

Infrared Spectra Study Booklet

This booklet will be used by many students during this laboratory session. Please do not write in it. Record your notes in your laboratory notebook.

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sulfate salts

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- calcium nitrate
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INSTRUCTIONS

The spectra in this booklet were collected on the same instrument you will use to collect the spectrum of your product from the aspirin preparation. Some were collected using a reflectance accessory and some were collected in a transmission mode. The y-axis in these spectra will be labeled either %reflectance or %transmittance. The peaks are the portions of the spectrum where the amount of infrared light reaching the detector decreases and are indicated by a lower %reflectance or %transmittance.

The x-axis has units of wavenumbers (cm^{-1}) and is a scale of the energy of infrared light used in this experiment. The high energy end of the x-axis is on the left, beginning at 4000 cm^{-1} . The energy of the light decreases as you move to the right and reaches its lowest value at 600 cm^{-1} .

The spectra which follow are separated into 9 groups according to the type of compound. Study the spectra contained within a group. Look for the peaks which occur at similar energy for all of the spectra in that group. For instance, you may observe that all of the spectra in a group have one or two peaks that are within 15 cm^{-1} of 1410 cm^{-1} . For that type of compound, you would record $1410 \pm 15 \text{ cm}^{-1}$

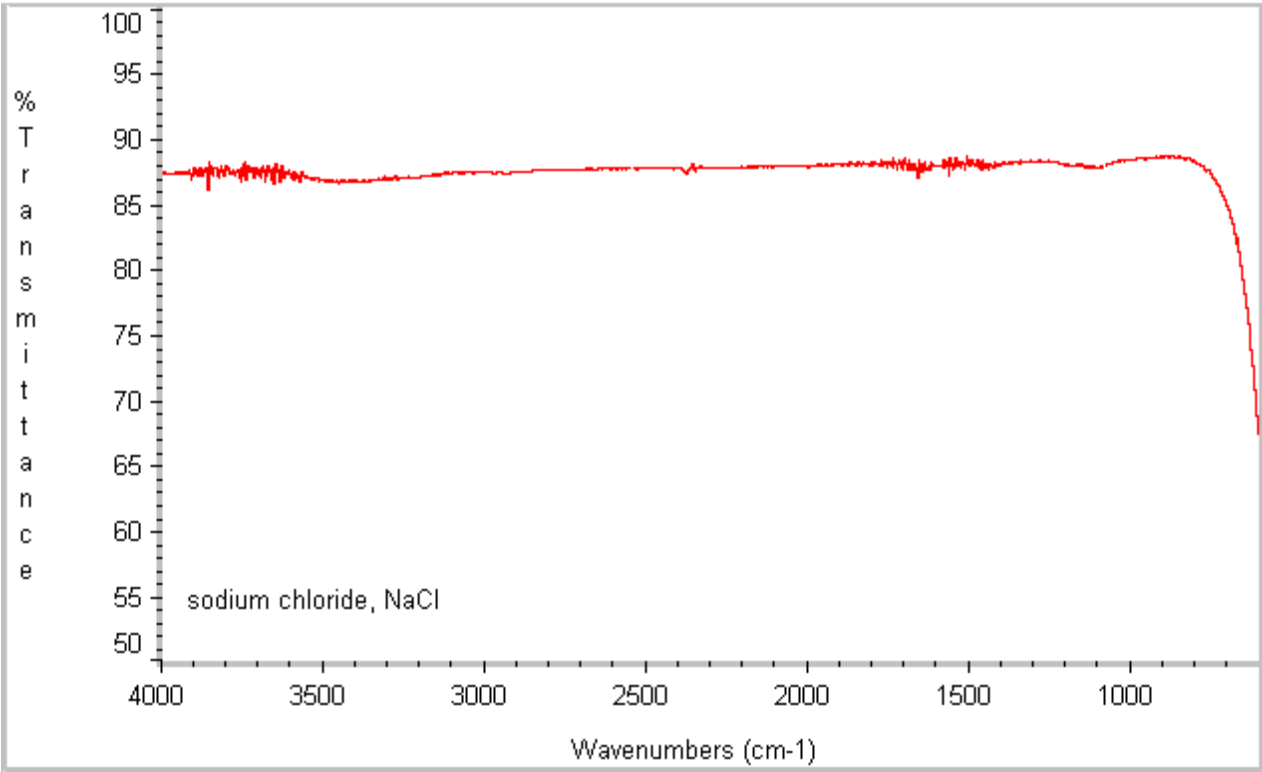
as a peak that is characteristic of compounds of that type.

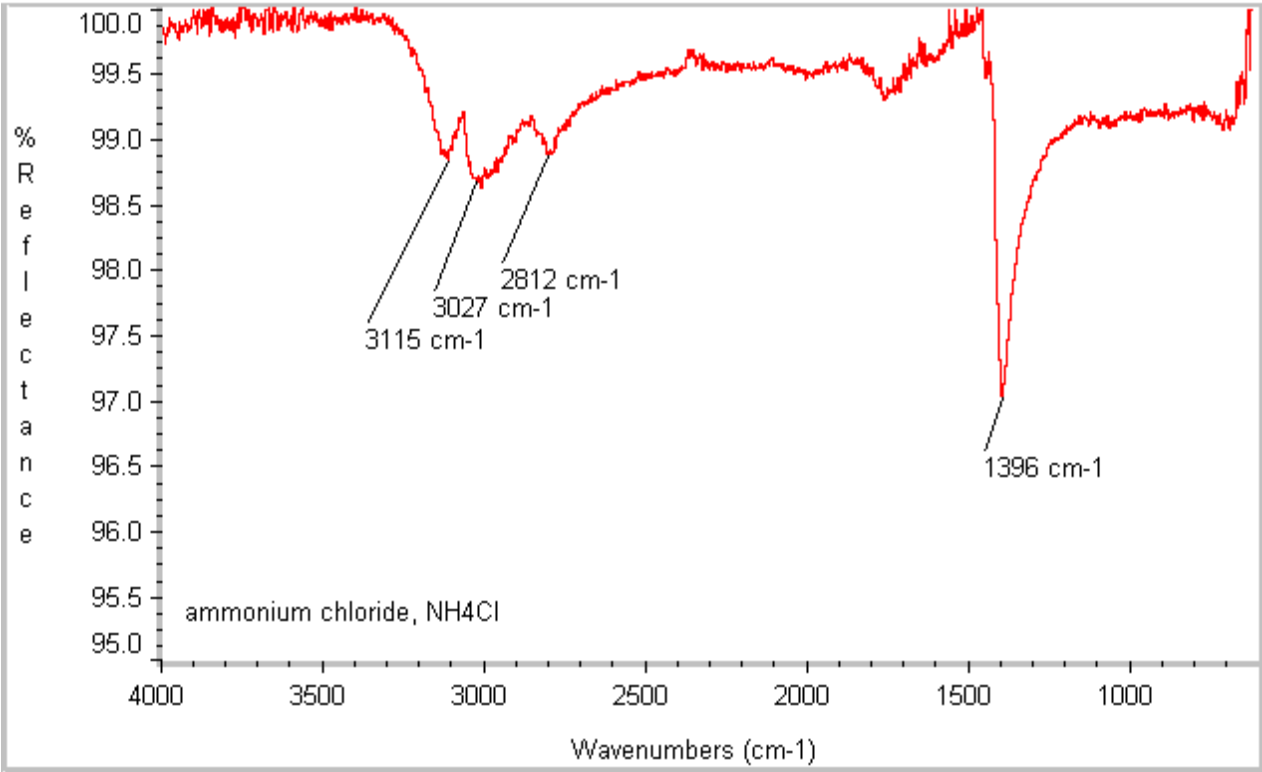
A closely spaced pair of peaks due to carbon dioxide in the air also shows up in some of the spectra. These peaks have been labeled in some of the spectra to help you identify them. Learn to recognize these peaks by their location in wavenumbers and by their characteristic shape. Disregard them when you find them in other spectra where they are not labeled.

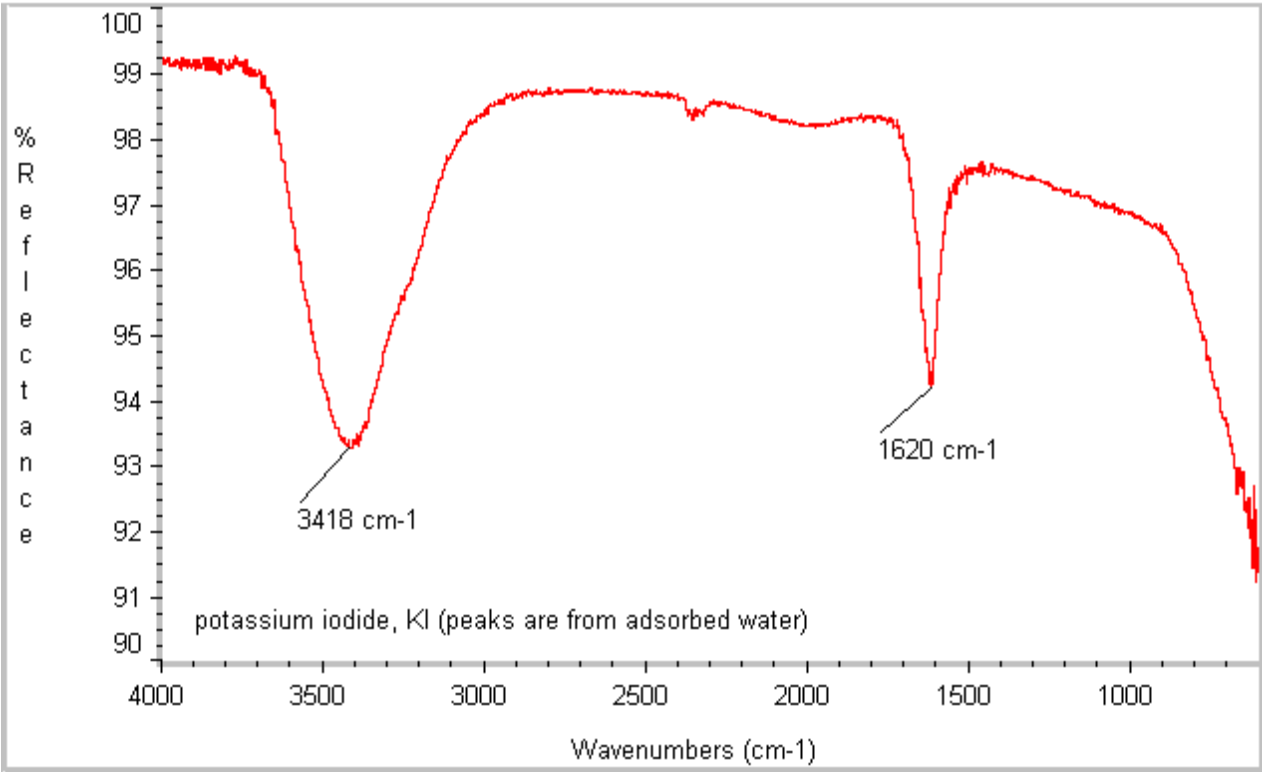
Some of the compounds included in this study are hydrates, which means they have water molecules as part of their crystal structure. Other compounds may have a strong tendency to adsorb water from the atmosphere. In either of these cases the spectrum will show the peaks expected for water. Look up the spectrum of water in your manual and estimate the position of the two most prominent peaks in wavenumbers. Look for these peaks in the spectra and assign them to water, not to the compound you are studying. These peaks appear in many, but not all, of the spectra.

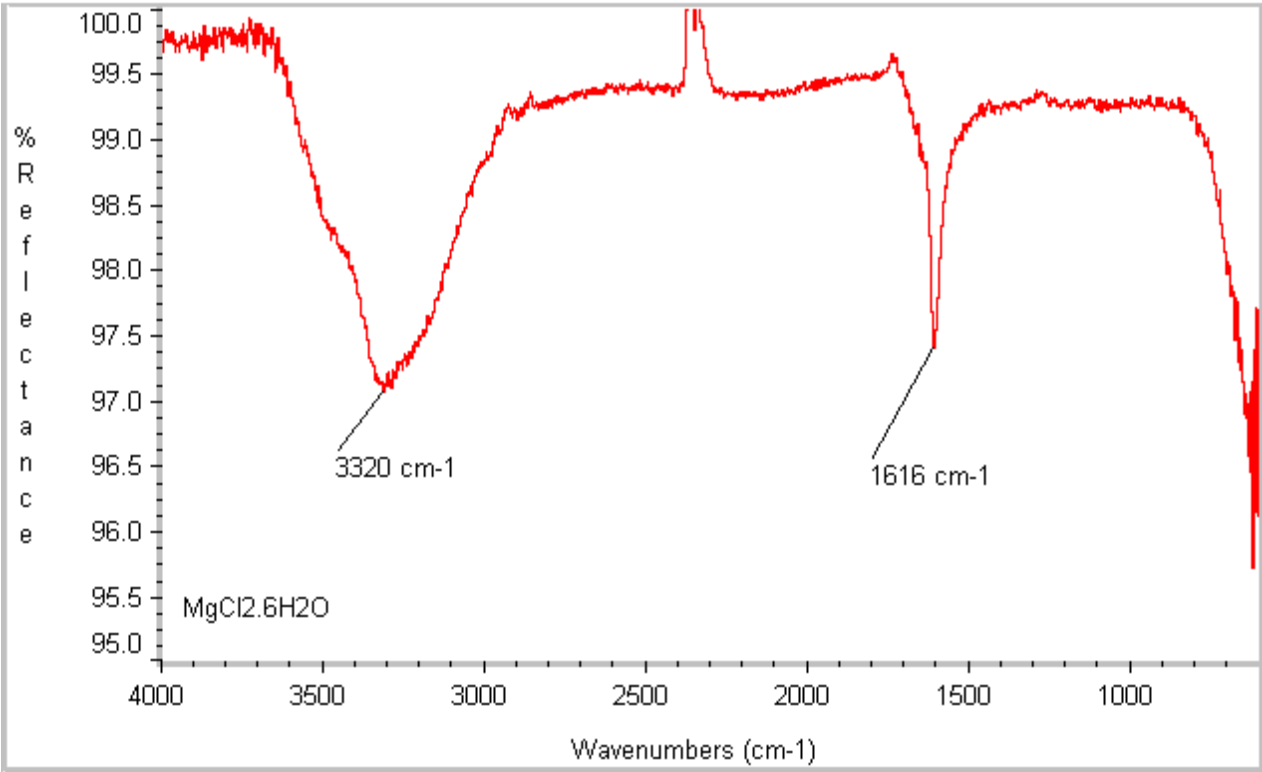
When you have completed your observations and have identified the peaks that can be used to characterize a type of compound, your instructor will give you a list. This list will contain five items and you are to use the spectra contained in the last section of this booklet to answer these five items. Each of these spectra is labeled with either text or a number. You may need to report the number to identify a matching spectrum, or find a particular spectrum and report the type of compound.

