1. **PO₄⁻³**

**P has 4 electrons assigned to it because it has 5 valence electrons to start with but 1 will go to an oxygen and the 3 extra electrons in the molecule will go to the other oxygens, giving each oxygen 7 assigned electrons that bond with P’s 4 assigned electrons to Hybridize.**

↑ ↑

↑↓

↑ ↑ ↑

↑

**sp³**

1. **XeF₄**

**Xe has 8 electrons assigned to it because it has 8 valence electrons to start with. It uses 4 to bond with the 4 Fs and the others for 2 lone pairs. Xe has expanded valence.**

↑↓

↑↓ ↑↓ ↑↓

↑

↑ ↑

↑

↑↓

↑↓ ↑ ↑

↑

**sp³d²**

1. **SO₃⁻²**

**S has 5 electrons assigned to it because it has 6 valence electrons to start with but 1 will go to an to an oxygen and the 2 extra electrons in the molecule will go to the other oxygens. S keeps 2 electrons as a lone pair and creates 3 sigma bonds with 3 oxygens. The double bond creates 1 sigma bond and 1 pi bond. Pi bonds do not hybridize because their orbitals do not blend together like sigma bonds, so we will count the double bond and one bond for hybridization purposes. S has expanded valence.**

↑ ↑ ↑

↑↓

↑ ↑ ↑

↑↓

**sp³**

1. **PF₆⁻**

**P has 6 electrons assigned to it because it has 5 valence electrons to start with and the 1 extra electron in the molecule goes to P so it can then bond with 6 Fs. P has expanded valence.**

↑↓ ↑ ↑

↑

↑↓

↑ ↑

↑

↑ ↑ ↑

↑

↑

**sp³d²**

1. **CH₃⁺**

**C has 3 electrons assigned to it because it has 4 valence electrons to start with and the 1 electron taken away from the molecule gets taken away from C. C then forms a bond with each hydrogen. This is a special case where carbon behaves like boron and only wants 6 electrons instead of following the octet rule, we know this because there is no possible way to give carbon 8 electrons because H can never form double bonds.**

↑

↑

↑↓

↑ ↑

↑

↑

**sp²**

1. **BrF₄⁻**

**Br has 8 electrons assigned to it because it has 7 valence electrons to start with and the 1 extra electron in the molecule goes to Br so it can then bond with 4 Fs and have 2 lone pairs. Br has expanded valence.**

↑↓ ↑↓ ↑↓

↑

↑↓

↑↓ ↑ ↑

↑

↑ ↑

↑

↑↓

**sp³d²**

1. **IF₅**

**I has 7 electrons assigned to it because it has 7 valence electrons to start with. It uses 5 to bond with the 5 Fs and the others for 1 lone pairs. I has expanded valence.**

↑↓

↑↓ ↑↓ ↑

↑

↑ ↑

↑

↑↓

↑ ↑ ↑

↑

**sp³d²**

1. **BF₃**

**B has 3 electrons assigned to it because it has 3 valence electrons to start with and uses all of them to bond with 3 Fs. Remember that Boron is an exception to the octet rule and only wants 6 electrons.**

↑

↑

↑↓

↑

↑ ↑

↑

**sp²**