# Rapid determination of $^{90}$Sr and $^{90}$Y in water samples with Hidex 300 SL TDCR liquid scintillation counter by Cerenkov-TDCR method

## Introduction

Sr-90 is one of the most hazardous isotopes because of its long physical and biological half-life and because it may cause damage to bone marrow. Therefore rapid and reliable methods to measure radiostrontium are needed particularly in a case of nuclear accident.

## Materials and methods

Both Eichrom and Triskem offer excellent products for radiochemical separation of Strontium-90 from its daughter Yttrium-90. Hidex 300 SL automatic TDCR liquid scintillation counter offers excellent measurement capabilities for rapid, robust and easy determination of Strontium quantities. Figure 1 shows flow chart of sample preparation and measurements.

The unique feature of Hidex 300 SL is the TDCR counting which can also be utilized in Cerenkov counting mode.

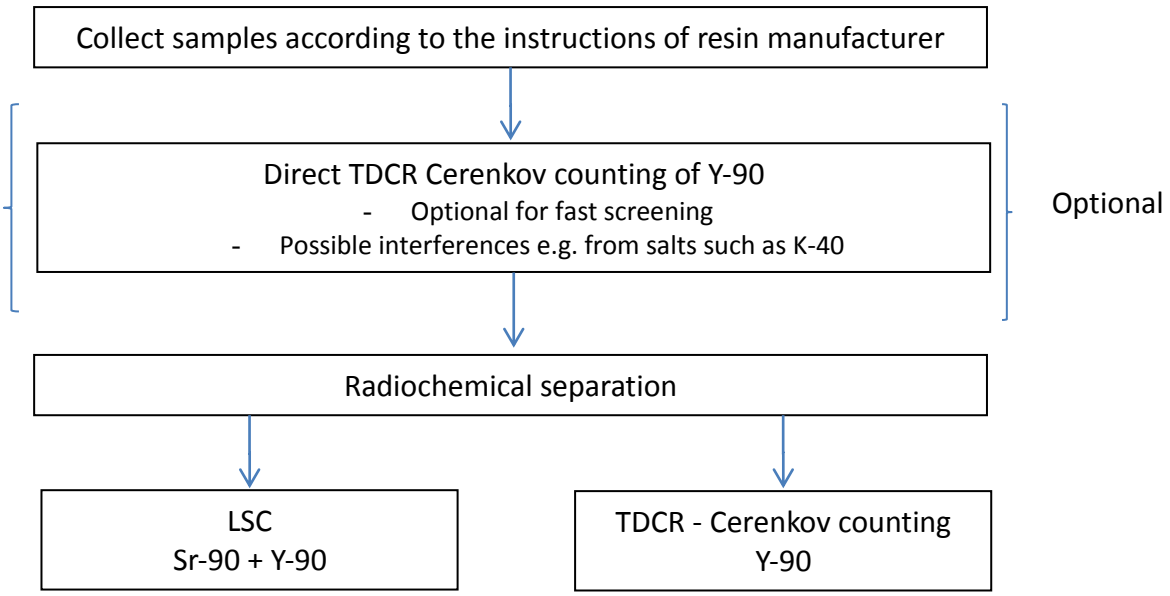


**Fig. 1** Diagram showing an overview of the methodology used to determine $^{90}$Sr and $^{90}$Y samples.


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Procedure

1. Prepare samples by radiochemical purification according to manufacturers instructions. ( Eichrom or Triskem)
2. After radiochemical purification take 8ml sample and measure in 20 ml plastic vial without scintillation cocktail. Count activity of Y-90 directly with Hidex 300 SL TDCR-Cerenkov method. Use readymade parameter file.
   Efficiency Y-90 = 0.6886 * TDCR + 0.1678
   *Use background corrected TDCR value with low activity samples
3. Add 12 ml AquaLight cocktail to sample and count total activity
   Total Bq = CPMnet/(TDCR*60)
4. Subtract results of the first measurement from the results of the second measurement to obtain activities for Sr-90.

Results and discussion
References customers have reported detection limits of:

Sr-90

1 h: 90 mBq/l
5 h: 40 mBq/l
10 h: 28 mBq/l
24 h: 18 mBq/l

Sample volume: 2 L
k1-a + k 1-b = 3.29
Blank: 50 CPM (for standard model instrument).

Please note that the detection limits are strongly dependent on sample preparation methods.


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