chloride, bromide, and iodide
salts

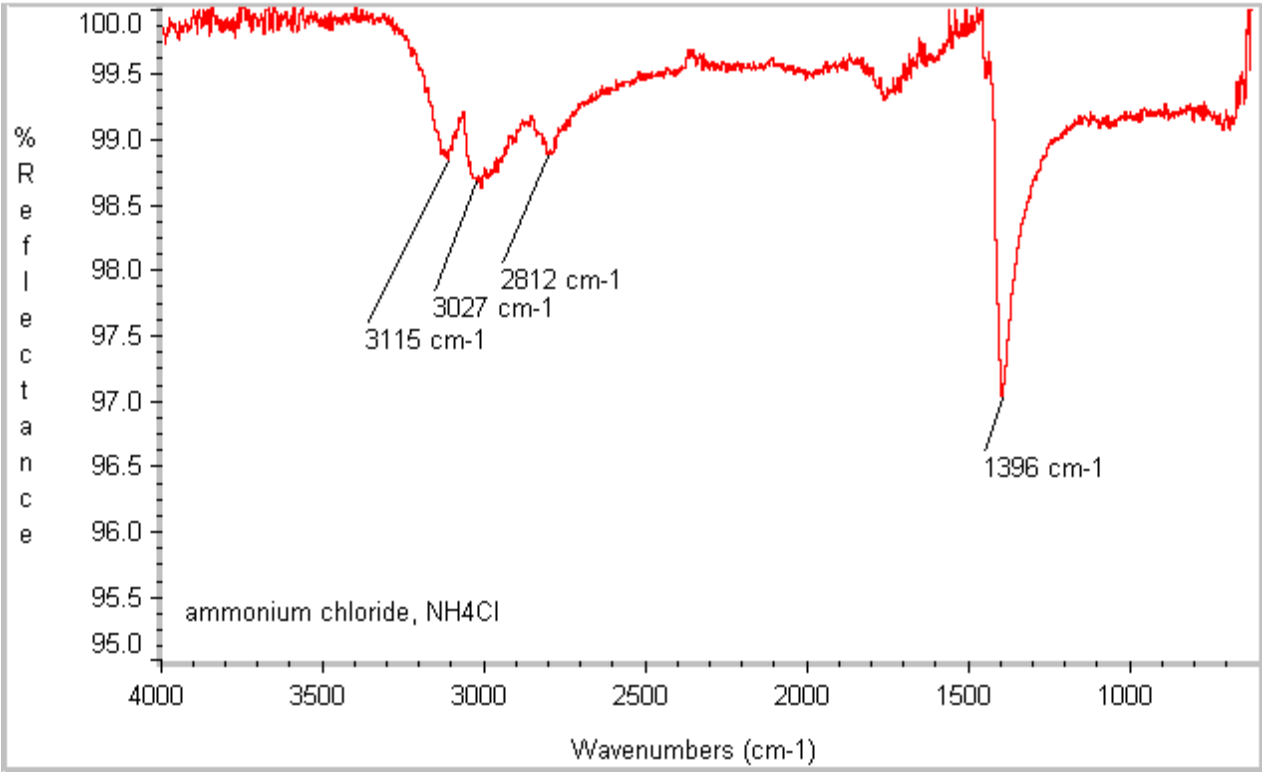


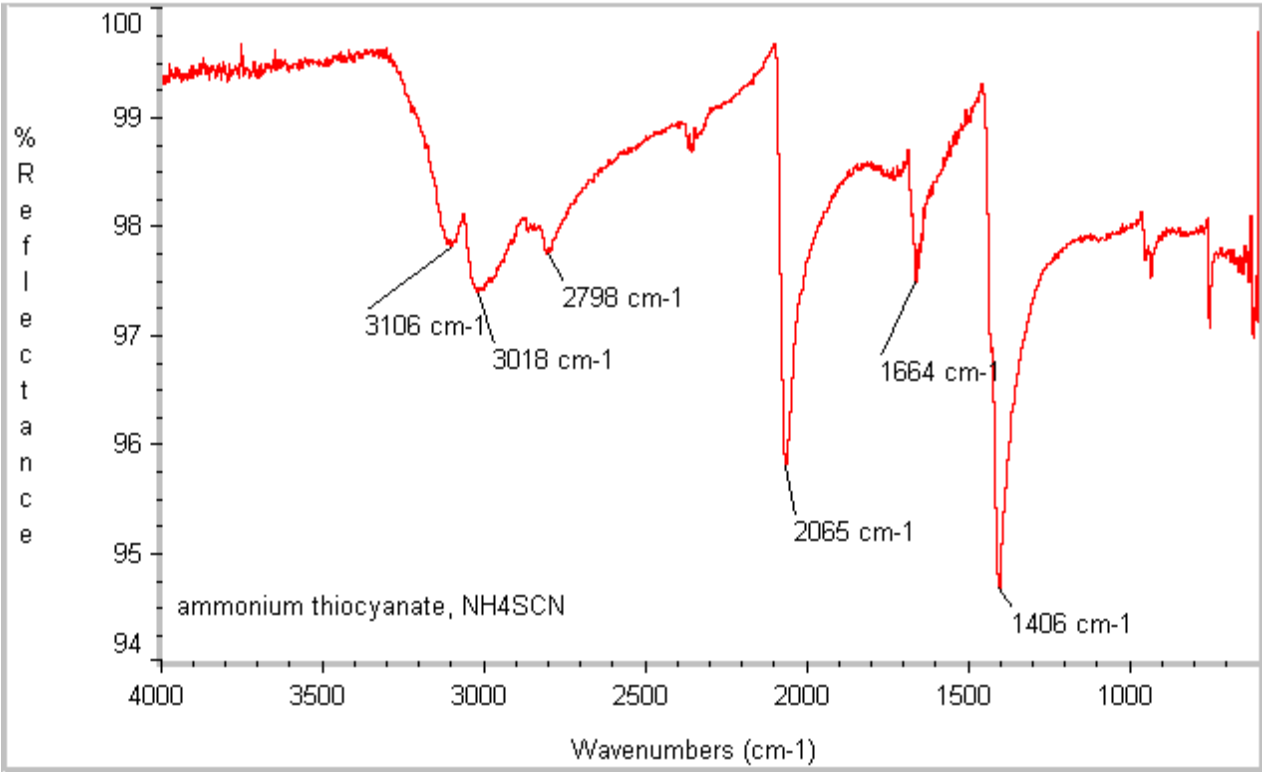


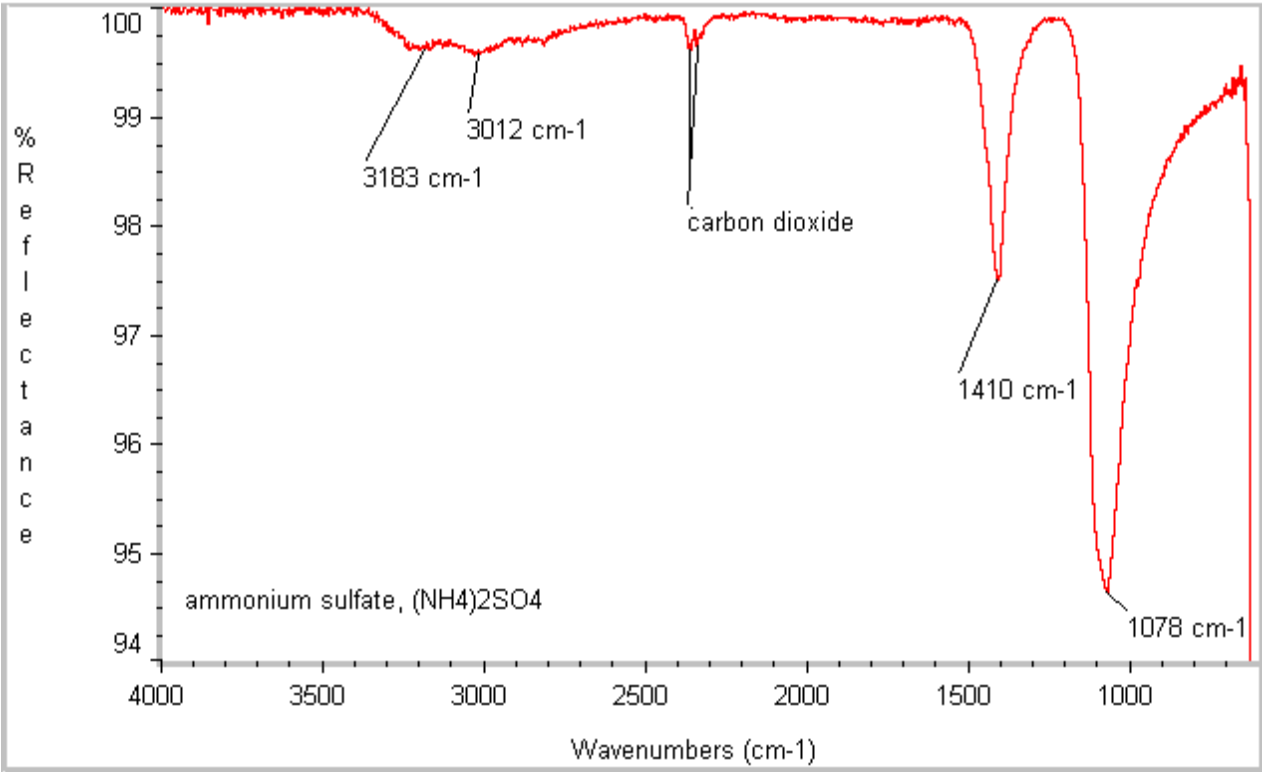


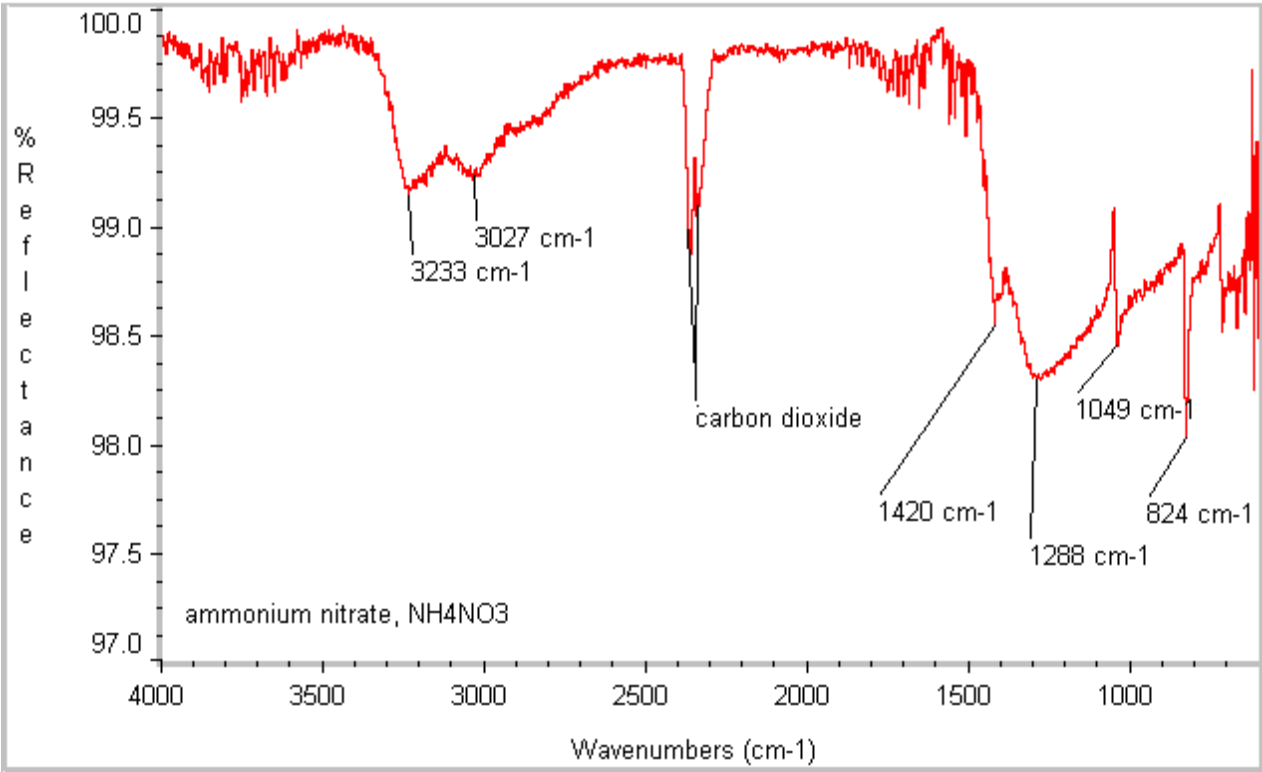


ammonium salts

