

## **DESIGN OF AN *IN-SITU* XRF INSTRUMENT FOR ELEMENTAL DIFFUSION MEASUREMENTS**

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We are designing an experiment to make *in-situ* measurements of iodine diffusion through a clay formation. Locating the diffusion front requires the lowest possible detection limits, so we have performed calculations to aid in the experiment and apparatus design. Calculating the minimum detection limit (MDL) requires knowledge of absolute count rates and of the background under elemental peaks. Thus we attempted to calculate the full spectrum, including the K and L lines for most elements and the scattered radiation, for several possible alternatives such as Gd X-ray tube, filters, voltage, and geometry. The calculations were checked against selected measurements on a few elements. The end result was the choice of a higher voltage system to excite the iodine K lines.