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Proton Induced X-ray Emission Spectroscopy of Red Wine Samples Using the Union College Pelletron Accelerator KATIE SCHUFF, SCOTT LABRAKE — A 1-megavolt tandem electrostatic Pelletron particle accelerator housed at Union College was used to measure the elemental composition and concentration of homemade Cabernet and Merlot red wine samples. A beam of 1.8-MeV protons directed at an approximately 12-μm thin Mylar substrate onto which 8-μL of concentrated red wine was dried caused inner shell electrons to be ejected from the target nuclei and these vacancies are filled through electronic transitions of higher orbital electrons accompanied by the production of an x-ray photon characteristic of the elemental composition of the target. This is the PIXE Method. Data on the intensity versus energy of the x-rays were collected using an Amptek silicon drift detector and were analyzed to determine the elemental composition and the samples were found to contain P, S, K, Cl, Ca, Sc, Mn, Al, Fe, & Co. Elemental concentrations were determined using the analysis package GUPIX. It is hypothesized that the cobalt seen is a direct result of the uptake by the grapes and as a product of the fermentation process a complex of vitamin B12 is produced.

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