

Decontamination of alkali chloride baths containing nuclear material by precipitation and distillation techniques



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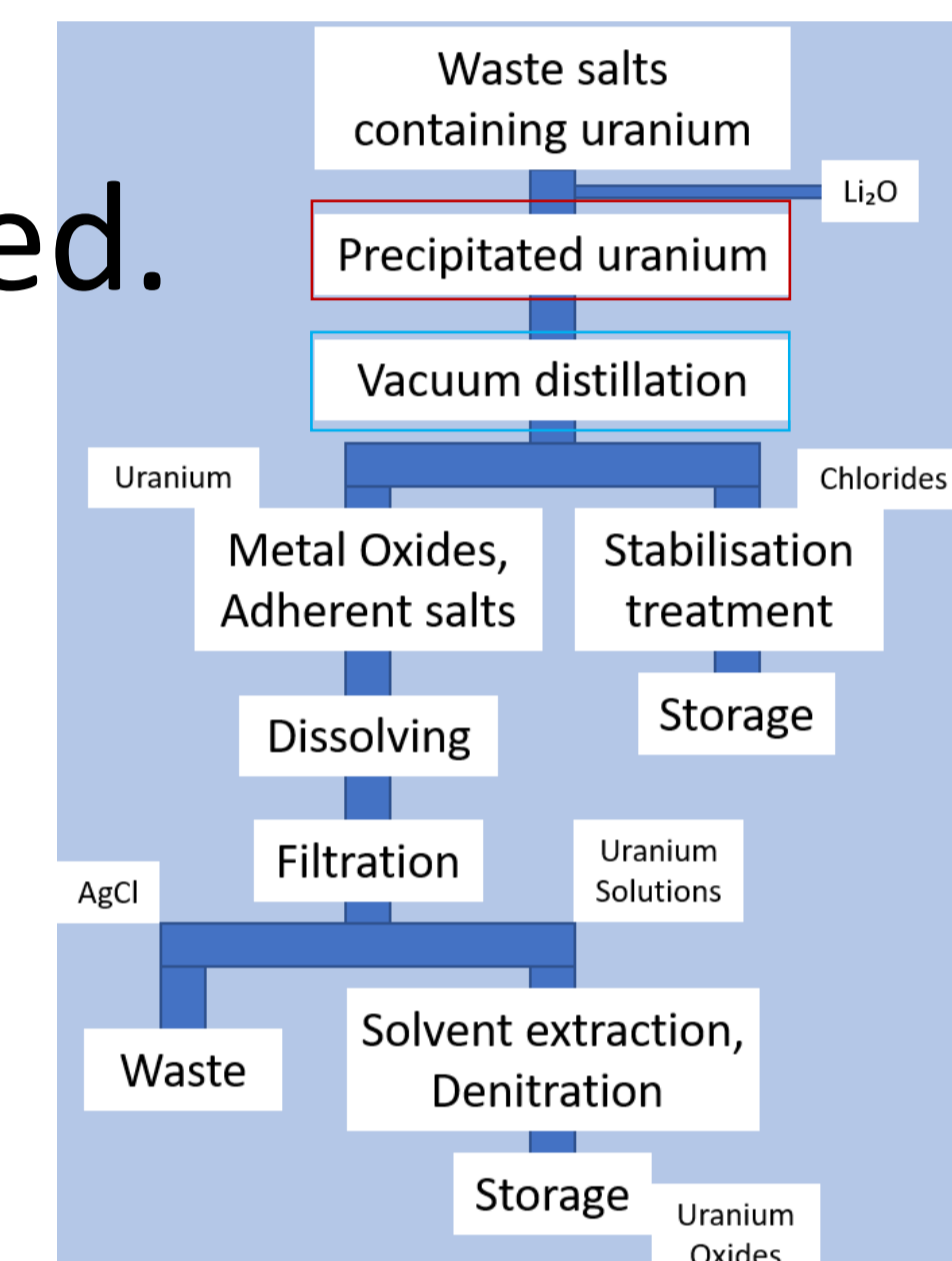
1. Introduction

The aim of this study is to develop a simple separation method for decontamination of salts, when waste salt generated from pyro-reprocessing test which contains uranium.

