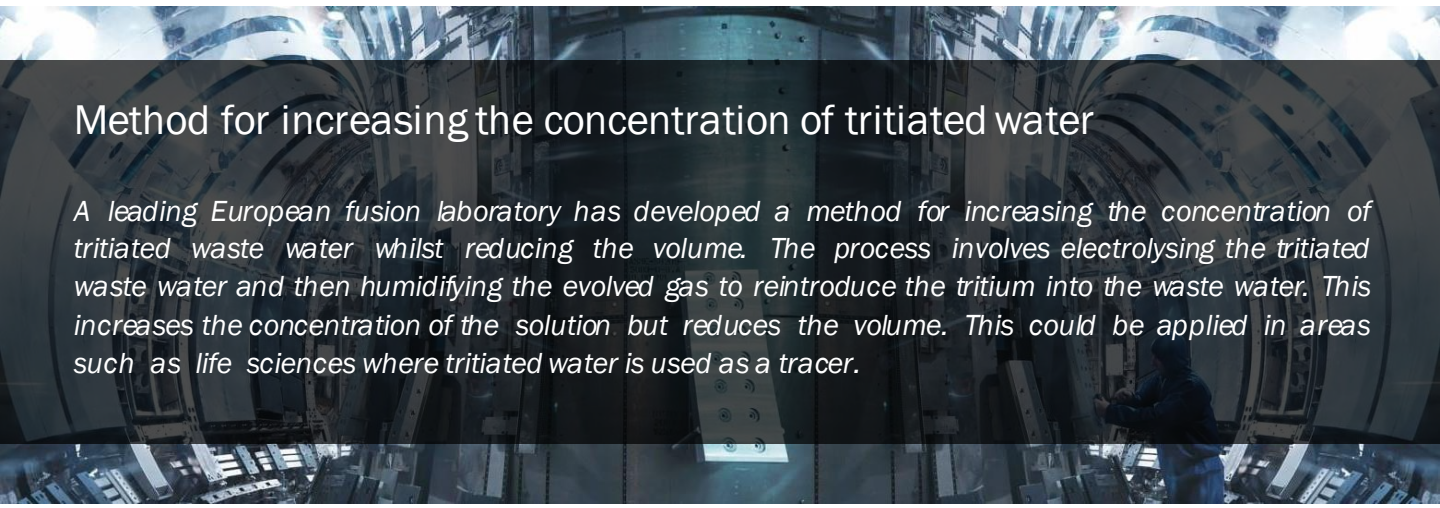


Method for increasing the concentration of tritiated water

A leading European fusion laboratory has developed a method for increasing the concentration of tritiated waste water whilst reducing the volume. The process involves electrolysing the tritiated waste water and then humidifying the evolved gas to reintroduce the tritium into the waste water. This increases the concentration of the solution but reduces the volume. This could be applied in areas such as life sciences where tritiated water is used as a tracer.

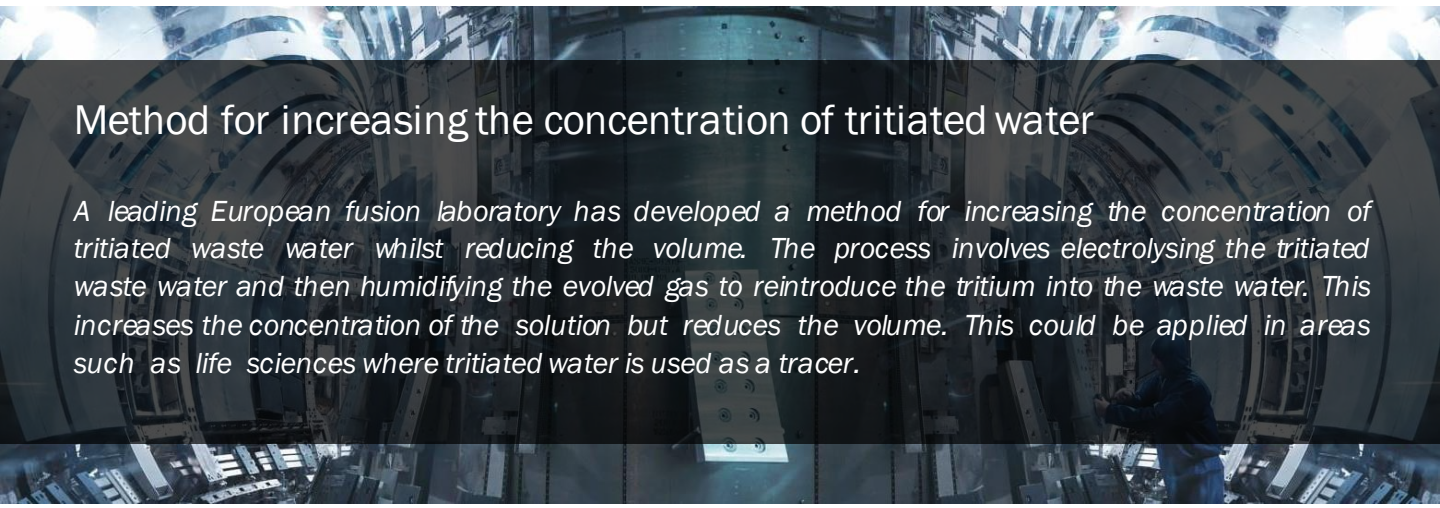
Description of the technology

Tritium is usually present at a low level in the water and this typically renders the recovery of tritium uneconomical. However, tritium may not be disposed of directly into the environment and therefore disposal of such water wastes is typically expensive. As the cost of disposal of radioactive waste is usually dependent on the volume of the waste, it is beneficial to concentrate radioactive waste as far as possible.

A method for reducing the volume and increasing the concentration of tritiated water has been develope d. This involves introducing the tritiated water into an electrolysis cell. Electrolyzing it forms gaseous hydr ogen and oxygen. The evolved hydrogen is then passed through a humidifier into a liquid phase catalytic isotope exchange separation column. The hydrogen rises up the column in a countercurrent flow with pure water that is being introduced at the top. This then flows back into the electrolysis cell in more concentrated form and can then be removed.

Example: The apparatus was operated for 296 days. 35600kg of tritiated light water were fed into the electrolysis cell and this contained a total tritium inventory of 105400GBq. The tritium concentration in the tritiated feed water averaged about 3GBq/kg. A prei determined level of 300GBq/kg was chosen for the concentration of the tritiumi contaminated water (as an end product). This meant that the amount of tritiated water was reduced from 35600kg to 350kg. In addition over 3500kg of tritium–depleted water with a concentration below 100kBq/kg was obtained from the tritium--depleted hydrogen when it has been recombined with oxygen. The limit of 300GBq/kg was chosen as the desired combination as this is below the limit of 330GBq/kg that is allowed for the international transportation of tritiated water.

EUROfusion
TECHNOLOGY TRANSFER PROGRAMME



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Innovation and advantages of the offer

- It is a less complicated method than alternatives on the market.
- There is flexibility on the final concentrations of the tritiated water.
- Doesn't require complicated monitoring systems and multiple feed points.
- Easily scalable

Non-fusion Applications

Tritium contaminated water is produced by nuclear reprocessing plants, the pharmaceutical industry, life--sciences research, and heavy water nuclear power reactors. This could offer a simplified, lower cost alternative to many labs and waste disposal companies working within these sectors.

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