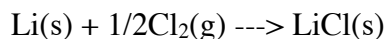


1. (8 points) For each of the following molecules, give the molecular shape and state whether it is polar or non polar.

Molecule	molecular shape	polar or non polar
water	bent	polar
carbon dioxide	linear	non polar
sulfur dioxide	bent	polar
ozone (O ₃)	bent	polar, one of the oxygens has a formal charge of -1 and another has a formal charge of +1

2. (5 points) Calculate the net energy change, ΔE , (in kJ per mole) that occurs when lithium iodide forms from the elements



Enthalpy of sublimation for Li	159 kJ/mole
Bond dissociation energy for Cl ₂	243 kJ/mole
Lattice energy for LiCl	853 kJ/mole
Electron affinity for Cl	-349 kJ/mole
First ionization energy for Li	520 kJ/mole

Show your work!

$$\Delta E = -401.5\text{kJ}$$

3. (5 points) Calculate the lattice energy for MgO:

Mg (s), energy for sublimation = +148 kJ/mol

1st ionization energy for Mg = +738 kJ/mol

2nd ionization energy for Mg = +1450 kJ/mol

Bond dissociation energy for O₂ = +499 kJ/mol

1st electron gain electron affinity for O = -141 kJ/mol

2nd electron gain electron affinity for O⁻ = +844 (it requires energy to stuff an electron into a negative environment of O⁻)

for MgO (s), energy of the reaction (ΔE) = -602 kJ/mol

for MgO (s), lattice energy = ?

Show your work!

$$\Delta E = -3890.5\text{kJ}$$

4. (2 points) How many pi bonds are present in acetylene (C₂H₂)? 2