

- 12) This question deals with bonds in carbon dioxide and carbon disulfide.
- Which structure has the shortest bond length between the central and each terminal atom?
 - Which structure has the greatest bond energy in its individual bonds?
 - Provide an explanation for your answers to parts a) and b) using principles of chemical bonding.
- 13) The following questions pertain to the PO_4^{3-} ion.
- Draw the resonance structures for the phosphate ion.
 - What is the bond order between the phosphorus atom and each oxygen atom in the phosphate ion?
- 14) The following questions pertain to the carbonate ion and carbon dioxide.
- Draw all of the resonance structures for the carbonate ion.
 - What is the effective bond order between the carbon atom and each oxygen atom in the carbonate ion?
 - What is the effective bond order between the carbon atom and each oxygen atom in carbon dioxide?
 - In which structure, carbonate or carbon dioxide, is the bond length between the carbon atom and each oxygen atom the shortest? Explain.
 - In which structure, carbonate or carbon dioxide, is the bond energy between the carbon atom and each oxygen atom the greatest? Explain.
 - Which structure has the most potential energy associated with its individual bonds? Justify your answer.