Determination of Sodium in Argonauta reactor water

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Keywords: flame atomic emission spectromety, sodium, reactor water.

The Argonauta Reactor has 500 W of maximum power and uses U_3O_8-Al MTR as dispersion fuel type with 20% uranium enrichment. The fuel plate cermet with a mixture of aluminum and U_3O_8, both in powder is put in a 12-mm aluminum frame. As moderator, deionized water is used between the plates and wedge-shaped graphite, between the fuel elements[1]. To avoid corrosion of the aluminium of the fuel plate and consequently; radioactive contamination of the reactor water, analytical control as the reactor water conductivity, pH and also quantitative analysis of the ionic concentrations of Cl^- and Na^+ , it is indispensable to maintain the water quality. The determination of Na by Flame Atomic Emission Spectromety (FAES-GBC 908) in Argonauta water samples was carried out [2]. The analytical curve obtained for Na is presented in the Figure 1. The Na detection and quantification limits were 0,006 and 0,022 $\mu g.g^{-1}$, respectively. The Table 1 shows Na content found in Argonauta water reactor samples.

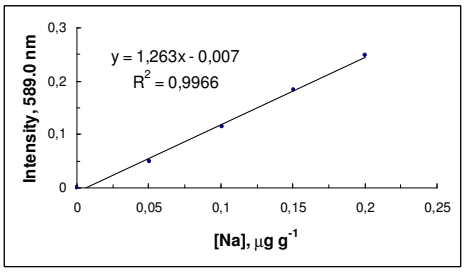

Figure 1 – Analytical curve of Na by FAES.

Table1- Sodium content in water reactor samples.

Sample	Na ($\mu g\ g^{-1}$)
W-1	≤LQ
W-2	0,071±0,004
W-3	0,024±0,007

References

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Processing of zirconite concentrate by alcaline fusion and lixiviation

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This work describes the processing of a Brazilian zircon ($ZrSiO_4$) concentrate via fusion with sodium hydroxide. Its goal was to produce a zirconyl sulphate solution ($ZrOSO_4$). The effects of $NaOH/ZrSiO_4$ mass ratio, temperature and reaction time were investigated. The fused mass was leached with pure water, followed by leaching of the insoluble matter with sulfuric acid. The effects of temperature and liquid/solid ratio on water leaching were investigated, as well as the influence of temperature and acid concentration on $ZrOSO_4$ purity. The best fusion conditions were: $NaOH/ZrSiO_4$ mass ratio = 1.5:1; temperature, 575°C; reaction time, 30 min. Water leaching was best conducted with a water/fused mass ratio = 5/1 at 25°C. Acid leaching required 100 mL 3 mol L^{-1} H_2SO_4 to dissolve the water-insoluble solid at 25°C. 97 wt. % of $ZrSiO_4$ was decomposed and around 91 wt. % of Zr was recovered in the final product [1, 2]

References

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