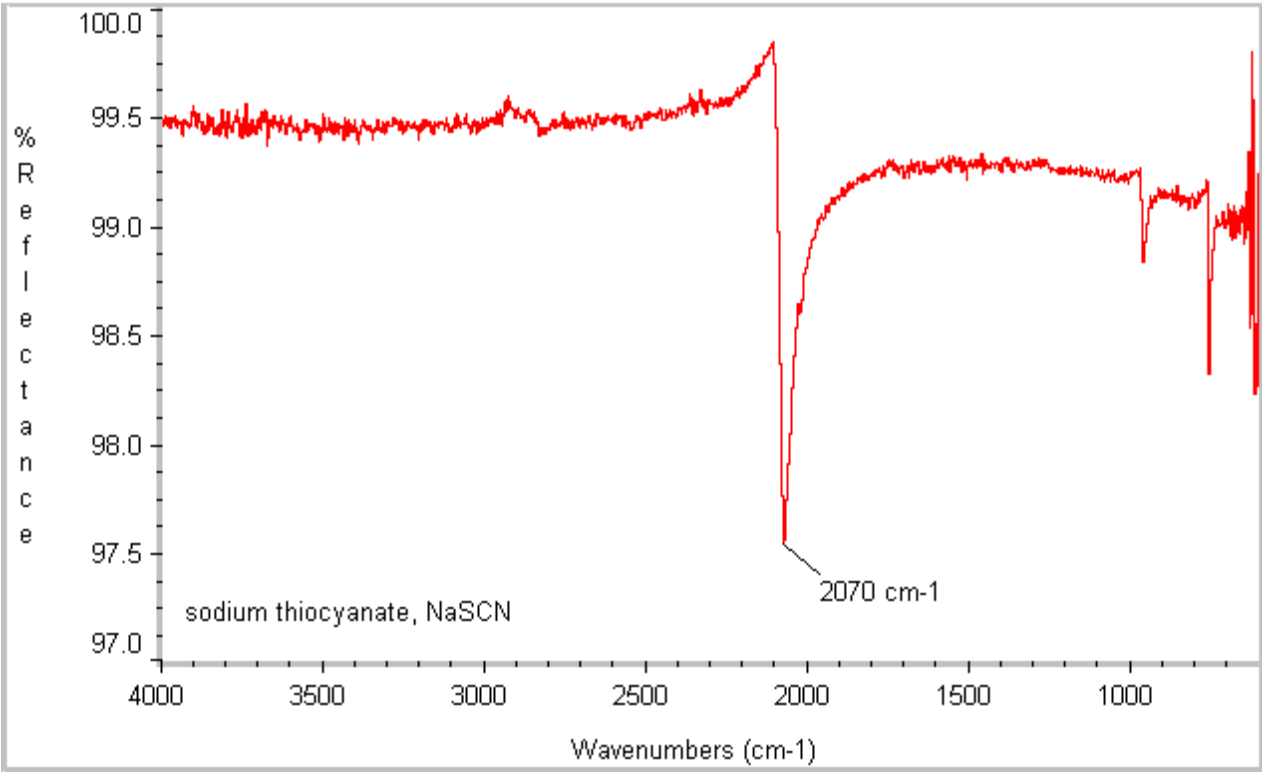


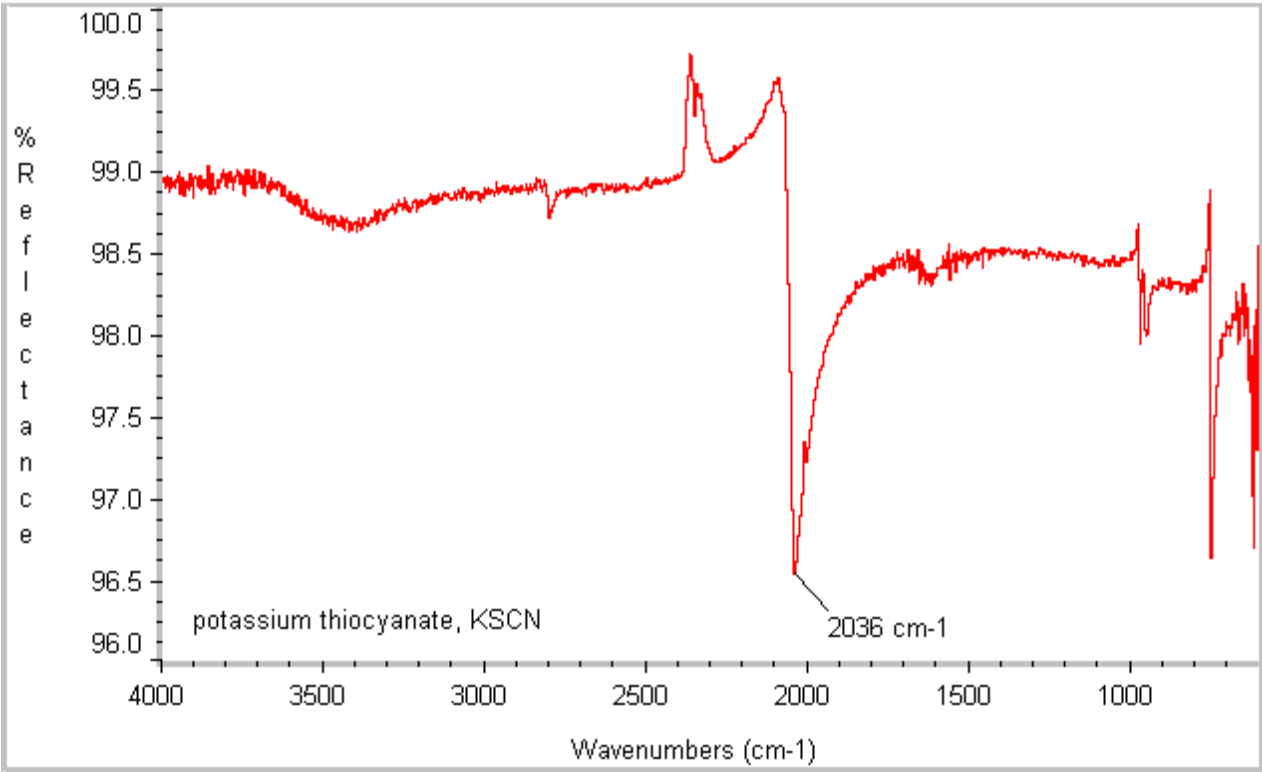


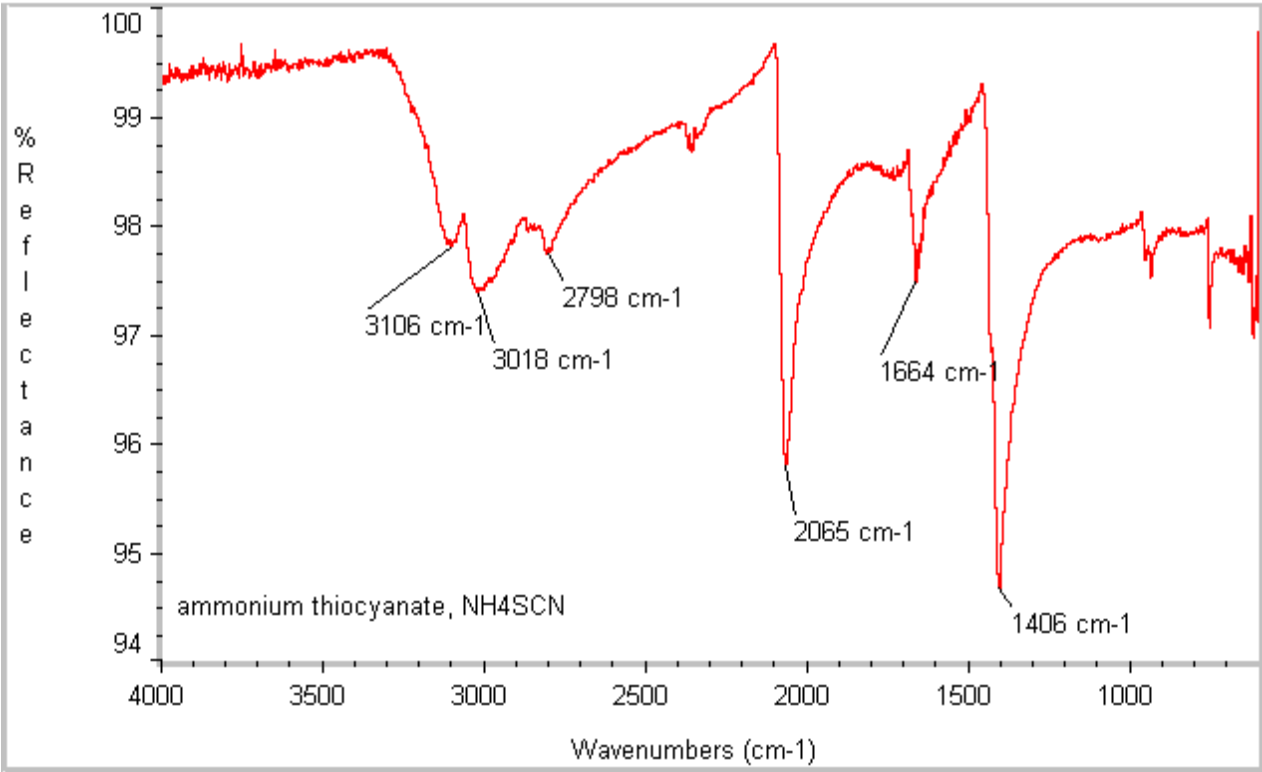




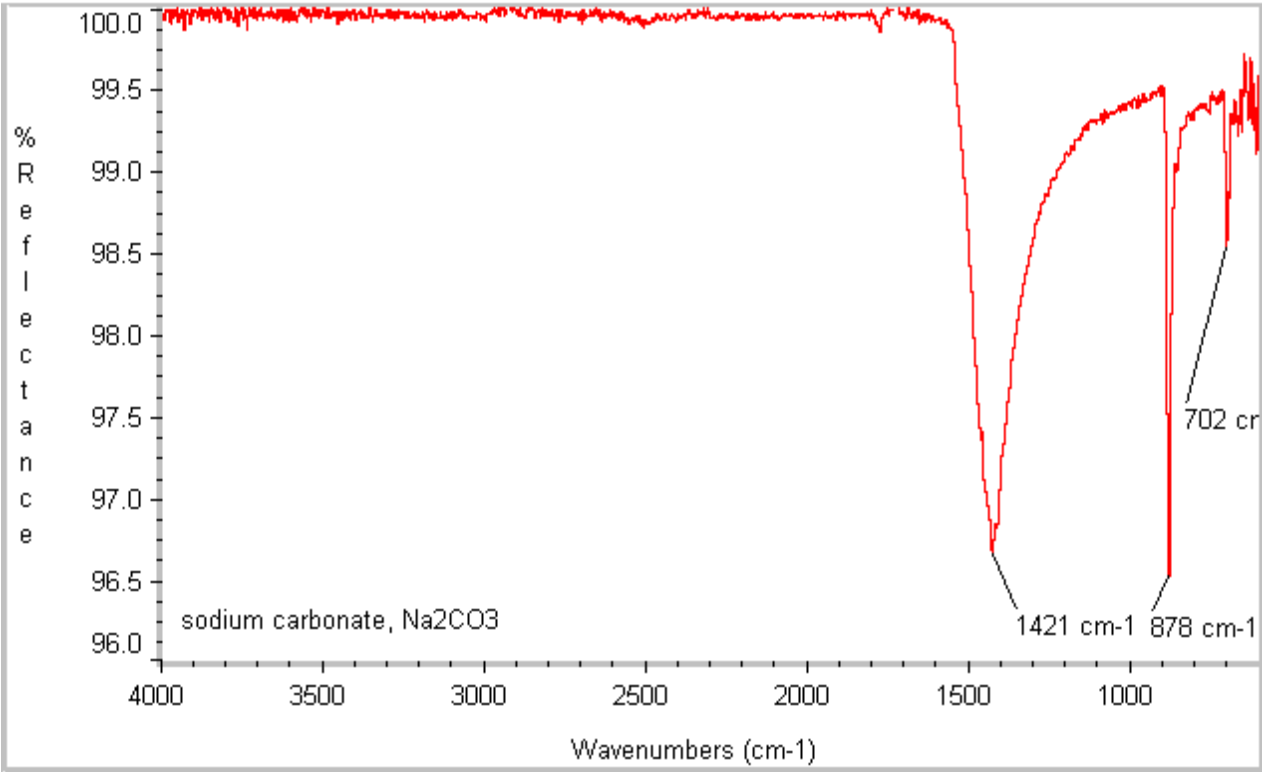
thiocyanate salts

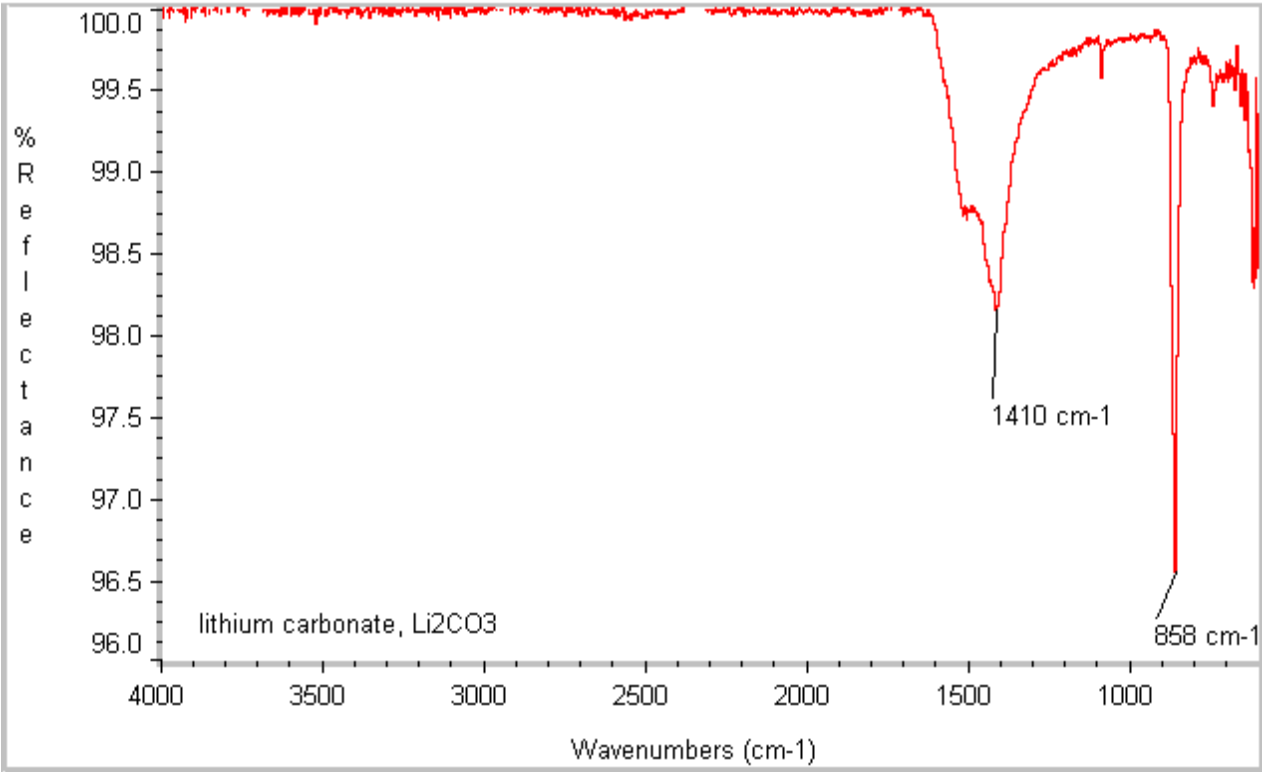


