonance structures for following species. Include any non-zero formal charges in the structures.

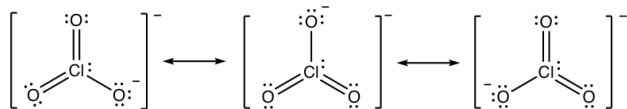
- O<sub>3</sub> molecule



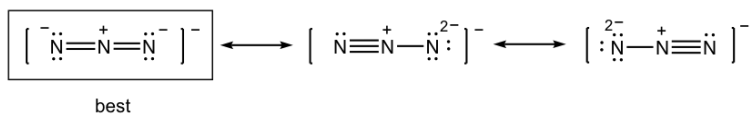
- nitrate anion NO<sub>3</sub><sup>−</sup>



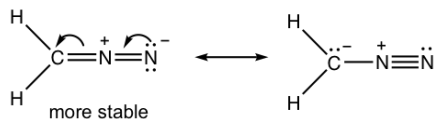
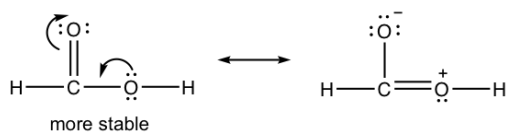
- chlorate anion ClO<sub>3</sub><sup>−</sup>



#### 1.6 Draw all the resonance structures for azide anion, N<sub>3</sub><sup>−</sup>, and indicate the most stable one.

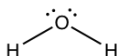


1.7 Draw new resonance structure and compare the relative stability, show arrows in the original structure.



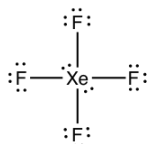
1.8

- What is the hybridization of oxygen atom in H<sub>2</sub>O molecule?



four electron groups around central oxygen (2 BP, 2 LP),  
the oxygen is in  $sp^3$  hybridization

- What is the hybridization of xenon atom in XeF<sub>4</sub> molecule, and what is the shape of the whole molecule?



six electron groups around central oxygen (4 BP, 2 LP),  
the oxygen is in  $sp^3d^2$  hybridization

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