Chapter 8

1. The absorption peak for the polyatomic CaOH is so much broader because of the electronic excitation is also associated with a manifold of vibrational excitations.

4. Natural line widths in atomic spectroscopy are the widths of lines broadened only by the uncertainty principle (no Doppler or pressure broadening). The width is determined by the lifetime of the excited state.

5. In the absence of KCl some of the sodium is ionized, which leads to a lower intensity of the emission line for atomic sodium. In the presence of KCl ionization of sodium is minimized because of the high concentration of electrons from the ionization of potassium.

6. The energy needed to promote a ground state 6s electron in Cs to the next energy level (6p) is so high that only a small fraction of the Cs atoms are excited at the temperature of a natural gas flame. At the higher temperature of a hydrogen/oxygen flame a much larger fraction of the atoms is excited, resulting in a more intense Cs emission line.

11. This can be explained by the ionization of uranium. At low concentrations, the fraction of U that is ionized would be greater, thus giving a nonlinear relationship between concentration and absorbance. The added alkali metal salt suppresses the U ionization.