CHEM 1100 Quiz 13 Summer 2014 Dr. Stone Name_____

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 | 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

$Li(s) + 1/2Cl_2(g) \rightarrow LiCl(s)$

| | |
|---|---|
| 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!

ΔE = -401.5kJ

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 $O_2$ = +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!

ΔE = -3890.5kJ

4. (2 points) How many pi bonds are present in acetylene ($C_2H_2$)? 2