



## MEASUREMENT OF THE GLOBAL COMPLEXING POWER OF A NUCLEAR WASTE PACKAGE, WASTE LEACHING OR OF AN EFFLUENT

### Challenges & Markets

The **detection of pollutants**, even slight traces of them, is a sanitary and environmental issue facing our society today.

In this context, the development of techniques enabling us to **reveal any risk of pollution and/or to characterize the pollutants** has become indispensable for all industries.

In order to prevent pollutant transfer drained by infiltration water and/or from soil runoff, the LARC has perfected a technique permitting researchers **to estimate the reliability of the buildup of polluted materials** through the global measurement of a piece of waste. This is a back titration method that enables us to assess the quantity of complexing (*i.e.* molecules and ions capable of complexing a cationic element (for example, a metallic cation)) present in the surroundings of the waste, with these molecules promoting the dissolution of the toxic compounds (or radiotoxic compounds) initially contained in the waste thereby inducing an increase in the pollution of soils. Once the presence of the complexing molecules is detected, a precise chemical characterization of these can be performed by offering a solution adapted to this type of pollution.

This type of analysis is particularly applicable in the field of :

- the **environment** (analyses of aqueous effluents /waste , analyses of traces... ),
- the **nuclear** industry (analysis of non-irradiated waste, radioactive waste or slightly radioactive waste...)

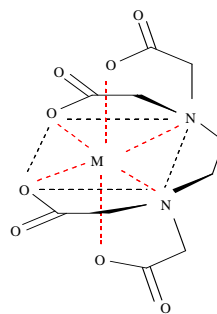
### Value added offer

The analyses laboratory of the DEN in CADARACHE (L.A.R.C.) offers industrialists its **technical expertise in terms of physico-chemical characterization** for any scientific project necessitating the **detection**, the **analysis of slight traces and/or ultra traces**. After development of methods on its own equipment, the laboratory can provide, through the assistance of its experts, **assistance** and **training in physico-chemical characterization**, and in the **analysis** and **interpretation of the results**.

Assistance by the personnel working in the LARC is possible at the time of the implementation of the client's analytical protocols. A **consulting and expertise activity** is offered through the optimization of the experiment and analyses of the samples.

The goal of the analysis laboratory of the DEN in CADARACHE (L.A.R.C.) is to meet the needs expressed by industrialists whether they are in terms of:

- **analysis services** dealing with specific issues necessitating a development,
- the **concession of licenses** concerning a specific technology (Patent & Know-how) or
- the **creation of new collaborations**,



Complexing a metal cation  
with EDTA

## Patents

CEA-Cadarache has 7 families of transferable patents on this particular thematic:

- [FR2909179B1](#) (expires in 2026)
- [FR2940469B1](#), [FR2940470B1](#), [FR2934409B1](#) (expires in 2028)
- [FR2918752B1](#), [FR2922030B1](#) (expires in 2027)
- as well as a patent pending filed in 2011

## Technical offers

- Development of tools and analysis methods of mineral or organic compounds in both liquid and solid phase,
- Process control,
- Characterization of substances and materials

## Expertise

- Physical Chemistry of materials,
- Physico-chemical analysis : the development and perfecting of tools and analysis methods for compounds
- Chemistry in solution: structure , coordination chemistry and speciation , reactivity of species, mechanisms
- radiolytics , measurement of complexing power, ...
- help in sampling.

## Equipment

The Cadarache Analysis Laboratory (L.A.R.C.) has powerful analytical means adapted to the detection and characterization of traces :

- Mass spectrometry ( ICP / MS quadruple or multi-collection , LC / MS),
- Atomic Emission Spectrometry (ICP/AES),
- Liquid chromatography coupled to mass spectrometry via electrospray and APCI interface , ion chromatography,
- Radiometric techniques (Measurement of beta emitters by liquid scintillation , gamma, X, alpha spectrometry )  
COTmetry,
- Measurement of AOX

## Our strong point:

50 years of experience!

## Key figures :

- TRL global complexing measurement power : 4
- Manpower  
22 research engineers / technicians
- Accreditations/network
  - ISO 9001 Certification
  - CETAMA-BNEN (French or international standardization)

## They've entrusted us with

### their work:

AREVA, EDF, ANDRA