

1. The following molecules all have *non-octet* structures. Draw Lewis structures for each and explain how they are non-octet: more than octet, less than octet, or free radical (odd number of electrons). 8 points

- a)  $\text{BeCl}_2$  b)  $\text{ClO}$  c)  $\text{AsF}_6^-$  d)  $\text{XeF}_2$

2. Draw three *octet* resonance structures for the carbonate ion  $[\text{CO}_3]^{2-}$  6 points

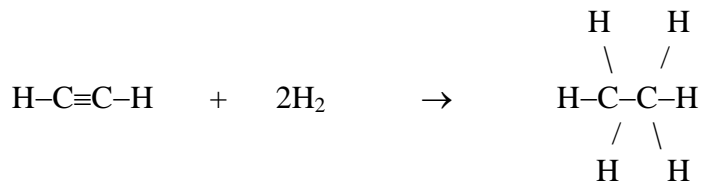
3. Arrange the following in order of **increasing** bond length (from shortest to longest):



How would the bonds in carbonate ion from question 2, above, fit in your order (between which two)? (2 points)

What is the relationship between bond enthalpy and bond length? (2 points)

4. Showing all of your work, calculate the enthalpy,  $\Delta H$ , of the reaction (8 points)



**Given:**  $D(\text{H}-\text{H}) \Delta H = 436 \text{ kJ/mol}$   
 $D(\text{C}\equiv\text{C}) \Delta H = 839 \text{ kJ/mol}$

$D(\text{C}-\text{C}) \Delta H = 348 \text{ kJ/mol}$   
 $D(\text{C}-\text{H}) \Delta H = 413 \text{ kJ/mol}$