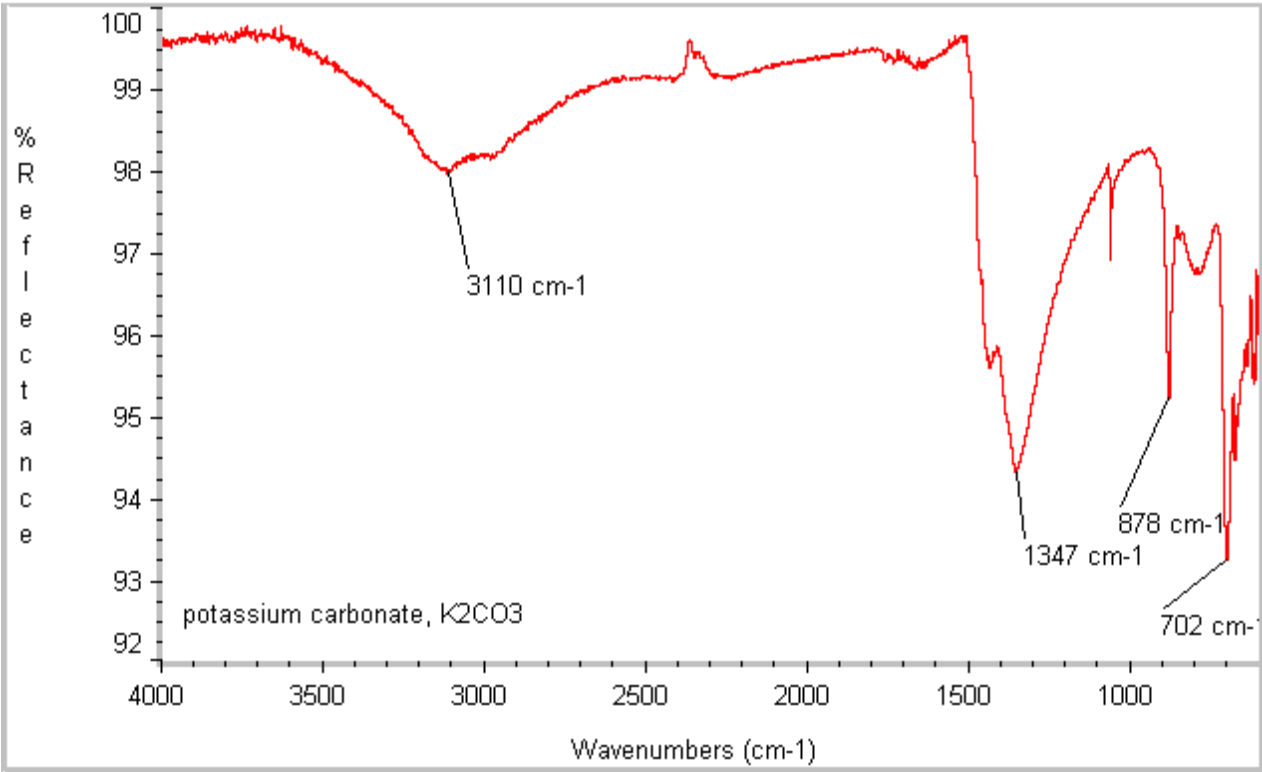


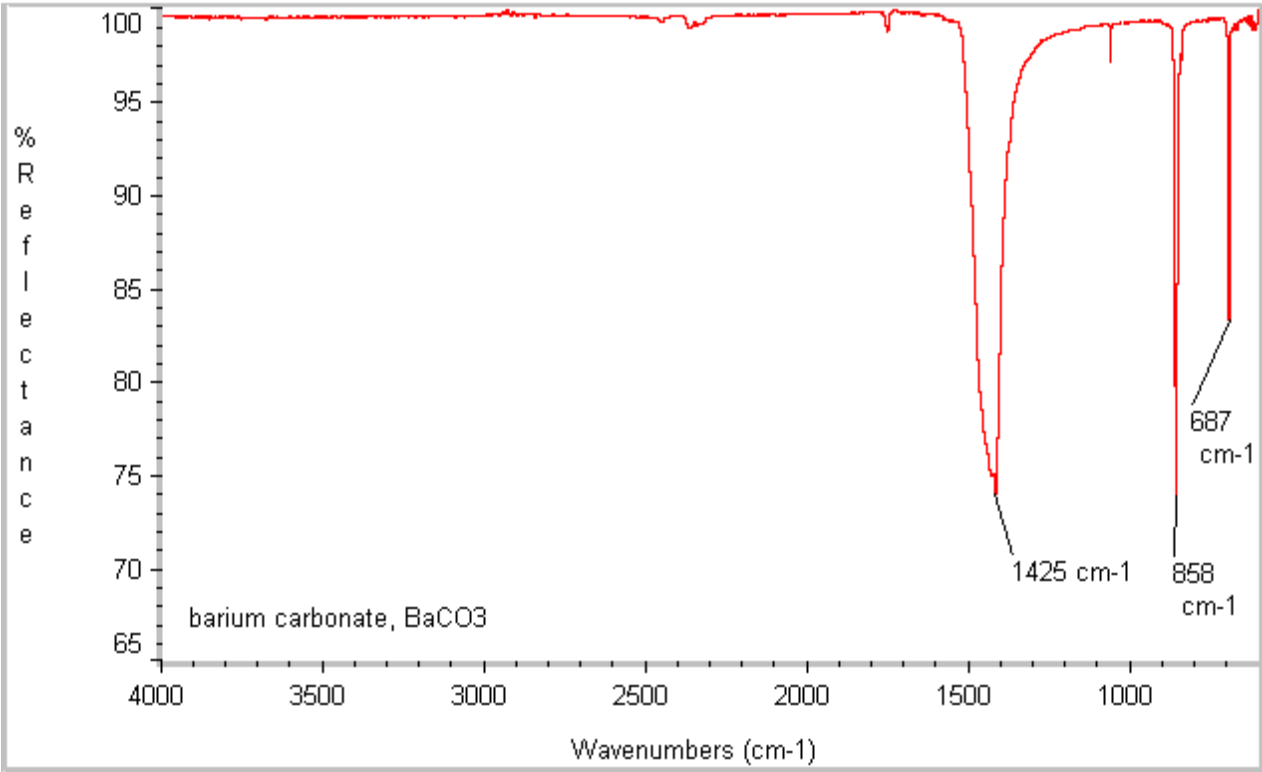


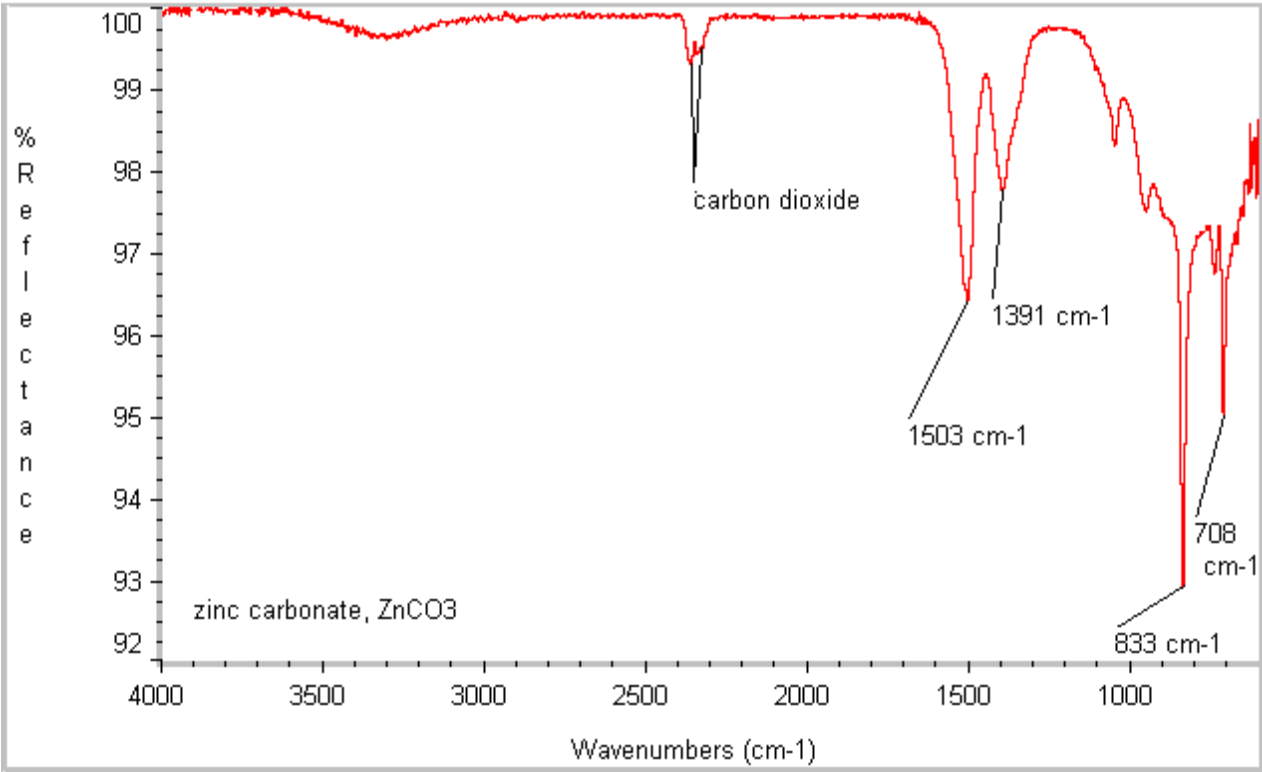
carbonate salts



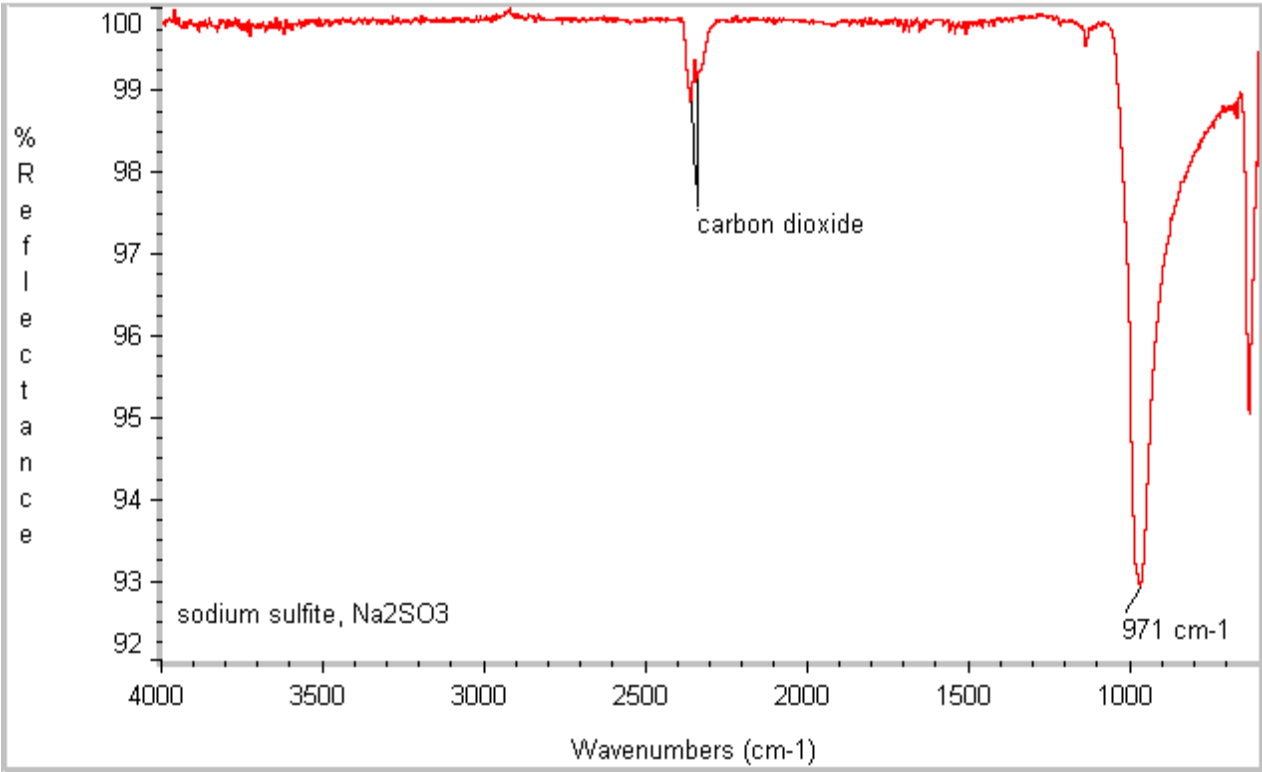


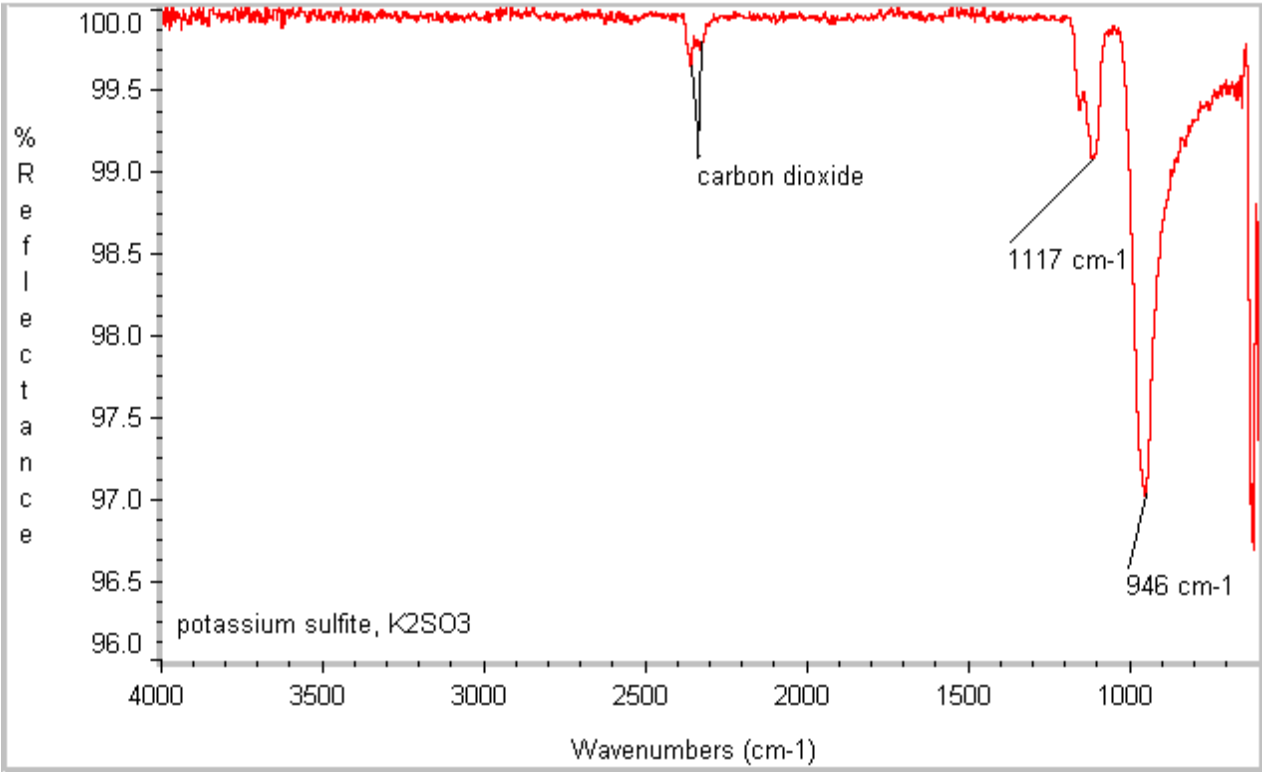




