Forming an Ionic Compound, Lewis Structures, Resonance Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. The carbonate ion, CO32-, is formed when carbon dioxide, CO2 reacts with slightly basic cold water.

a. Draw the Lewis dot structure for the carbonate ion and for carbon dioxide. Include any resonance structures.

b. Describe the relative bond energy of the three C-O bonds in the carbonate ion.

c. How does the bond energy of the carbon-oxygen bonds in carbon dioxide compare to the bond energy of the bonds in carbonate?

2. a. Use Needs, Available, Shared (show work) to draw Lewis structures for sulfur trioxide, the sulfite ion,

and sulfur dioxide. Include any resonance structures.

b. Compare the relative lengths of the sulfur-oxygen bonds in the three molecules.

3. Use the energies below to calculate the lattice energy of calcium chloride. In the table below, write an equation for each reaction step in the process and give the associated energy change. **Give the appropriate sign for the energy change.**

Bond energy for Cl2(g) = 242.6 kJ/mole

First electron affinity of Cl(g) = -348.7 kJ/mole

First ionization energy of Ca(g) = 590 kJ/mole

Second ionization energy of Ca(g) = 1145 kJ/mole

Enthalpy of sublimation of Ca(s) = 178.0 kJ/mole

Enthalpy of reaction for the formation of calcium chloride = -795.0 kJ/mole

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| **Reaction** | **Energy Change (kJ)** |
| 1. |  |
| 2. |  |
| 3. |  |
| 4. |  |
| 5. |  |
| 6. |  |
| Overall reaction: |  |