

USING ION-SELECTIVE ELECTRODE FOR DETERMINING IODINE-131 PREPARATION SPECIFIC ACTIVITY

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In 2000 in the State Scientific Centre of the Russian Federation "Research Institute of Atomic Reactors" (SSC RF RIAR) a pilot facility was developed for iodine-131 production. Iodine-131 produced at this facility meets all the requirements of world standards and has the following features:

Parameter	Values
Chemical form	Sodium iodide solution (NaI ¹³¹) in the carbonate-bicarbonate buffer (or in 0.001 mole/l NaOH)
Specific activity	Carrier free (> 5 Ci/mg)
pH of solution	7 ÷ 10
Radionuclide purity	> 99.9%
Radiochemical purity	> 97%
Bulk activity	0.15 Ci/ml

Specific activity is one of the most important characteristics of radionuclide preparations. It determines their consumer properties and the period of the permissible usage of the preparation. At present in order to determine the Iodine-131 preparation specific activity the methods are used based on the kinetic analytical reaction Ce^{4+}/Ce^{3+} following by spectrophotometric analysis [1,2]. Such methods are not labour-efficient and do not provide stable results. Authors [3] report the fundamental possibility to apply ionometry using an iodine-selective electrode for determination Iodine-131 preparation of specific activity. The method used for determination of anion concentration using ion-selective electrodes is characterised by simplicity and rapidity. For this method the concentration range to be measured covers 10^{-1} - 10^{-7} mole/l with respect to [I⁻].

This paper presents the experimental results of the investigations on the determination of specific activity of iodine-131 preparation using iodine-selective electrode. This method allows determination of the analytical concentration of ion-iodide in carbonate-bicarbonate buffer (pH = 8 ÷ 11) and NaOH solution (0,01 mole/l, pH = 8 ÷ 11). A micro-cell has been developed for the analysis of the iodine-131 solution allowing the reduction of the sample volume under analysis to $\leq 0,3$ ml. A relative error of the determination of [I⁻] analytical concentration within the range 10^{-6} ÷ 10^{-1} mole/l does not exceed 1%.

References:

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