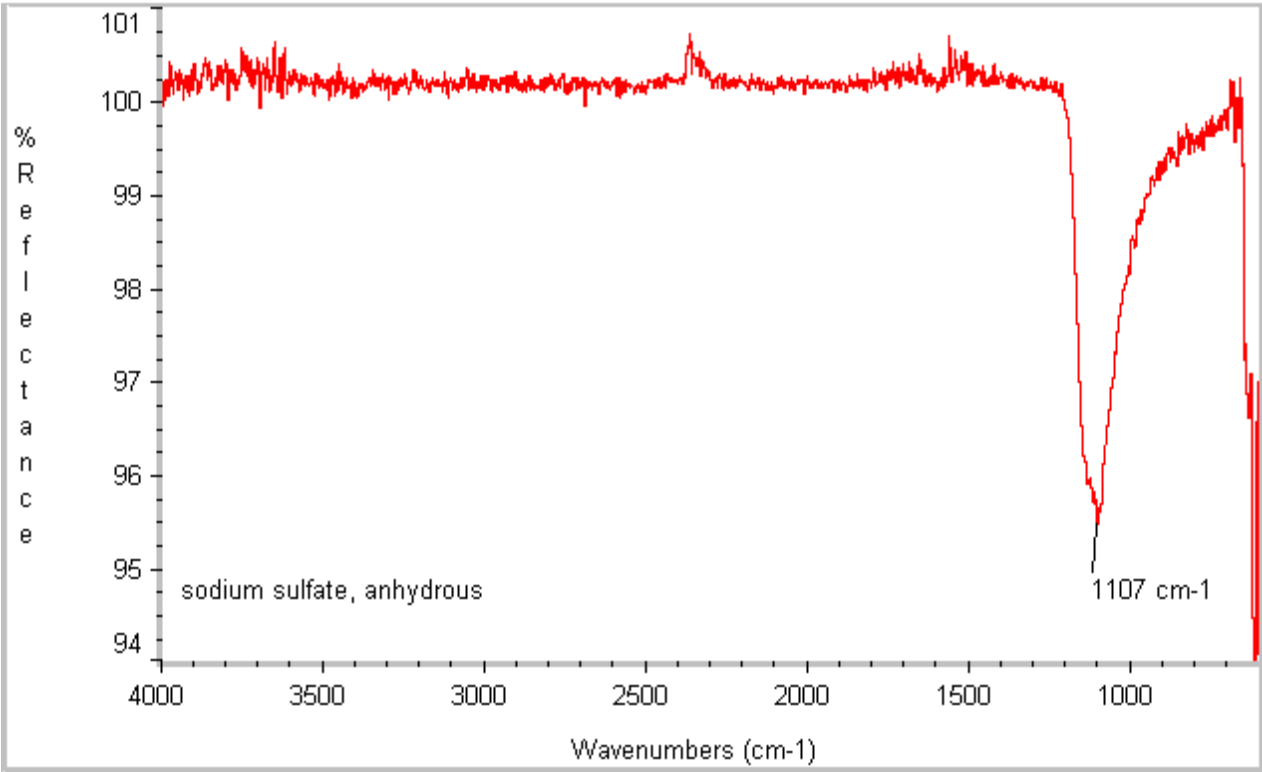


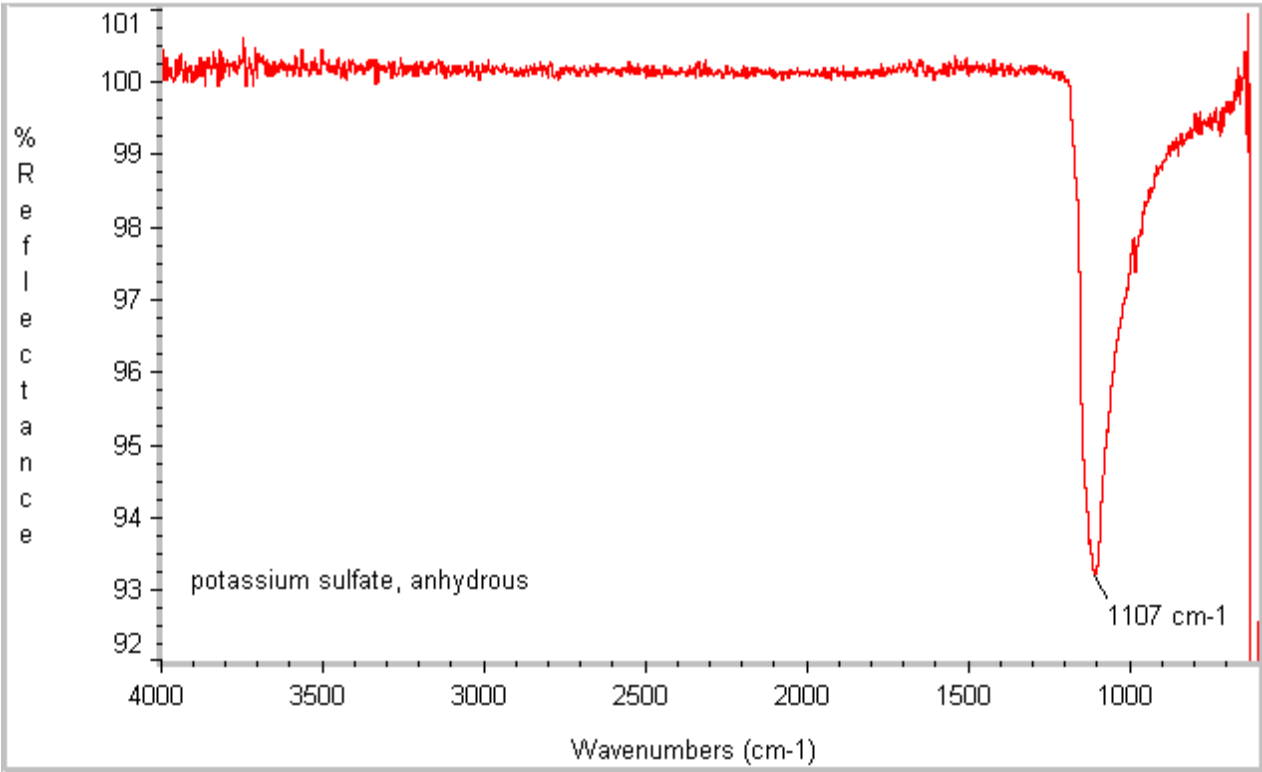
sulfite salts

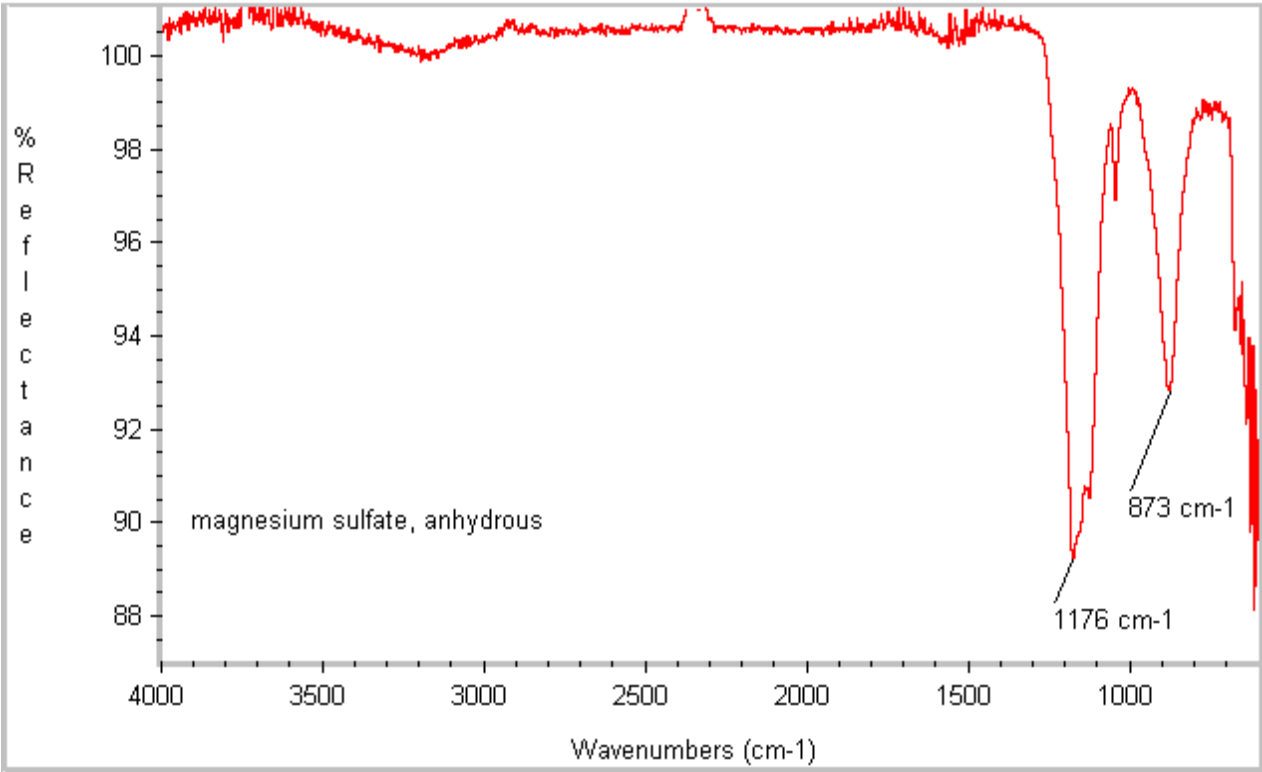


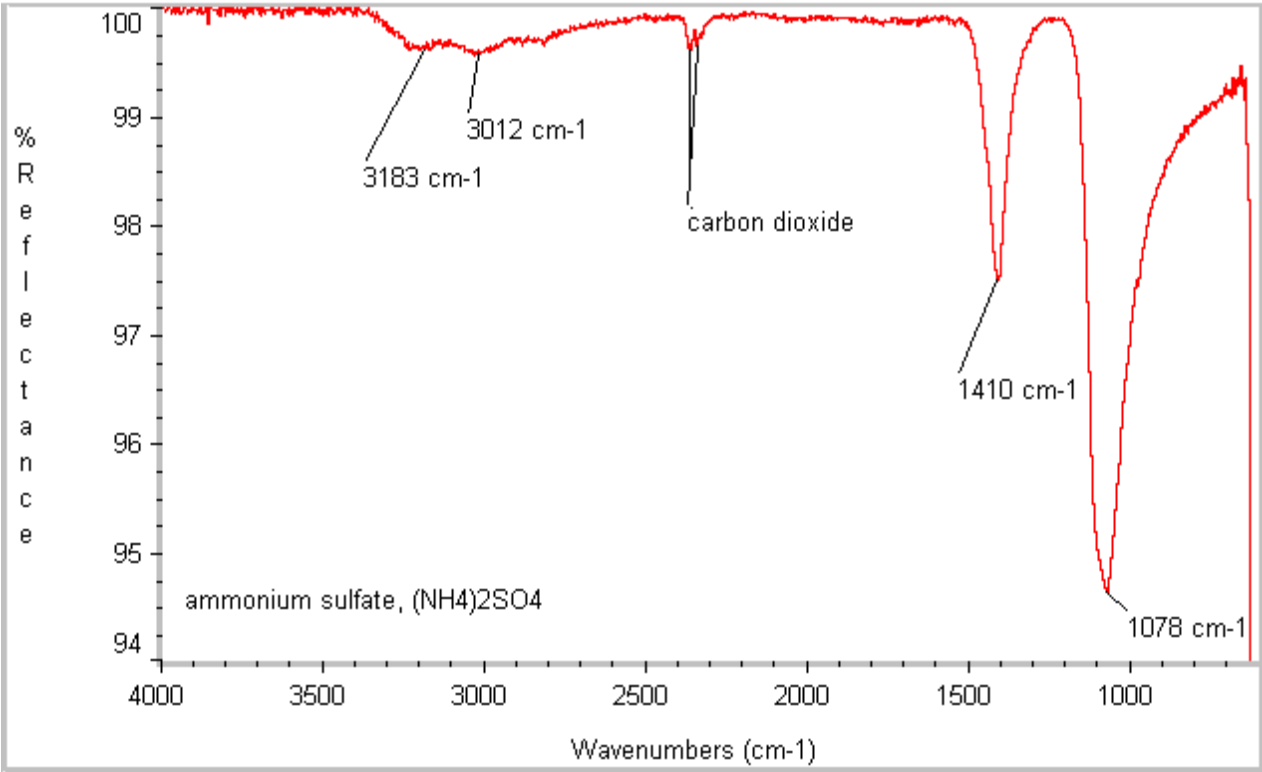


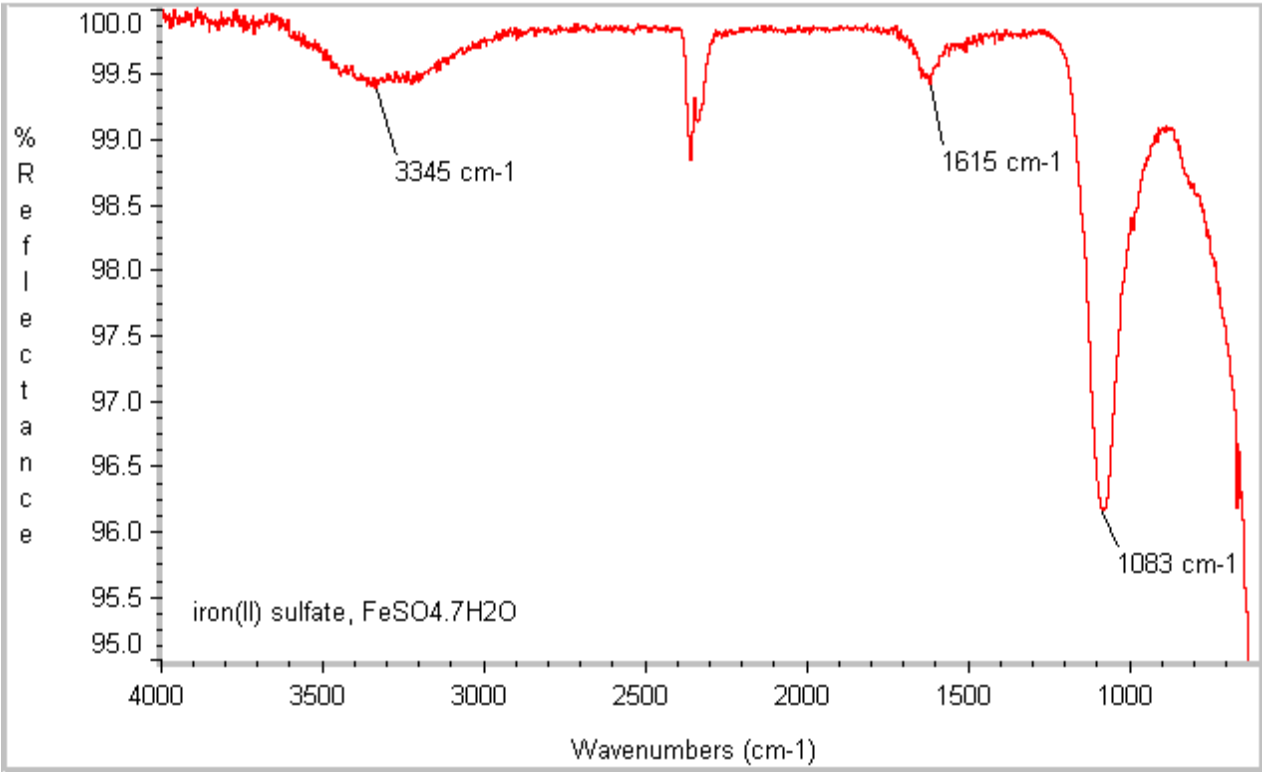