A two-step process has been considered.

I. Oxides are added as oxygen donor in the melts, and then uranium is separated from the salt as precipitates.

II. Melt bath components are evaporated by a vacuum distillation.

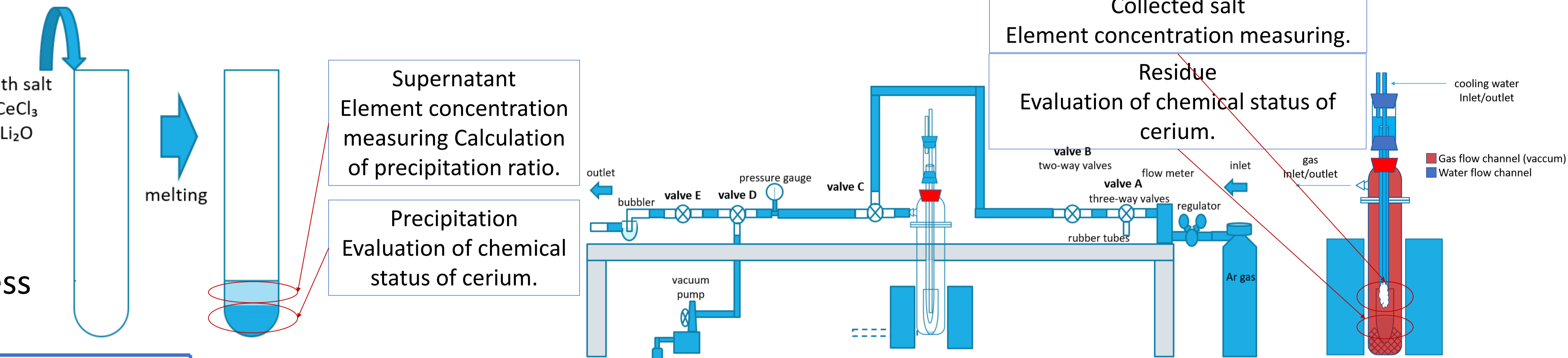


Alkali chloride treatment process

2. Experimental

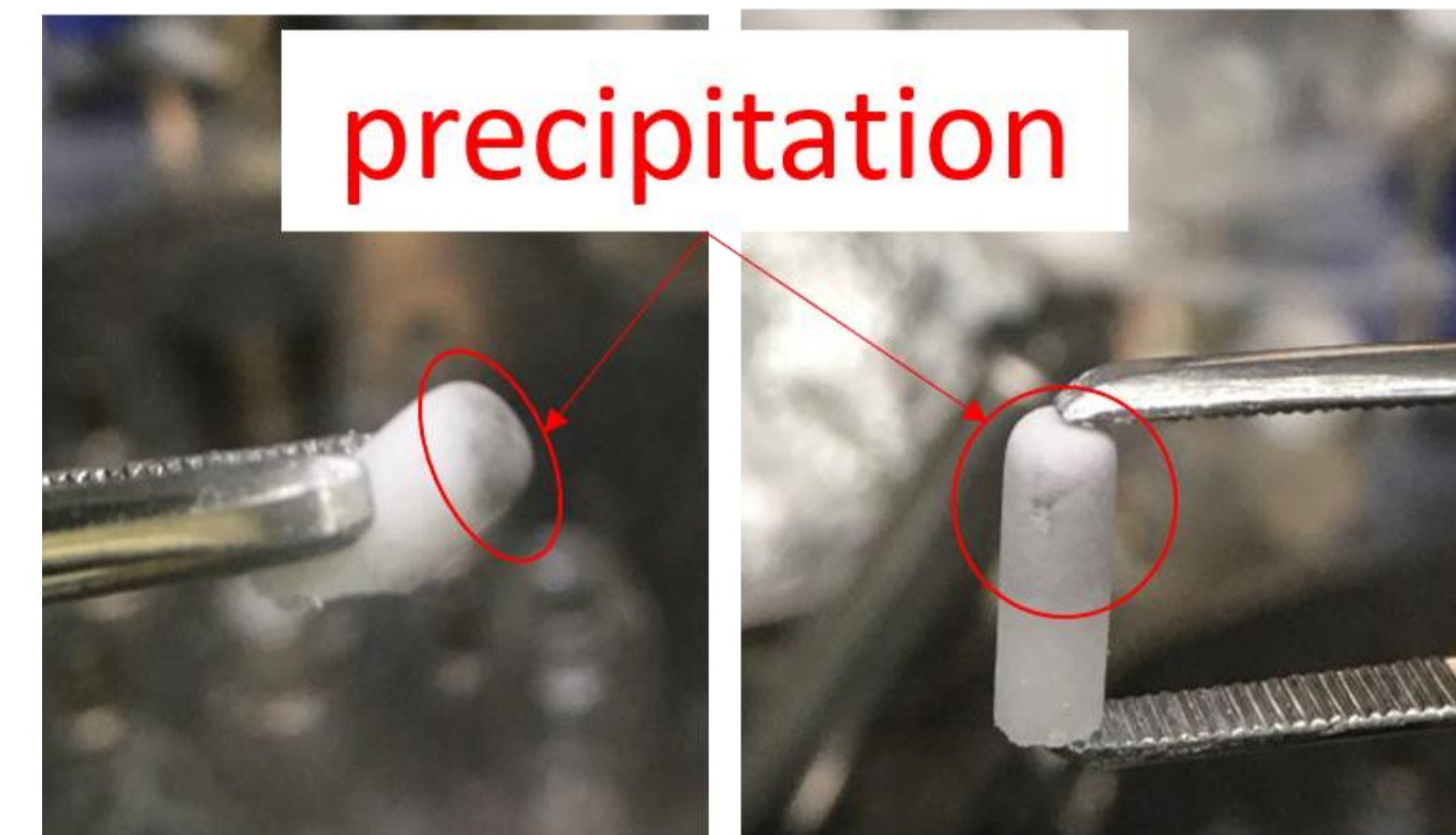
The amount and the procedure of addition of the precipitant and reaction condition has been optimized by the aid of evaluation of chemical status of cerium in the precipitation.

Next, a distillation line has been constructed and the best condition for distillation has been searched using the precipitates co-existing melts.

