

# ***Course 12.141: Electron Microprobe Analysis by Wavelength Dispersive X-ray Spectrometry – Problem Set 4***

***Problem 4:*** In the Ti-V system, the  $VK\alpha$  peak overlaps the  $TiK\beta$  peak. Analyze the steel sample for Ti and V using their  $K\alpha$  X-rays, an accelerating voltage of 15 kV, a beam current of 10 nA and applying peak overlap corrections. The L-values of characteristic x-rays for Ti and V are given below:

<b>X-ray</b>	<b>Analyzing Crystal</b>	
	<b>PET</b>	<b>LIF</b>
TiK $\alpha$	88.03	191.12
TiK $\beta$	80.52	174.81
VK $\alpha$	80.19	174.09
VK $\beta$	73.17	158.85

The L-value differences (peak separations) between  $VK\alpha$  and  $TiK\beta$  are 0.33 with PET and 0.72 with LIF. Since the difference is larger with LIF, it should be the preferred crystal for analyzing Ti-V compounds. In this exercise, use both crystals for the measurements. The sample contains minor amounts of Ti and V. Set the counting times such that 5-10% standard deviation of counts is achieved. Compare and explain the results obtained with the PET and the LIF crystals.