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A simple method for preparation of labelled halides*

It is well known that labelled halides can easily be produced by direct activation. This method, however, with very few exceptions, produces doubly-labelled salts. In the course of an investigation on thermal decomposition of halides, a method was developed for preparing hydrochloric acid labelled with Cl-38 by an easy and quick procedure which is suitable for the preparation of practically any chloride singly-labelled. The method permits the use of the short-lived and readily available Cl-38 instead of the long-lived but very costly Cl-36, in those cases where both isotopes are suitable. This method may be of help in many investigations of chemical reactions, reaction mechanisms, reaction kinetics, etc., of halide acids and salts, provided a neutron source of sufficient flux is available for the activation.

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The preparation is carried out in a small glass apparatus as shown in Figure 1. The vessel is designed to minimize the dead volume. The operation is performed in a shielded hood suitable for radiochemical work with activities up to 5 mCi. The process consists of the following steps:

a) 15 mg KCl are irradiated; in our case the irradiation is performed in the pneumatic rabbit of the IRR-1 reactor at a thermal neutron flux of 7×10^{12} n/cm^2/sec, for 5 minutes;

b) the irradiated salt is transferred from the vial to the gas generator (1) shown in Figure 1;

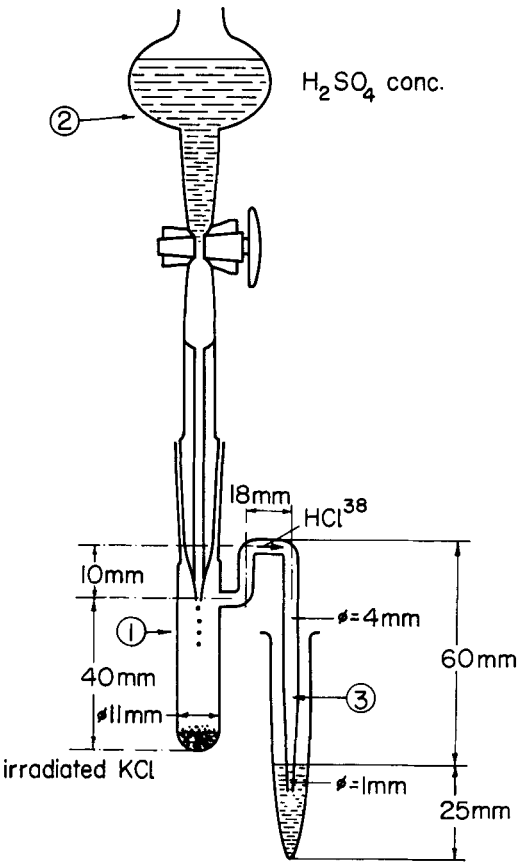

Fig. 1

c) concentrated sulphuric acid from (2) is allowed to drip slowly into the salt. $H^{38}Cl$ is developed immediately according to the reaction

$$KCl + H_2SO_4 \longrightarrow HCl\uparrow + KHSO_4$$

The introduction of acid is continued after the reaction is complete, until the gas generator is filled with the acid. In this way the hydrogen chloride gas is driven into the small reaction tube;

d) The $H^{38}Cl$ is absorbed through a capillary tube (3) into a solution which contains 0.2 milliequivalents of the hydroxide or carbonate of the required metal in 0.1 ml water. The labelled chloride solution is now ready for use.

The yield of the labelled hydrochloric acid is 80% as calculated from the assay of the $H^{38}Cl$ absorbed in the solution.

This method has been used in our laboratory for more than two years and has proved reliable and rapid. Labelled material is normally obtained within fifteen minutes of the end of irradiation. The procedure may be applied to the production of labelled bromides and iodides as well.

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