



Contribution ID: 93

Type: **Poster Presentation**

## POSSIBLE APPLICATION OF IONIC LIQUID 3-METHYLPYRIDINIUM SALICYLATE IN LSC MEASUREMENTS

This paper investigates the scintillating and wavelength shifting properties of a newly synthesized ionic liquid 3-methylpyridinium salicylate (3-MPS), presenting the first results of its possible application in various Liquid Scintillation Counting (LSC) measurements. There have been few reports so far about ionic liquids' advantages for the detection and quantification of ionizing radiation. Presented experiments involved the addition of 3-MPS in small amounts (<1 g) to aqueous solutions of several radionuclides prepared in 20 ml counting vials, which were counted on ultra Low-Level Liquid Scintillation Spectrometer Wallac 1220 Quantulus. The presence of 3-MPS significantly influenced  $^{210}\text{Pb}/^{210}\text{Bi}$  spectra generated by Cherenkov radiation and gross alpha/beta spectra, it even impacted  $^3\text{H}$  spectra, although no scintillation cocktail had been added to the counting vials.

The emission and absorption spectra of 3-MPS have proven that it manifests a substantial wavelength shifting effect. That property can be very useful during Cherenkov radiation detection when radionuclides that can be detected with relatively low efficiency (such as  $^{210}\text{Pb}$ ) are of concern. Namely, 3-MPS presence can improve the efficiency for  $^{210}\text{Pb}/^{210}\text{Bi}$  detection via Cherenkov counting on an LS counter. The addition of 0.8 g of 3-MPS increased the efficiency from 16.4(4)% to 93.3(14)%, consequently reducing Minimal Detectable Activities (MDA) achieved more than five times. This discovery offers the unmatched improvement to all existing methods for  $^{210}\text{Pb}$  determination via Cherenkov counting. Furthermore, it was determined that 3-MPS acts as a scintillator when added in the amount  $> 0.1$  g to the counting vial, which suggests that it could find the application in the detection of various radionuclides via LSC measurements. Its influence on gross alpha/beta spectra generation of  $^{210}\text{Pb}$  and  $^{226}\text{Ra}$ , as well as on beta spectra of  $^3\text{H}$ , was also examined and reported in the paper.

These findings should be further explored and considered since 3-MPS usage in LSC measurements might offer one innovative alternative to the commercial LSC cocktails. The presented results support the idea that 3-MPS or other ionic liquid of similar structure soon might be implemented into the common LSC practice.

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**Session Classification:** Techniques for low-level  $\alpha$ -particle,  $\beta$ -particle and  $\gamma$ -ray measurements

**Track Classification:** Techniques for low-level  $\alpha$ -particle,  $\beta$ -particle and  $\gamma$ -ray measurements