1. Identify the correct compound for each of the following and give a brief

explanation for your choice.

1. Undergoes exchange with 13CO most rapidly, [Cr(CO)6] or [Cr(CO)6]+.
2. Will undergo fastest exchange with 13CO: [Rh(PPh3)2(CO)Cl] or [Rh(η5-C5H5)(CO)2]
3. Has the highest energy CO stretching absorptions: [Fe(η5-C5H5)(CO)2(CH3)] or [Fe(η5- C5H5)(CO)2(Cl)]
4. Reacts fastest with nucleophiles such as dimethylamine: [Fe(η5-C5H5)(CO)3]+ or [Co(η5- C5H5)(CO)2]? Note: this reaction is not a substitution at the metal center.

What is the structure of the metal product formed from the faster reaction when there are at least two equivalents of Me2NH available?

1. Both nickelocene [Ni(η5-C5H5)2], a 20 e− system, and ferrocene [Fe(η5-C5H5)2], an 18 e− system, can be protonated. One product contains a metal hydrogen bond, whereas the other is protonated on the ligand. Draw the structures of the products derived from nickelocene and ferrocene and briefly explain the reason for the difference in the reactivity of the two metallocenes.