

Record 21 of 26

Title: ELEMENTAL ANALYSIS USING NATURAL GAMMA-RAY SPECTROSCOPY

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Abstract: A gamma-ray spectroscopy setup has been recently established to measure the natural gamma-ray activity from potassium (K-40), uranium (U-238), and thorium (Th-232) isotopes in rock samples of oil well-logs. The setup mainly consists of a shielded 135 cm³ Hyper Pure Germanium (HPGe) detector, a 5 in. X 5 in. NaI(Tl) detector and a PC based data acquisition system. The core samples, with 70-100 g weight, have cylindrical geometry and are sealed such that radon gas from U-238 decay would not escape from the sample. For room background subtraction, pure quartz samples identical to core samples were used. The sample is first counted with the HPGe detector to identify the elements through its characteristic gamma rays. Then the elemental concentration is determined by counting the sample with a NaI detector. In order to determine the absolute concentrations, the sample activity is compared with the activities of standards supplied by NIST and IAEA. The concentration of U-238 and Th-232 has been determined in ppm range with that of K-40 in wt.%.