

Transmission IR of phosphorus in water-ice

The possibility of life on other planets has prompted philosophical debate and scientific research for years. As more of space is explored, and more is discovered about the origin of life, various planets and moons have come under speculation for the possibility of life. The icy moons of Saturn and Jupiter are prime examples. This is because of the presence of water-ice on their surfaces. However, there are many other important chemicals and elements necessary for life to develop and thrive. One such element is phosphorus. In order to analyze the ice on the surface of these moons and other planetary bodies, infrared spectroscopy is frequently used. This project aims to collect a series of transmission infrared spectra of phosphorus compounds in water-ice to be used as a reference. A mull cell set-up of the Omni-Cell System is being used with modifications to allow cooling to cryogenic temperatures, similar to those on icy moons. Development of a method for freezing the sample and keeping it frozen during infrared spectroscopy is underway. The solutions are made with deionized water and phosphorus compounds at super-saturated concentrations including phosphite and phosphate salts of calcium, magnesium, and iron. Metal phosphites (i.e., CaHPO_3 , MgHPO_3 , FeHPO_3 , and $\text{Fe}_2(\text{HPO}_3)_3$) will be investigated first because they are significantly more soluble than the corresponding metal phosphates.