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Spectrometric Characteristics of Various Detectors for X-Ray Determination of Iodine from K-Series Line Emission using ^{241}Am as the Source

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Results of the studies of spectrometric characteristics of scintillation and semiconductor detectors with crystals from NaI(Tl), CdTe, CdZnTe, Si(PIN), Si(Li), Ge(HP) for registration of X-rays in the energy range from 20 keV to 60 keV are present. The energy resolution, the presence of escaping peaks, peaks from the radiation of structural and technological elements was determined and a comparison of the effectiveness of the registration was done on the base of the investigating of the response functions (spectra). The limitations and possibilities of application of these detectors to determine the iodine content in carbon using the X-ray radiometric method with registration of K-series characteristic X-ray radiation are listed. The methods to avoid the interference of K-series iodine analytical line with escaping peaks were demonstrated. It is found, that to develop the technique having a high analytical characteristics for the determination of the mass content of iodine in carbon, which is designed for operating in stationary conditions the use of Ge(HP) detector is preferable. If priority requirements are the small size and high mobility of analytical device, it is preferable to use the CdTe detector with thermoelectric cooling and a secondary induced X-ray radiation from a studied sample.

Keywords: characteristic X-rays, semiconductor detector, iodine, K-series, radioisotope X-ray fluorescence