

Gross alpha analysis from water samples

Preparation of the samples

Samples are shaken in shaker at least one hour. After this, aliquote (19 ml sample) is taken from the water sample into the teflon coated liquid scintillation vial (Fig. 1). Write name of the sample on the cork of the liquid scintillation vial, same identification (ID) is written on the walls of the liquid scintillation vial.



Figure 1. Preparation of gross alpha samples.

Drying of the samples

Water samples are dried under IR lamp or in freeze dryer (Fig. 2). If freeze dryer is used, samples need to be in frozen before putting them in freeze dryer. Evaporation of the samples takes between 1 and 2 days depending on number of the samples. After samples are dried, new aliquote (19 ml) from water is taken. In the second filling it must be careful with amount of water. Extra water can not be taken away from liquid scintillation vial.

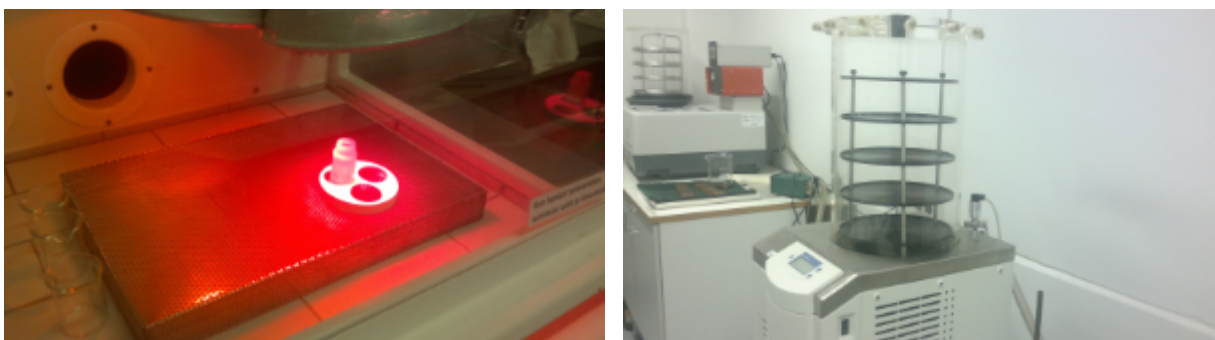


Figure 2. Drying the samples under IR lamp or using freeze dryer.

Dissolution of dried samples

After samples are dried, the residue is dissolved into 1 ml 1.0M HCL acid. The acid is prepared into low activity level water. Shake the water and make sure that all precipitation is dissolved into the acid (Fig. 3). You may use ultrasonicshaker if needed. After dissolution, shake the samples for one hour.

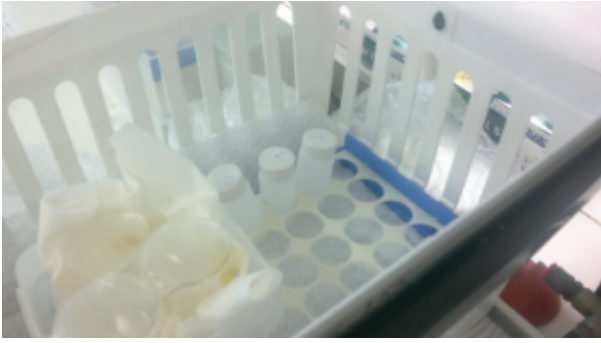


Figure 3. Shaking the samples.

Addition of the liquid scintillation cocktail

After precipitation is dissolved, 21 ml of liquid scintillation cocktail (Ultimate Gold AB) is added. The cork of the vial is closed tightly and check the ID of the cork and bottle. Remove the ID from the wall of the liquid scintillation vial.

Preparation of the background samples

Make background sample for every batch. Add 1ml 1.0M HCl and 21 ml Ultima Gold AB liquid scintillation cocktail. Give ID and date for background sample.

Washing the samples

Before samples are stored for 30 days, they are washed in ultrasonic shaker using distilled water and Ba-alcohol. Washed samples are stored for 30 days in dark room in order to attain radioactive equilibrium between Ra-226 and Rn-222. Put ID of the batch and date in front of the samples.

Destruction of the liquid scintillation vials

After samples are measured and the results are reported liquid scintillation vials are sent to hazardous waste disposal plant for destruction.

Problems and solutions

Very salty and colored samples cause quenching and increase uncertainty of the results. Decreasing amount of water taken for analysis may decrease quenching. Sometimes ascorbic acid need to used in order to get rid off colour.