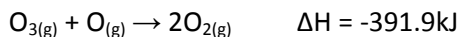


1. Assume that the energy-level diagram given at right applies to the ions CN^+ and CN^- .

- Which ion has the stronger carbon to nitrogen bond?
- Is either of the ions paramagnetic? Explain.

2. Hydrogen forms ionic compounds with certain metals in which it is present as the hydride ion, H^- . Determine the electron affinity of H through a Born-Haber calculation, using a lattice energy of -812kJ/mol NaH and the following data: Enthalpy of sublimation of $\text{Na} = +107\text{kJ/mol}$; 1st ionization energy of $\text{Na} = +496\text{kJ/mol}$; the bond dissociation energy of hydrogen gas is 436kJ/mol ; enthalpy of formation of $\text{NaH}_{(s)} = -56.27\text{kJ/mol}$

3. In the stratosphere, the reaction of ozone (O_3) and atomic oxygen helps to maintain the heat balance on Earth:



Given that the bond energy of $\text{O}_2 = +498\text{kJ/mol}$, estimate the bond energy in the O_3 molecule.

4. Write the most reasonable Lewis structure for H_2SiO_3 .

What is the formal charge on the silicon?

What is the molecular geometry with respect to the silicon?

What is the hybridization on the silicon atom?

How many sigma and pi bonds exist in the molecule (VSEPR)?

5. Does the predicted shape of the Cl-S-Cl bond angle in sulfur dichloride agree with the experimental angle of 103° ? Explain.

6. In both of the ions, ICl_2^+ and ICl_2^- , an iodine atom is bonded to two Cl atoms. Do you expect the same hybridization scheme for the central I atom in each case? Explain.