sulfate salts

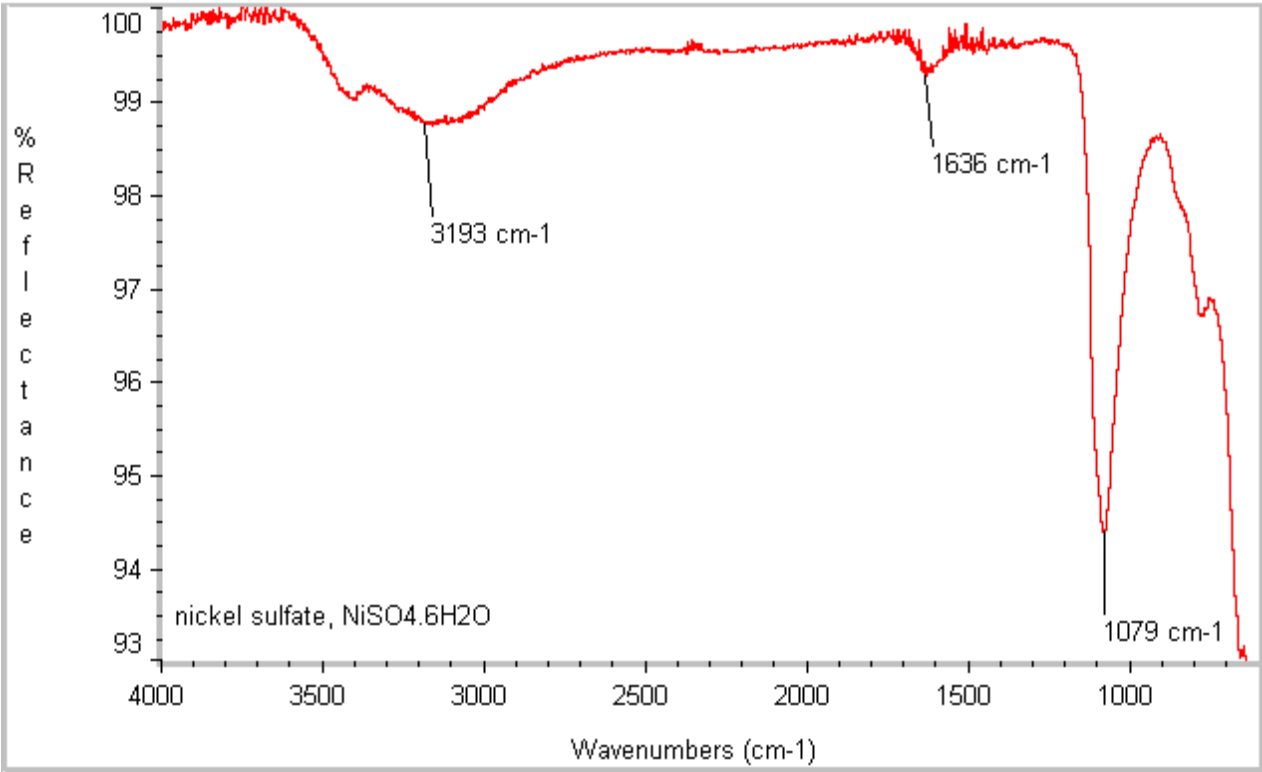


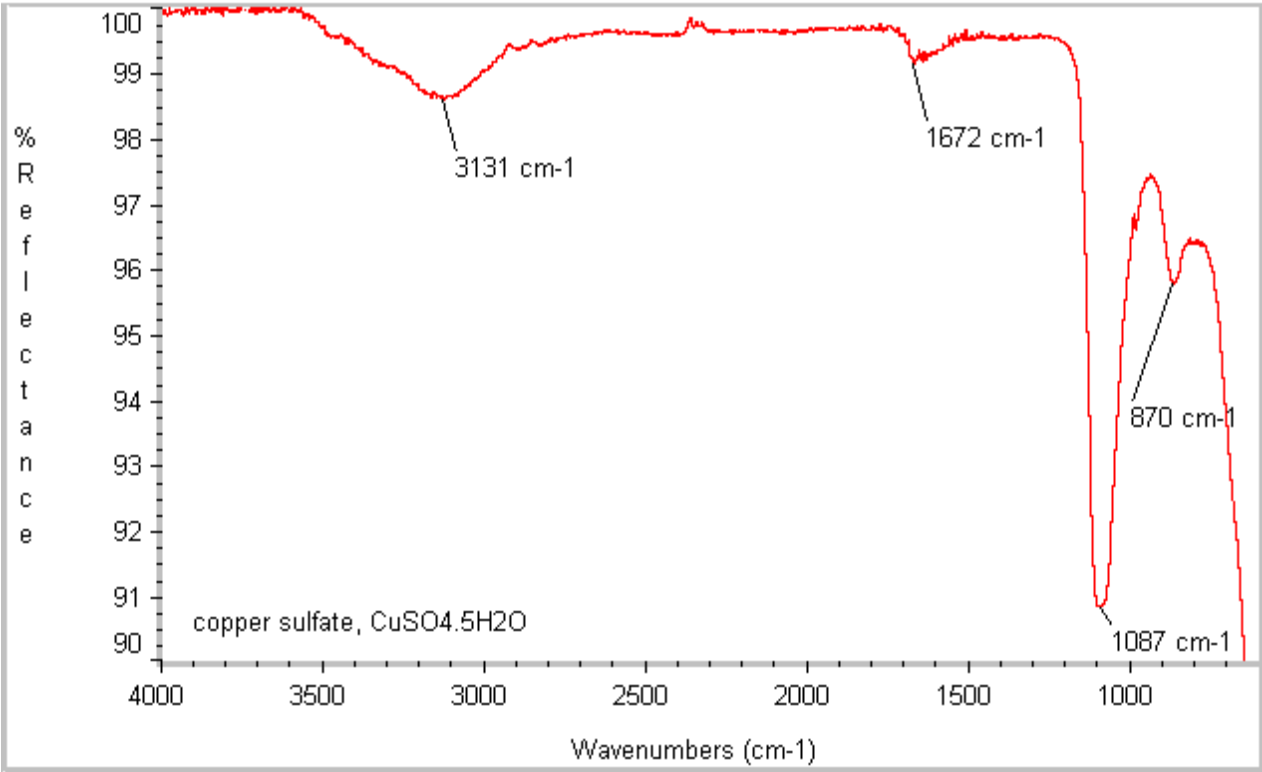


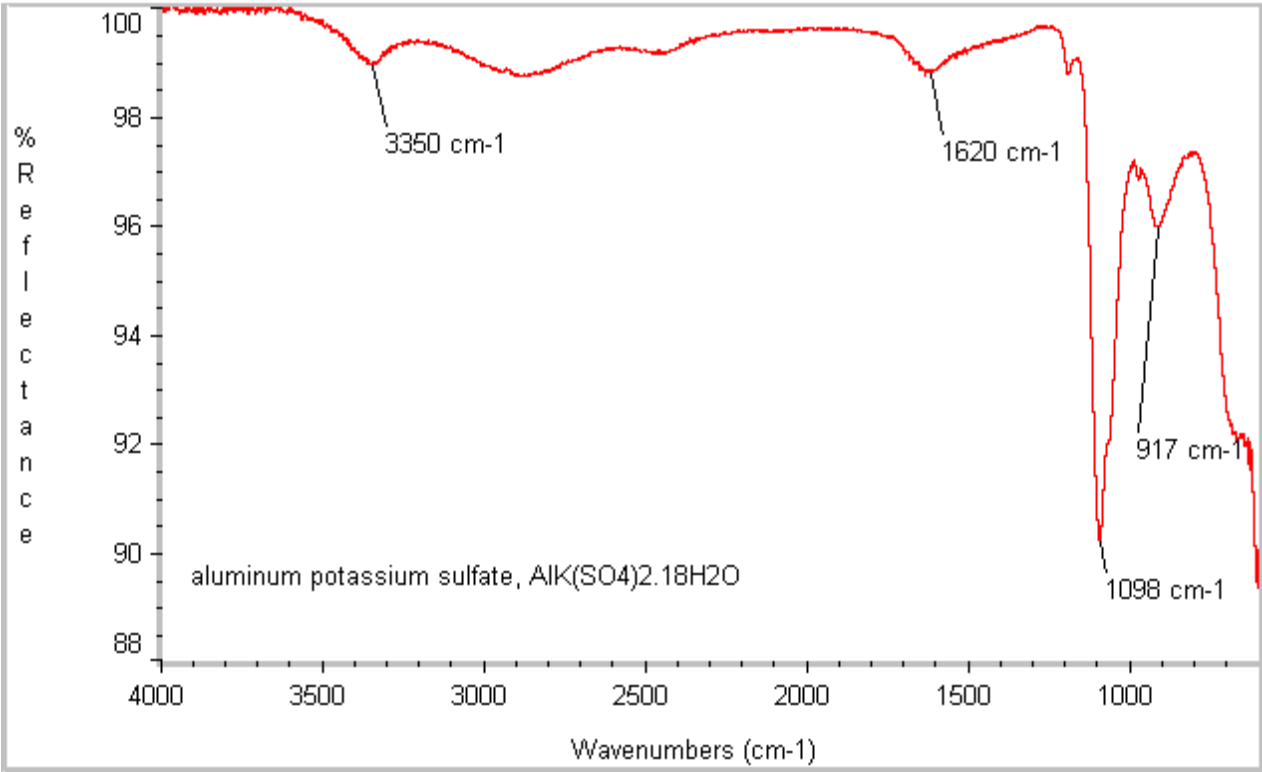




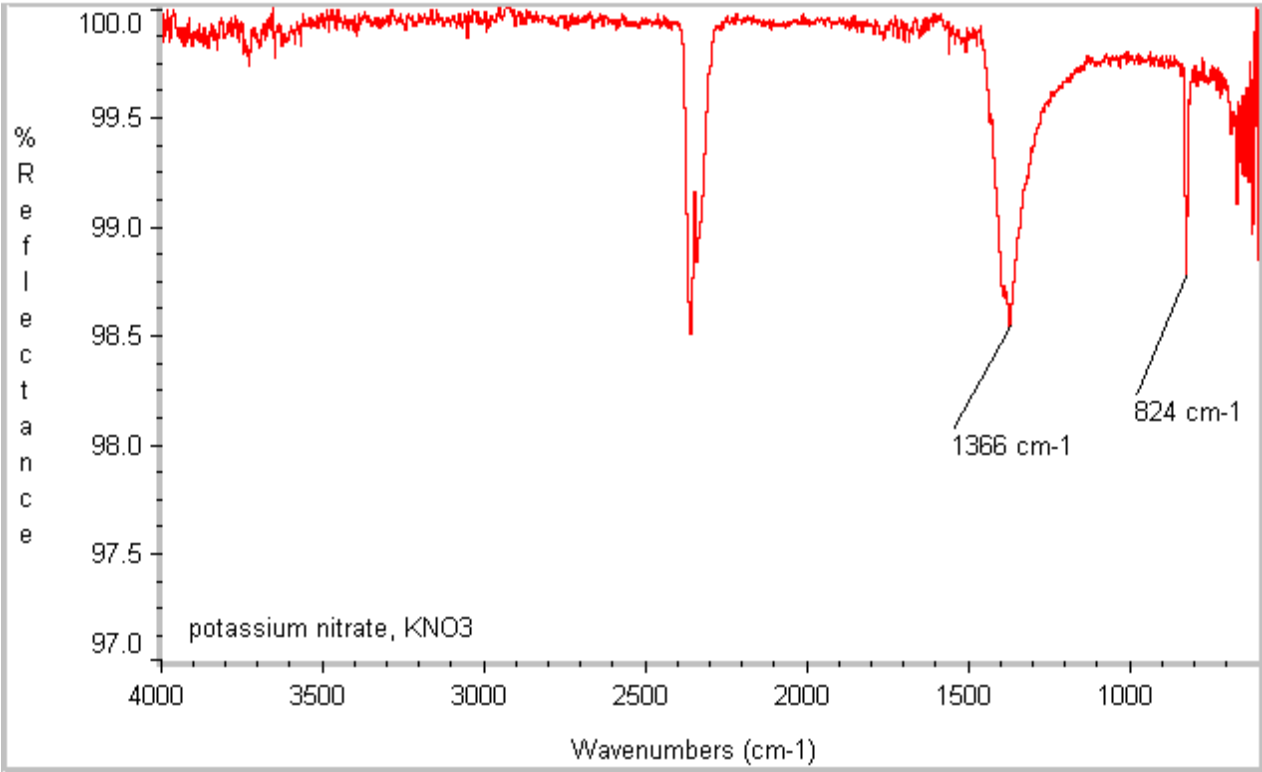


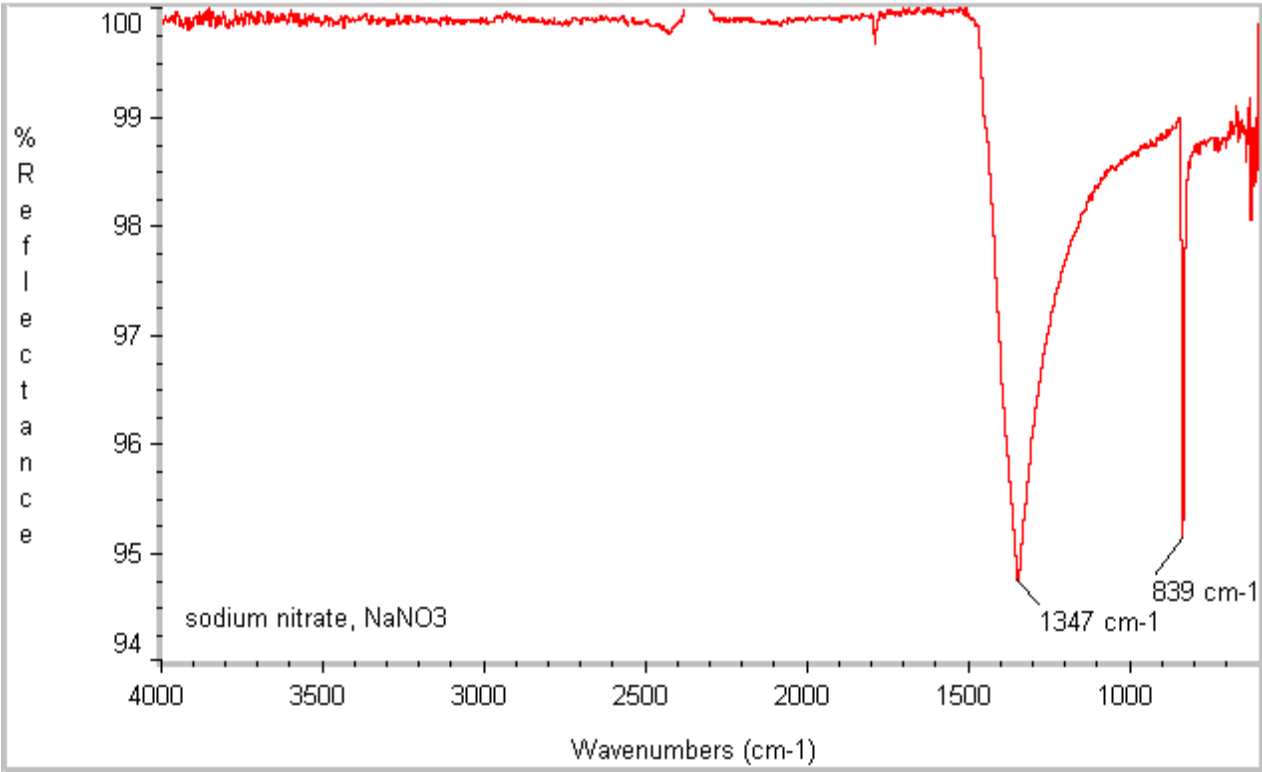


