

9 • Bonding & Molecular Structure

FRQ PRACTICE

1982 D

- (a) Draw the Lewis electron-dot structures for CO_3^{2-} , CO_2 , and CO , including resonance structures where appropriate.
- (b) Which of the three species has the shortest C-O bond length? Explain the reason for your answer.
- (c) Predict the molecular shapes for the three species. Explain how you arrived at your predictions.

1990 D

Use simple structure and bonding models to account for each of the following.

- (a) The bond length between the two carbon atoms is shorter in C_2H_4 than in C_2H_6 .
- (b) The H-N-H bond angle is 107.5° , in NH_3 .
- (c) The bond lengths in SO_3 are all identical and are shorter than a sulfur-oxygen single bond.
- (d) The I_3^- ion is linear.

1992 D



Nitrogen is the central atom in each of the species given above.

- (a) Draw the Lewis electron-dot structure for each of the three species.
- (b) List the species in order of increasing bond angle. Justify your answer.
- (c) Select one of the species and give the hybridization of the nitrogen atom in it.
- (d) Identify the only one of the species that dimerizes and explain what causes it to do so.

1996 D

Explain each of the following observations in terms of the electronic structure and/or bonding of the compounds involved.

- (b) Molecules of AsF_3 are polar, whereas molecules of AsF_5 are nonpolar.
- (c) The N-O bonds in the NO_2^- ion are equal in length, whereas they are unequal in HNO_2 .
- (d) For sulfur, the fluorides SF_2 , SF_4 , and SF_6 are known to exist, whereas for oxygen only OF_2 is known to exist.