RAMAN SPECTROSCOPIC STUDIES OF VANADIUM(III) COMPOUNDS

Anne-Marie Boulanger
Christian Reber, Rémi Beaulac

Université de Montréal

Université d'Ottawa

Vanadium(III) compounds have many applications: normalisation of diabetic symptoms and uses as therapeutic agents are two examples. It is important to study vanadium(III) in detail so that we understand its chemistry.

Vanadium(III) has a d^2 electronic configuration. The five compounds studied each have six metal-oxygen bonds and are more or less of octahedral symmetry.

Raman spectroscopy was used to study the electronic Raman transitions. This type of spectroscopy can also be used to study vibrational transitions of the molecule. We use a monochromatic light source, a visible laser line of 514 nm.

Electronic Raman transitions between electronic ground state levels were observed for all compounds, often as a broad band at approximately 1400 cm^{-1}. Results are shown in Table 1. It was also observed that this transition had a strong temperature dependence. The intensity of that band was diminishing with an increase of the temperature.

Table 1: Electronic Raman transition for the vanadium(III) compounds studied

Compound	Electronic Raman Transition	Width at Half Height
$V(urea)_6I_3$	1420 cm^{-1}	138 cm^{-1}
$V(urea)_6(ClO_4)_3$	1440 cm^{-1}	135 cm^{-1}
$Cs[V(C_2O_4)_2(H_2O)_2]\cdot 4H_2O$	1455 cm^{-1}	68 cm^{-1}
$K_3[V(C_2O_4)_3]\cdot 3H_2O$	1470 cm^{-1}	130 cm^{-1}
$V(ma)_3$	1495 cm^{-1}	150 cm^{-1}