



**KINETRICS**

# **SCEPTER™ Process**

Selective Carbon Extraction Process Through Exchange Reaction



**SCEPTER™** is a Green Technology



**A novel process developed by Kinectrics for extracting and recovering the valuable isotope carbon-14 from waste ion exchange resins, and reducing the volume of the processed resin**

## **Waste Resin Challenge**

The waste ion exchange resins generated by heavy water type nuclear reactors contain significant amounts of carbon-14. Because this radioisotope has a half-life of 5730 years, such wastes are classified as Intermediate Level Wastes (ILW). In addition to the high cost of disposing of this type of waste, the waste resins can also emit carbon-14 into the environment.

The nuclear industry would benefit from a method for extracting the carbon-14, reclassifying the processed waste resin as Low Level Waste (LLW), and dramatically reducing the volume of the waste while recovering the carbon-14. The recovered carbon-14 can then be used in chemical and biomedical research and the production of pharmaceuticals.



**SCEPTER™** reduces waste volume to 1/3 of original

## **Technical Description**



The treatment process contains two main chemical steps:

- 1 Proprietary carbon extraction reagent that removes the carbon-14 from the resin**
- 2 Precipitation reagent that converts the extracted carbon to an insoluble low volume material**

The resin, without the carbon-14, is dried under gentle conditions using minimal energy and reduced in volume.

The precipitation chemistry has been selected in a way that the second step regenerates the original extraction reagent. This provides both cost-saving and environmental benefits.



**An innovative process that removes over 95% of carbon-14**



**Waste disposal savings through volume reduction**

## A Green Waste Solution

Kinectrics has developed a novel process that removes well over 95% of the carbon-14 in spent ion exchange resins while reducing the impact to the environment.

The **SCEPTER™** process is a mild chemical treatment that uses **no highly hazardous chemicals** (nothing corrosive, toxic, carcinogenic, flammable, nor harmful to the environment) and produces **no environmental emissions**.

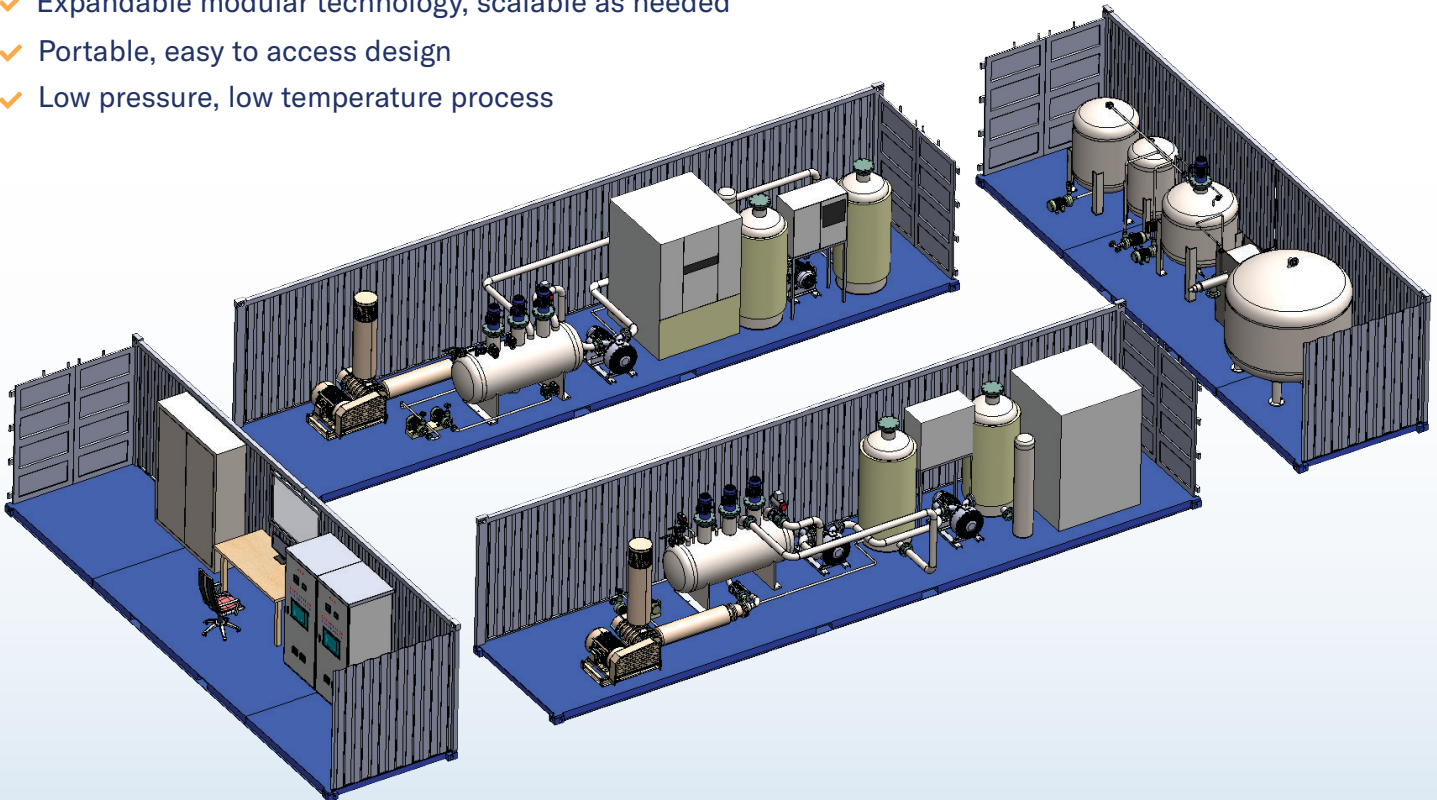
### Advantages include:

- Ambient temperature, low pressure operation
- Volume reduction of treated resin between 35 to 50% of its original volume
- Reduction of the carbon-14 waste volume to only 3% of its original volume
- Producing carbon-14 that can be purified for chemical R&D and radiopharmaceutical products
- Proprietary carbon-14 extraction reagent that can be recycled and reused
- Huge waste disposal savings through volume reduction of ILW and LLW
- Carbon-14 can be purified and isotopically upgraded for use as a waste derived product
- Process regenerates the extraction reagent for reuse

## Modular Design

### Key Features of Modular Design:

- ✓ Expandable modular technology, scalable as needed
- ✓ Portable, easy to access design
- ✓ Low pressure, low temperature process



Kinectrics' **SCEPTER™** process is a **Green** technology for the management of waste ion exchange resins



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