

Determination of Metal Amino Acid Complexation via Fourier Transform Infrared Spectroscopy

Overview of FTIR:

Fourier Transform Infrared Spectroscopy (FTIR) is an analytical technique used to identify, organic, polymeric, and in some cases inorganic materials. Specifically, FTIR is most useful in the identification of functional groups in organic substances. When a compound is placed in an IR beam, energy (light) is absorbed by the functional group and the remaining light is measured and used for identification. For example, when an IR beam passes through a functional group, such as a carboxylic acid, it absorbs a photon and bends or stretches (vibrates) a specific amount which allows the remaining light to be observed and the functional group to be defined.

Sample Preparation:

FTIR samples can be categorized in three main groups; liquids, soluble solids and insoluble solids. Liquids are usually examined as thin films in cells made of sodium chloride. Soluble solids can be analyzed as melts or in organic solvents. Metal amino acid complexes are soluble solids. However, due to the zwitterionic nature of amino acids they are best observed as a solid disc after they have been mixed with KBr and compressed into a pellet. The procedure for preparing such a sample is outlined below:

1. Weigh out 280mg of Potassium Bromide on an analytical balance.
2. Add 3 mg of the metal amino acid complex on top of the potassium bromide
3. Grind sample to a fine chalk-like powder with a non-porous stone mortar and pestle.
4. No crystal facets should be observable once the powder is at the correct size.
5. Heat the powdered sample at 100°C for 1hour for drying.
6. Transfer sample immediately to the pellet press die set.
7. Place the die set in the hydraulic press.
8. Increase the pressure on the die set to 8 metric tons under vacuum.
9. Allow the sample to crystalize for 10 minutes under vacuum and pressure.
10. Release the pressure to 1 metric ton before increasing it again to 8 metric tons. Repeat once.
11. Release the pressure completely and break the vacuum.
12. Invert the die set and gently remove the clear KBr pellet.
13. Immediately place the finished pellet in a small Ziploc bag which is subsequently placed upon a bed of desiccant (P_2O_5) prior to analysis (to keep moisture out of the pellet).
14. Analyze the sample with FTIR and Interpret the Spectra.