

1.7: 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)

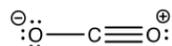
B-F : polar. O-O : non-polar C=N : polar

- 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).

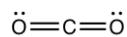
bonding polarity: C—S < C—O < C—F

1.3 Draw the Lewis structure of N₂ molecule: $\text{:N}\equiv\text{N:}$

1.4 Why following structure is not the best way to show the Lewis structure of CO₂?

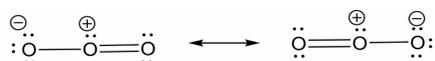


Because the formal charges are not minimized in above structure. The formal charge in the best Lewis structure of CO₂ are all zero, and the best Lewis structure of CO₂ is shown here:

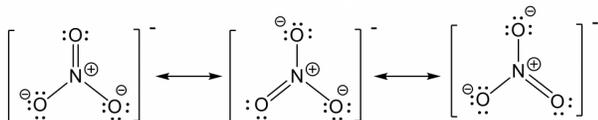


1.5 Draw all the equivalent resonance structures for following species. Include any non-zero formal charges in the structures.

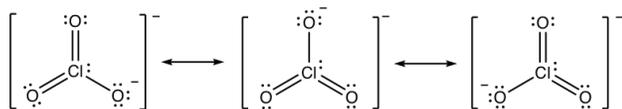
- O₃ molecule



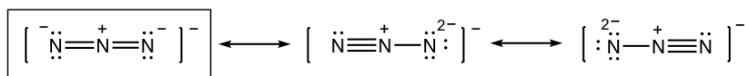
- nitrate anion NO₃⁻



- chlorate anion ClO₃⁻

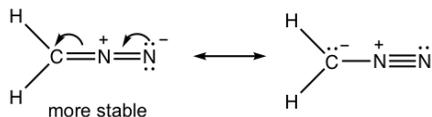
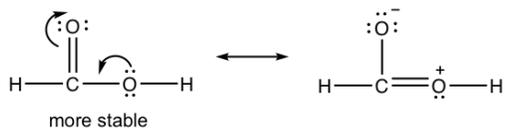


1.6 Draw all the resonance structures for azide anion, N₃⁻, and indicate the most stable one.



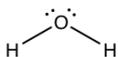
best

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



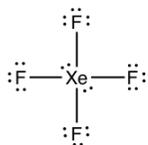
1.8

- What is the hybridization of oxygen atom in H₂O molecule?



four electron groups around central oxygen (2 BP, 2 LP),
the oxygen is in sp³ hybridization

- What is the hybridization of xenon atom in XeF₄ molecule, and what is the shape of the whole molecule?



six electron groups around central oxygen (4 BP, 2 LP),
the oxygen is in sp³d² hybridization

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