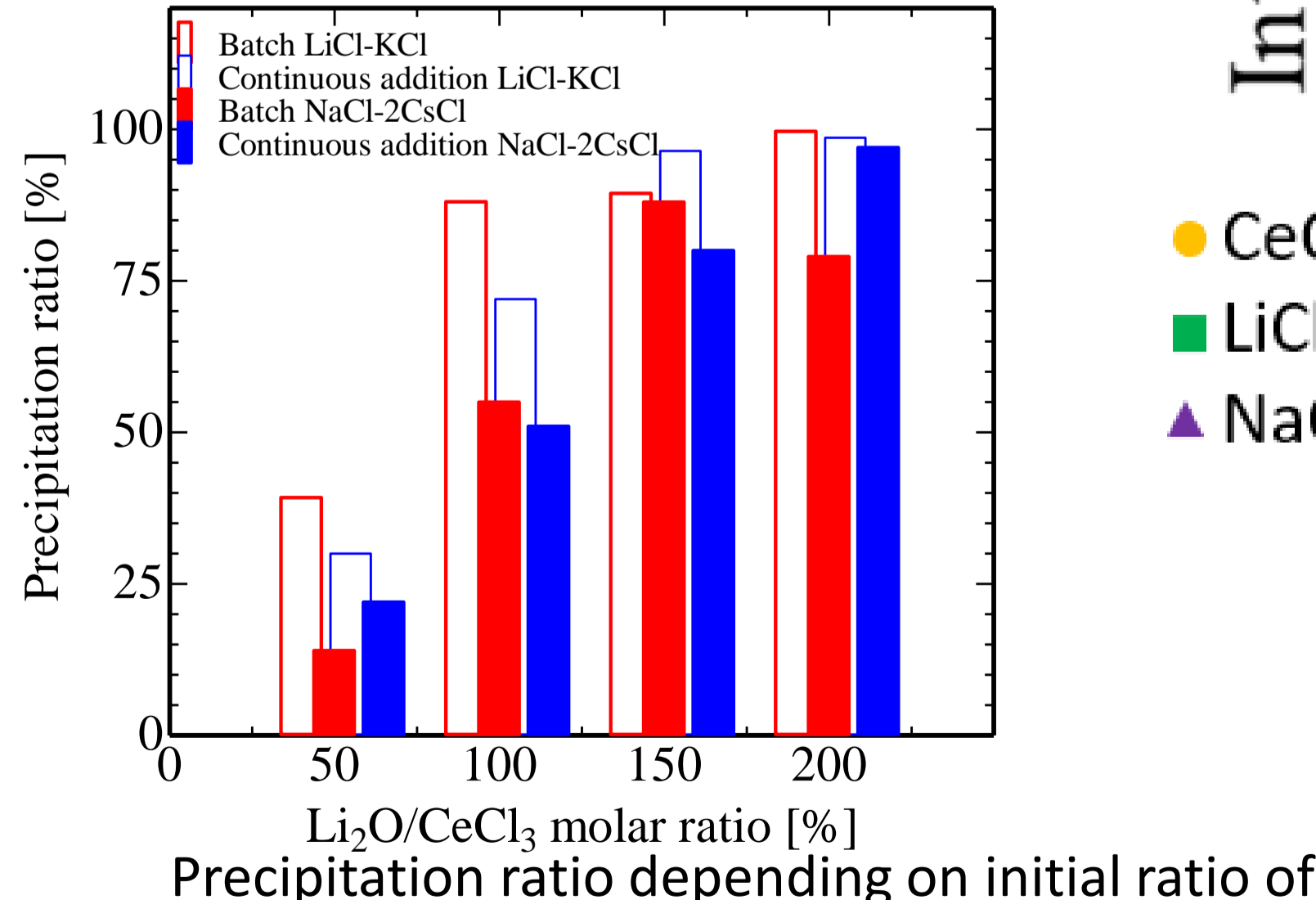


Experimental apparatus for precipitation preparation and salt vacuum distillation

