**Homework: Covalent Bonding (part 1)**

**Learning Check Page 223 #19-21, 23**

1. **Describe forces involved in a covalent bond.**

The nuclei of both atoms exert an attractive force on both of the shared electrons.

The distance between the nuclei is determined by a balance between the repulsive forces (positive nuclei repels positive nuclei and negative electron repels negative electron) and the attractive forces (positive nuclei attracts negative electrons)

1. **What are the characteristics of a σ bond? Give two examples as part of your answer**

A σ bond is symmetrical around the bond axis of the two nuclei.

A σ bond has an energy level that is lower then the energy of the atomic orbitals in the original atoms, making the molecule more stable then the original atoms.

1. **For the tetrahedral molecule, silicon tetrachloride, SiCl4(s), write the condensed electron configuration of a lone silicon atom, predict the hybridization in the molecule, and write an electron configuration for the hybridized orbitals of the central silicon atom.**

Silicon atom – [Ne]3s2 3p2

Hybridization – mix on s orbitals with 3p orbitals

Electron configuration **-**  four 3sp3 orbitals

1. **In biology, one meaning of hybrid is the offspring of two animals or plants from different species. How can this help you remember the meaning of hybrid orbital?**

A hybridized orbital is the product of mixing two different types of orbitals.

**Review Questions Page 227 #9**

1. **Consider the hybrid orbital sp3d** 
   1. **What type of orbitals and how many of each type combine to make sp3d orbitals?**

One s-orbital, three p-orbitals and one d-orbital combine to make sp3d orbitals

* 1. **How many hybridized sp3d orbitals exist on the atom?**

There are five hybridized sp3d orbitals

* 1. **What shape is characteristic of a molecule in which the central atom exhibits sp3d hybridization?**

Trigonal bipyramidal

**Learning Check Page 230 #28, 29**

1. **What is an expanded valence? Include labelled diagrams in your explanation.**

Atoms in the third period or higher can form hybrid orbitals that include d-orbitals, and can therefore hold more than 8 electrons.

1. **Could a carbon atom have an expanded valence as the central atom in a molecule? Explain why or why not.**

Carbon can not have an expanded valence because it is in the second period and the second energy level only has s and p orbitals so there is only room for 8 electrons.