

# International Symposium on Uranium Raw Material for the Nuclear Fuel Cycle: Exploration, Mining, Production, Supply and Demand, Economics and Environmental Issues (URAM-2018)



Contribution ID: 96

Type: ORAL

## Understanding of uranium extraction mechanisms from phosphoric and sulphuric media using DEHCNPB

*Wednesday, 27 June 2018 16:00 (20 minutes)*

Phosphate rocks are widely exploited for the manufacturing of phosphoric acid and fertilizers but they contain uranium (30-300 ppm). Therefore, recovering this uranium would enable the decontamination of phosphoric acid while valorizing uranium for the nuclear industry. New extractant molecules were investigated in the past few years to develop a new solvent extraction process. An amidophosphonate, the butyl-1-(N,N-bis-2-ethylhexylcarbamoyl)nonyl phosphonic acid (DEHCNPB), showed good uranium extraction efficiency while meeting U/Fe decontamination requirements (as demonstrated during pilot scale trials). Afterwards, DEHCNPB was also used for the extraction of uranium from conventional resources (from sulfuric lixiviation media). However, pilot scale trials showed poorer performances, as uranium leaks in raffinates were higher than expected.

The objective here is to study uranium and iron extraction mechanisms from those two different media (phosphoric and sulfuric). Thermodynamical data were acquired such as: extraction isotherms, slope analysis, phosphates/ sulfates and water extraction. These data showed different behaviors depending on the initial medium. Spectroscopic techniques such as FTIR, NMR, ESI-MS and EXAFS were also investigated to study uranium-DEHCNPB complexes formed in the organic phase, enabling the determination of stoichiometries and coordination modes.

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**Session Classification:** Uranium from Unconventional Resources

**Track Classification:** Track 8. Uranium from unconventional resources