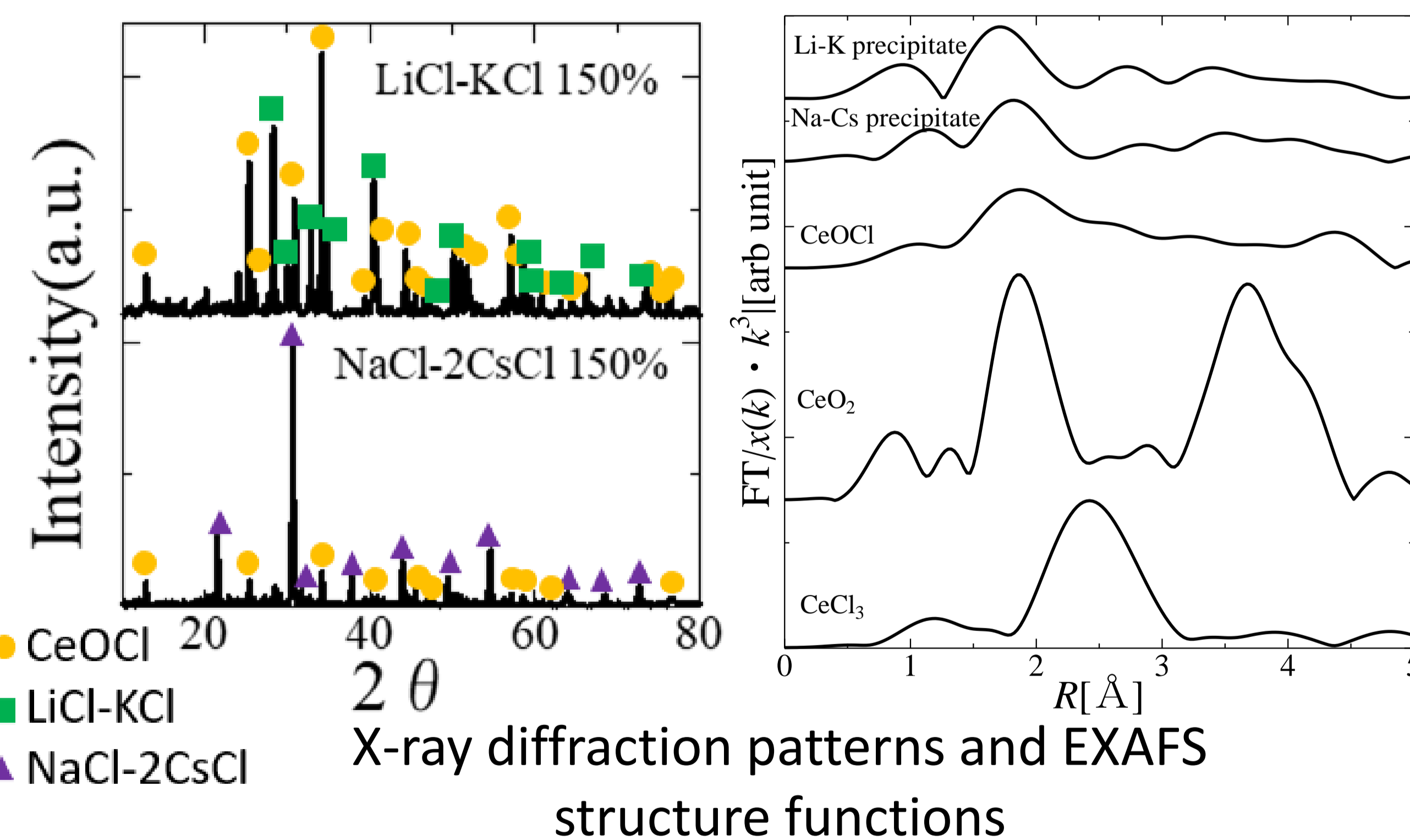
3. Results and discussion



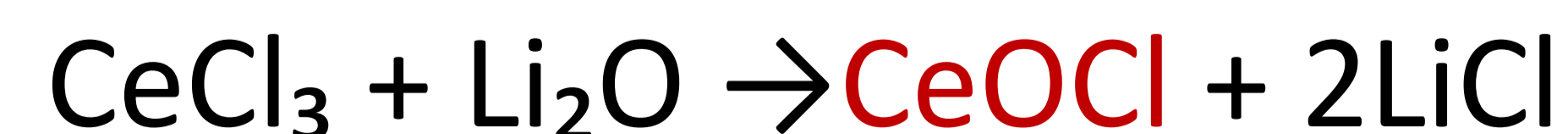
Precipitation at 50% and 200% (NaCl-2CsCl melts)



precipitation ratio depending on initial ratio of lithium oxide/cerium chloride in LiCl-KCl eutectic and NaCl-2CsCl melts