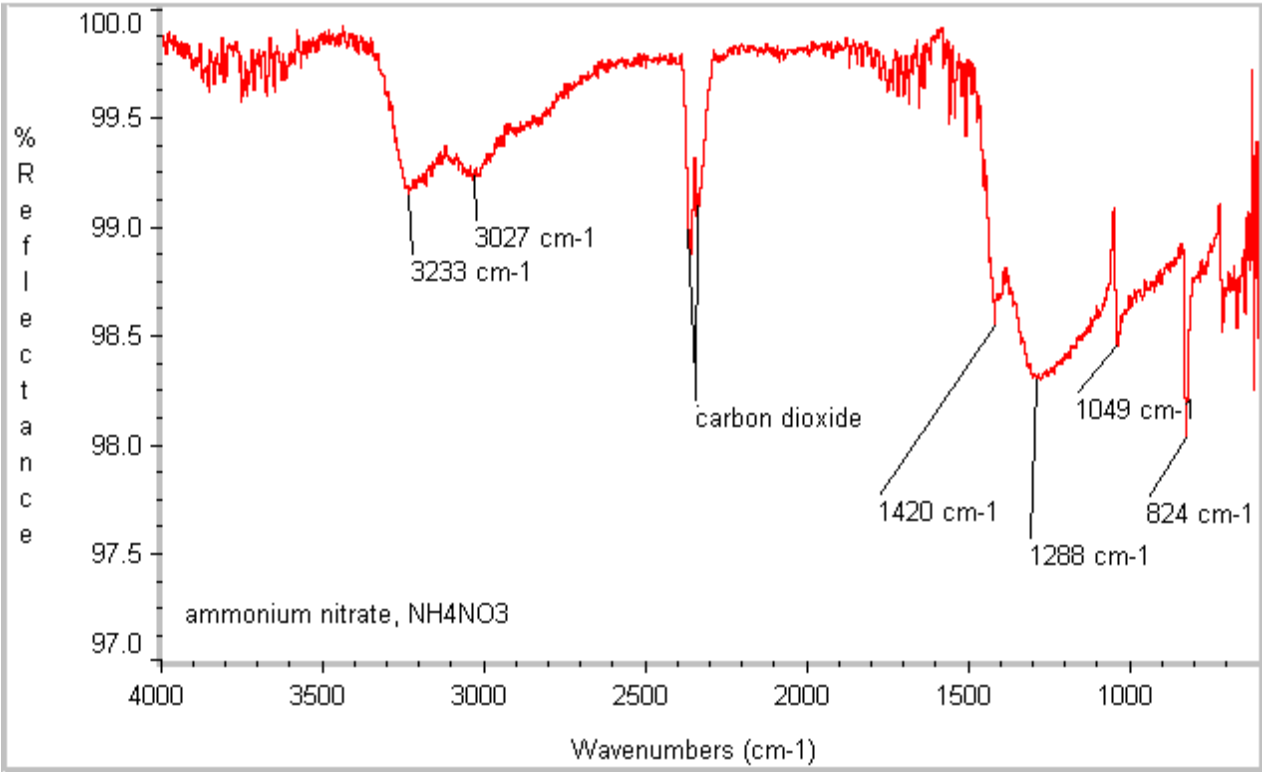


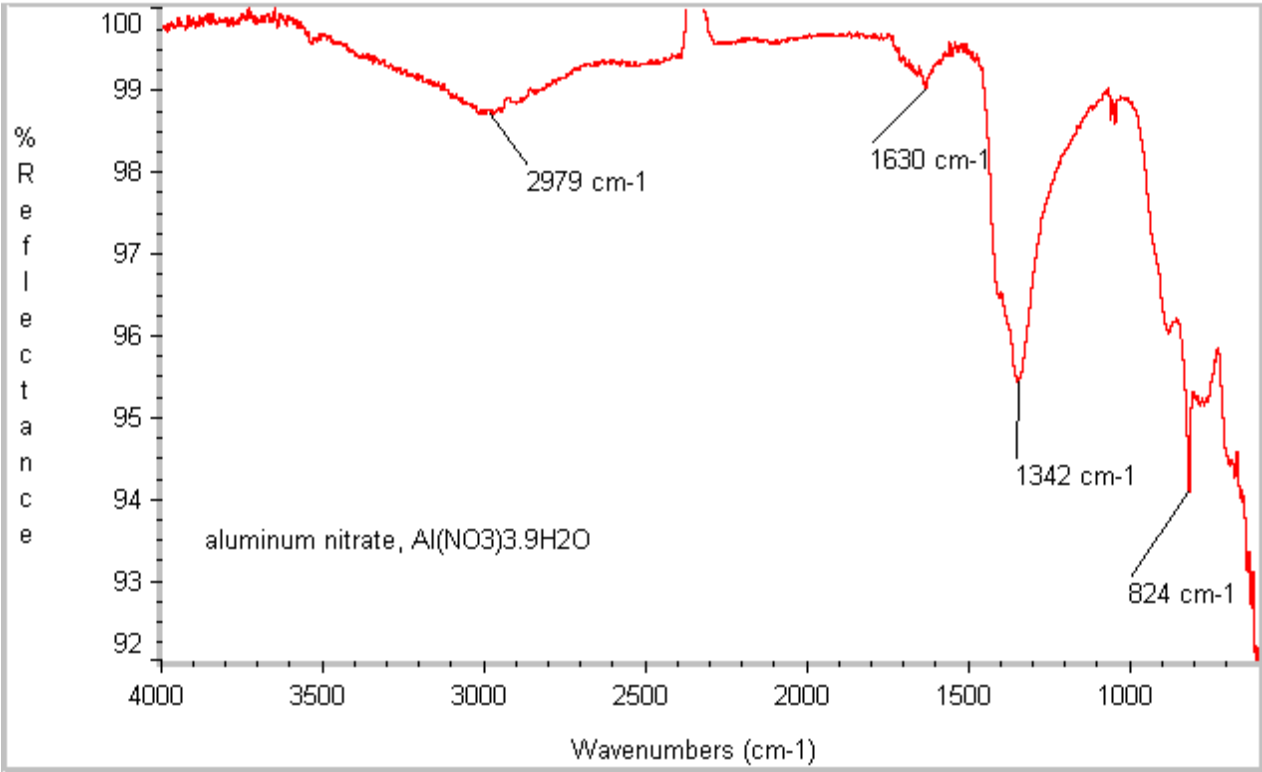


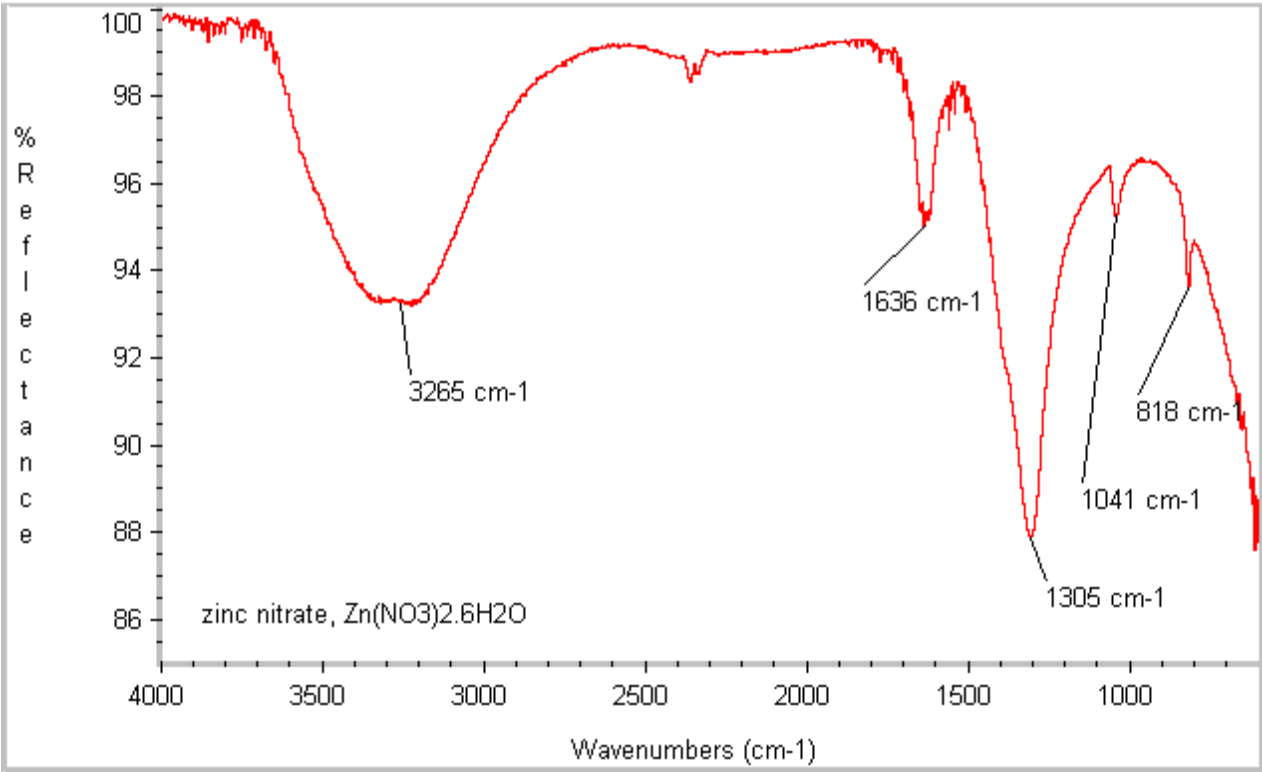
nitrate salts

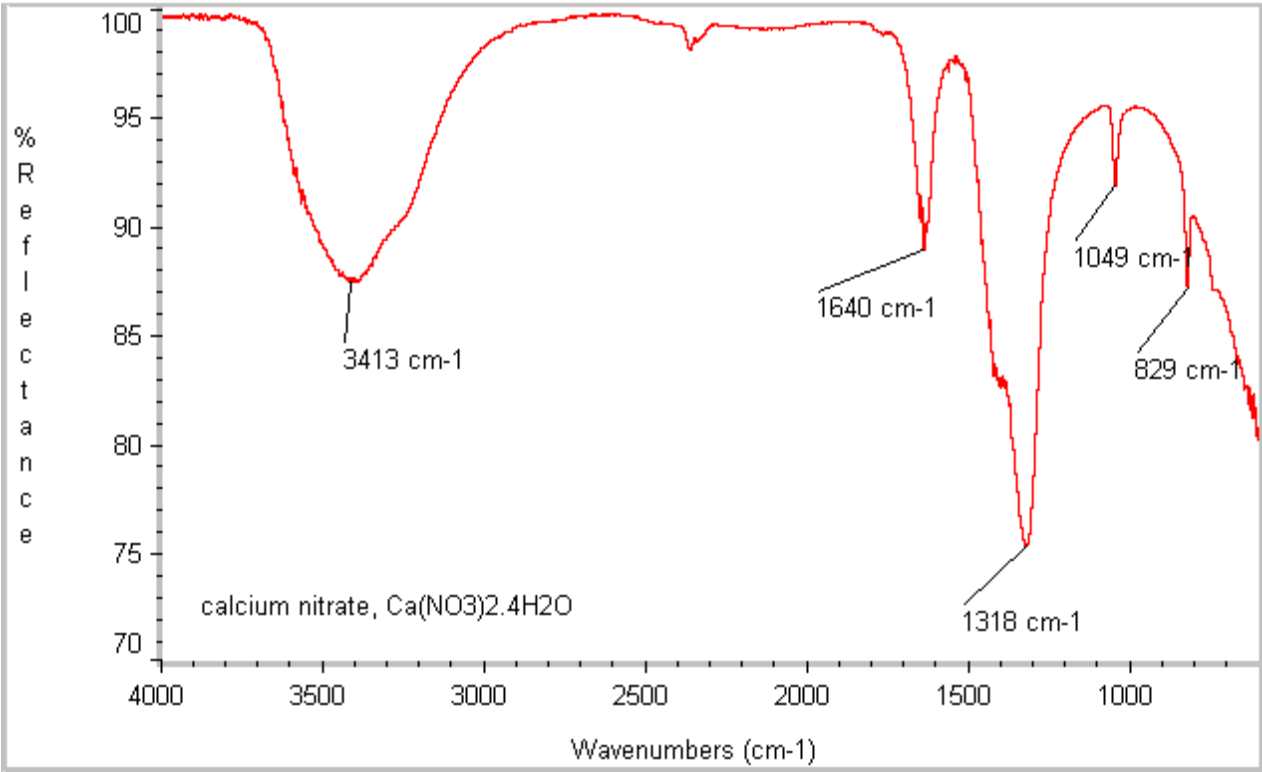


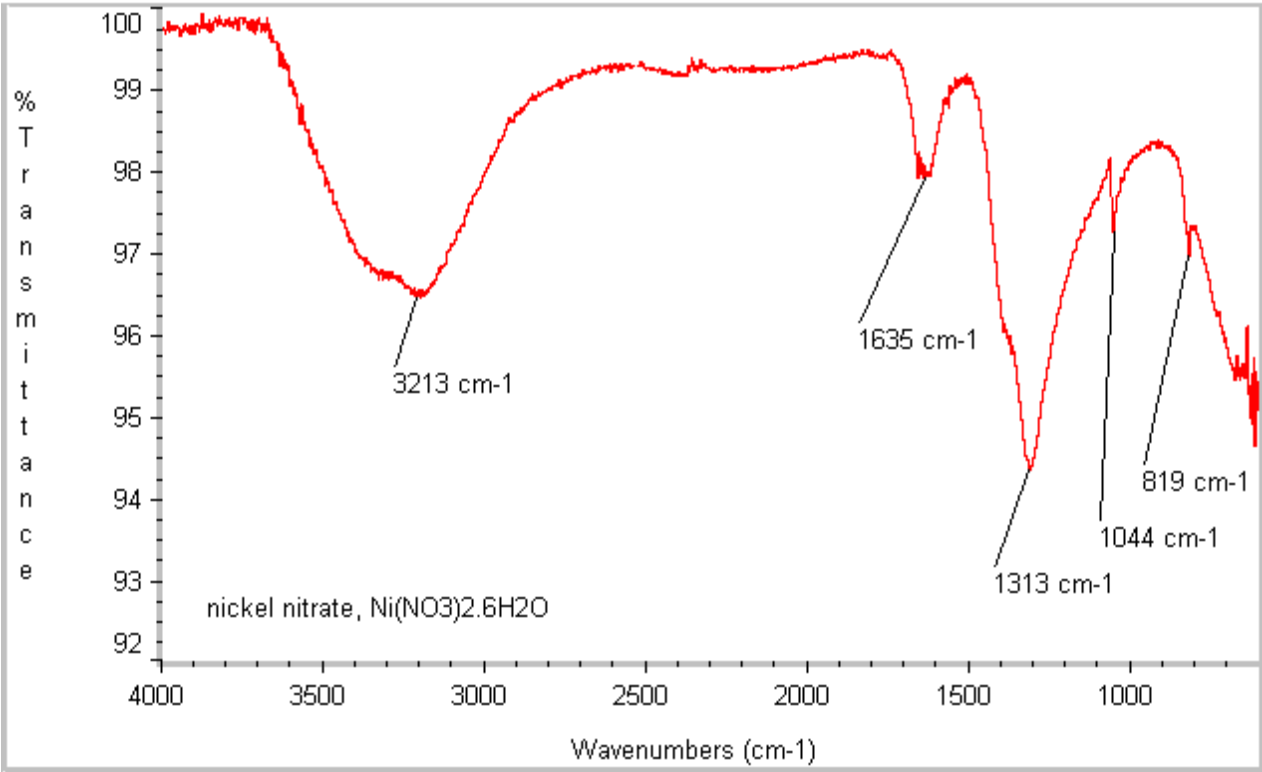




