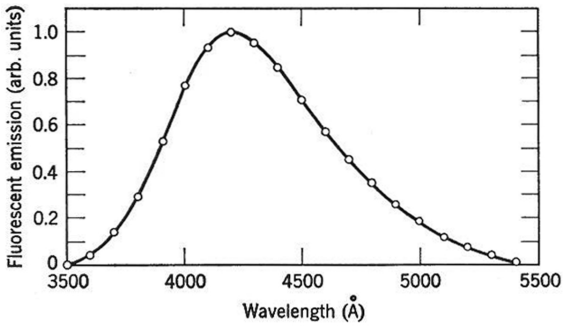
McPHERSON

Scintillator for VUV Detection

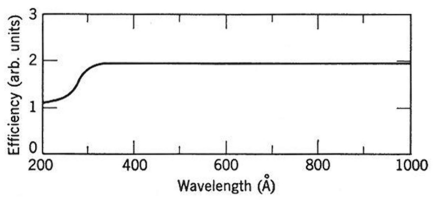
Photomultipliers offer high gain, low noise and fast time response. They are among, if not the most popular and widely used detectors for spectroscopy. It makes sense then, to detect vacuum ultraviolet radiation with a photomultiplier tube. But photomultiplier tubes cannot detect very short wavelengths by themselves. Their glass or quartz enclosure limits the response range. Addition of a scintillator is one method to easily sensitize a PMT for shorter wavelengths (to at least 30nm).

Sodium salicylate is the most popular scintillator we use today. Sodium salicylate has excellent fluorescent efficiency, nearly constant response in the 30 to 300nm spectral region, is easy to prepare, and does not affect vacuum pressure. Stability of fluorescence efficiency is excellent over time in vacuum systems with clean dry vacuum pumps. We have systems in the field using it for more than twenty years with continued good operation. It is our first choice for preparing photomultipliers for spectroscopy in the vacuum ultraviolet.

Emission Wavelength: 420nm
Decay Time: 7-12 nanoseconds
Characteristic: Crystalline layer of approximately 1-2mg/cm^2
Fluorescence Efficiency: ~60% for incident wavelengths 40 to 300nm



Fluorescent emission spectrum of sodium salicylate



Relative quantum efficiency of sodium salicylate between 200 and 1000 Å

The coated sodium salicylate layer is mechanically fragile. Do not touch or contact it in any way. Sodium salicylate dissolves readily. Do not wipe or splash any liquid near the coated layer. Mechanical or liquid contact will likely ruin the scintillator coating.

Relative QE and Emission traces from:
Techniques of Vacuum Ultraviolet Spectroscopy, by J.A.R. Samson, Pied Publications 1927 South 26 Street, Lincoln Nebraska
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