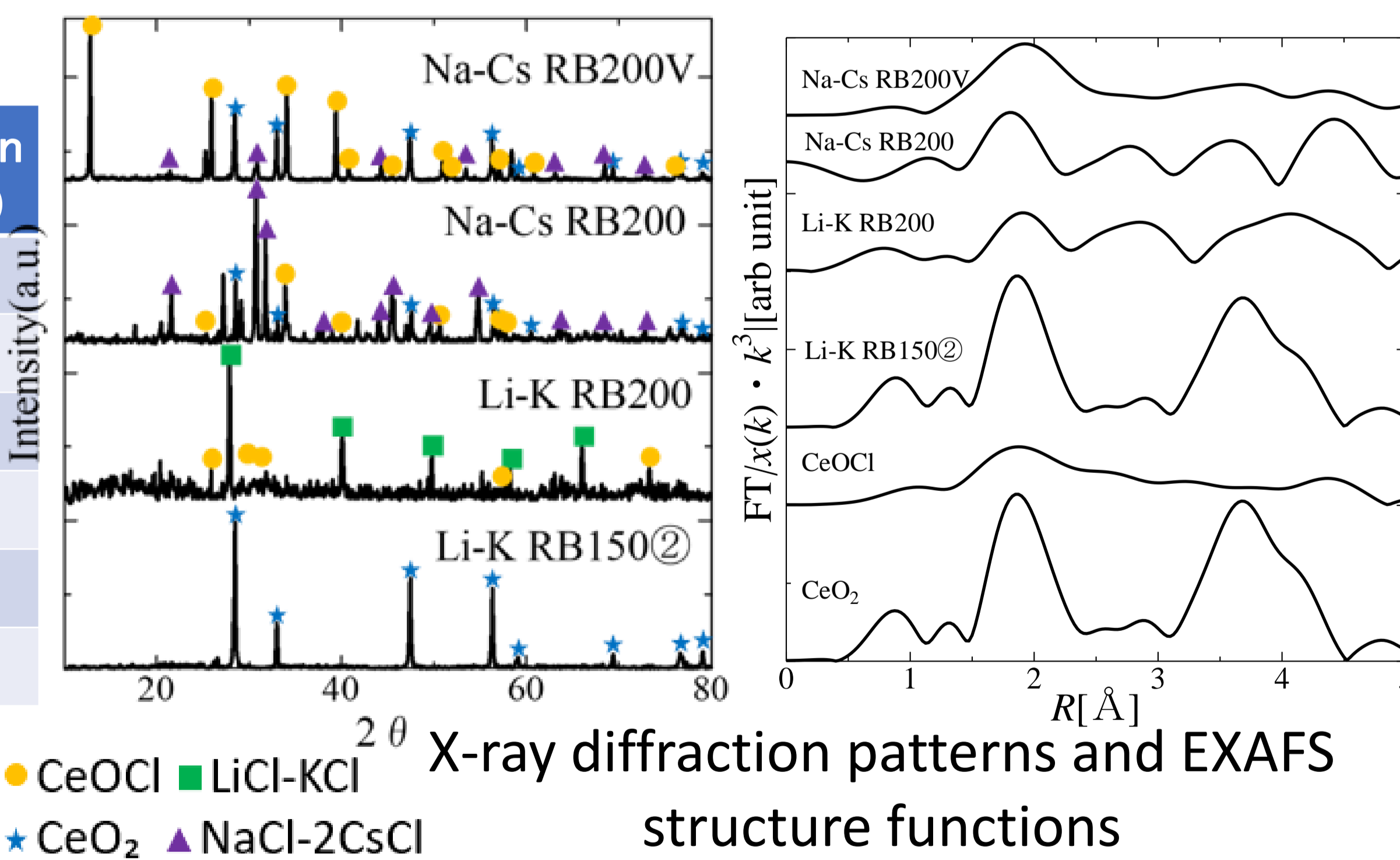


reaction formula



Collected salt and residue (NaCl-2CsCl 200V)

	Li ₂ O added (%)	Collection rate (%)
Li-K	150①	6.5
Li-K	150②	89.8
	200	34.0
Na-Cs	150	71.4
Na-Cs	200	58.7
Na-Cs	200V	97.5



Distillation ratio of the salt from the sample was achieved up to 90% at 800°C distillation for ca. 4 hours.

In addition, a **vertical structure** has been adopted for an efficient salt recovery system. (58.7%→97.5%)

The residue is a mixture of **trivalent cerium** and **tetravalent cerium**.

1.5 times-2 times more Li₂O added, the precipitation rate was 90%. From the results obtained by structural analysis and XRD on precipitates, it is considered that **oxychloride** was formed.