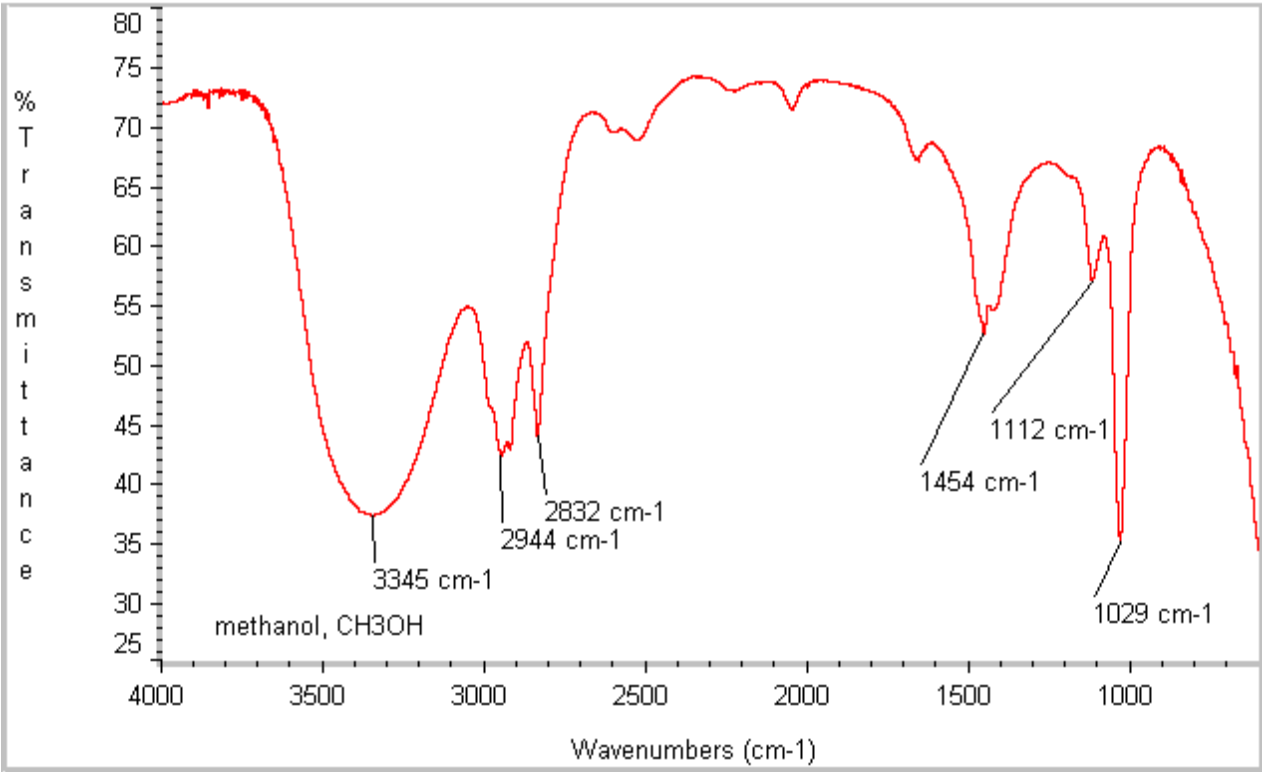


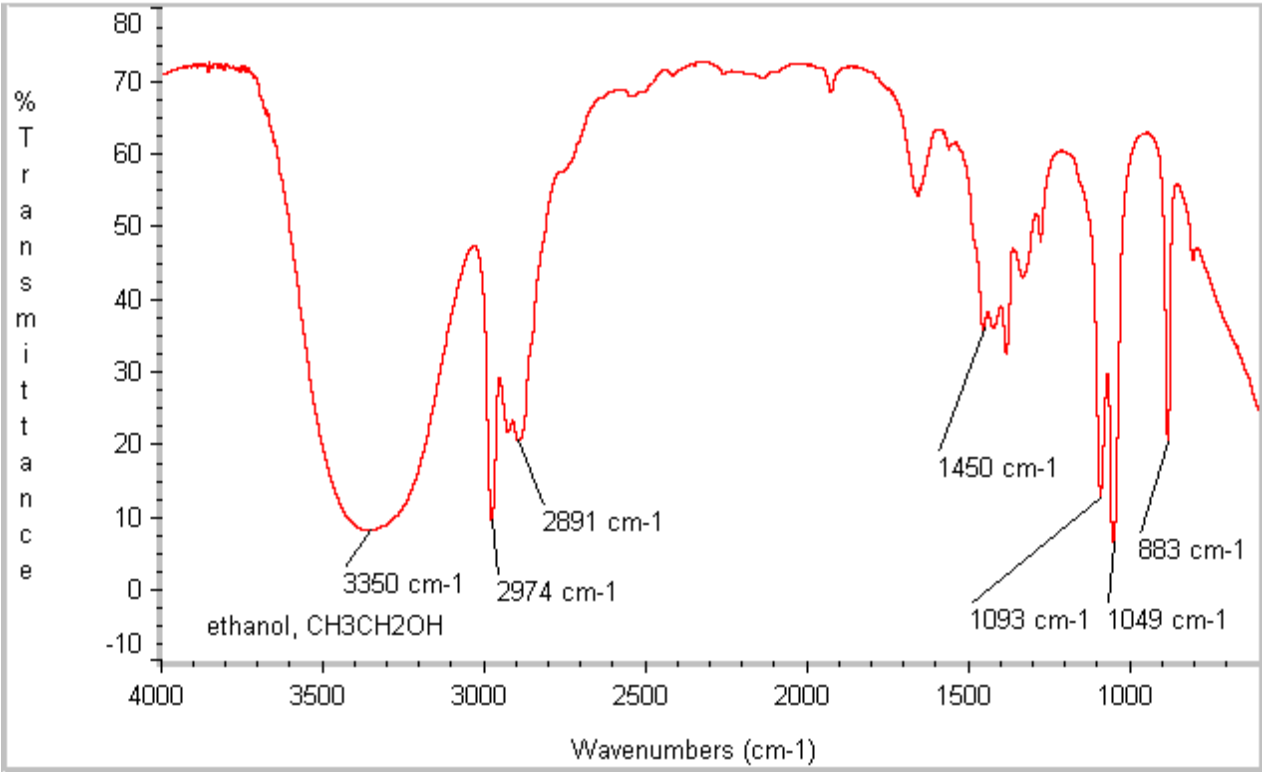


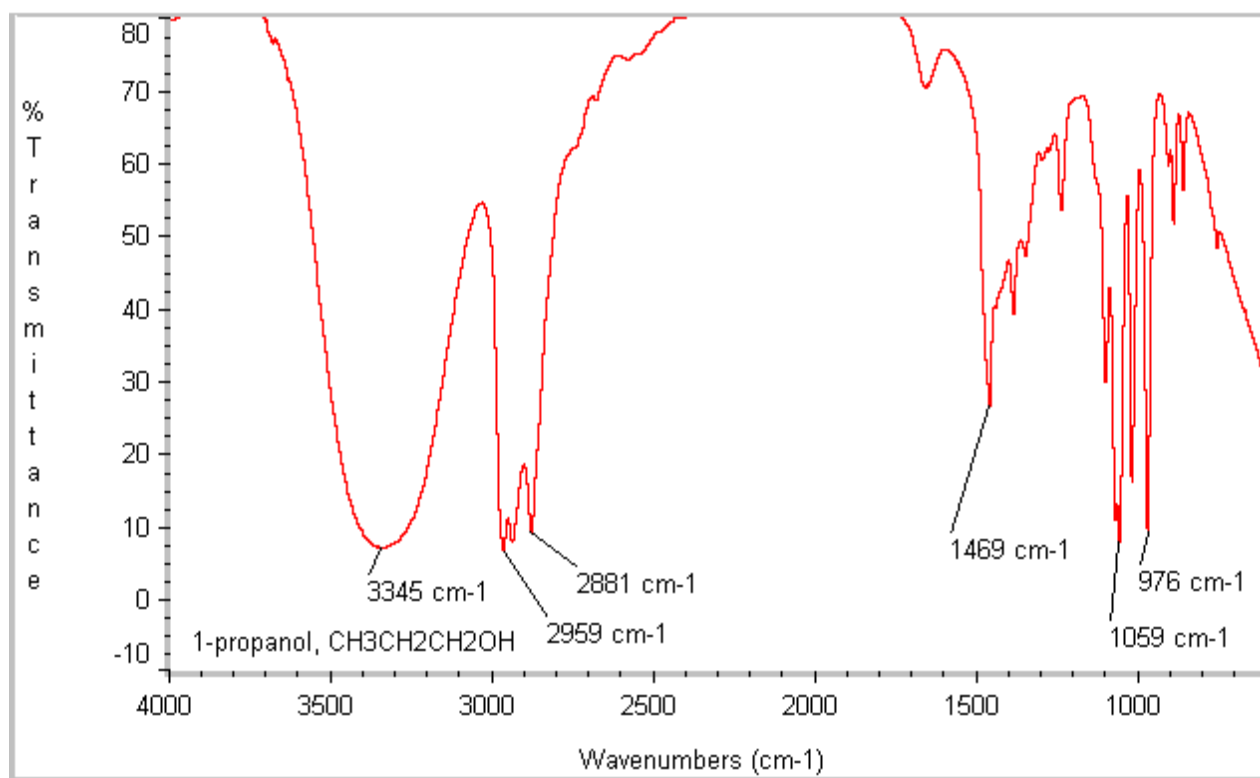


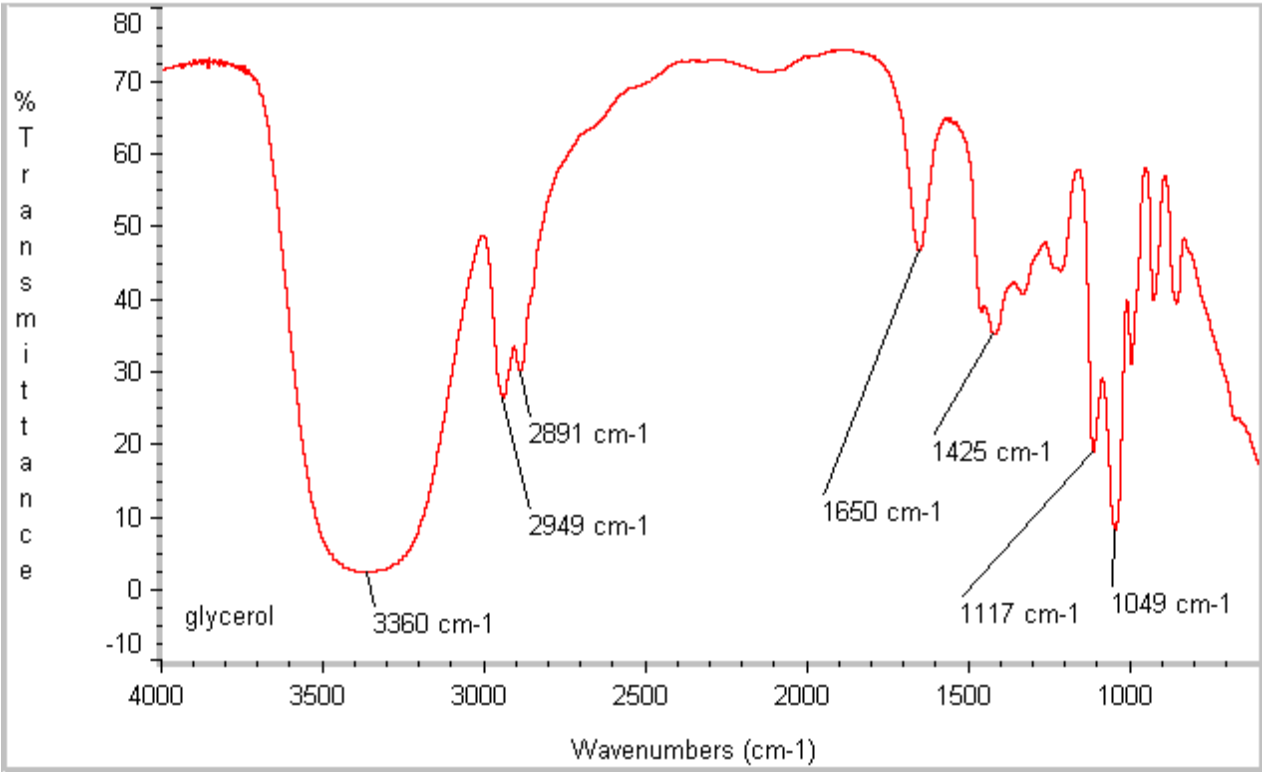


alcohols









carboxylic acids

