HyChem

PHD RESEARCH PROPOSAL

Doutoramento em Engenharia da Refinação, Petroquímica e Química (EngIQ)

USE OF NANOMATERIALS FOR INDUSTRIAL PROCESS OF SODIUM CHLORATE AND HYDROGEN ELECTROLYTIC CO-PRODUCTION

Summary / Framework

Sodium chlorate, industrially produced in Portugal by HyChem, has its main application in the pulp and paper economic sector. Sodium dichromate is traditionally used in industrial sodium chlorate production as a pH buffer in the electrolysis stage of the process and also to block the undesired reductions of chlorate and hypochlorite. As a hexavalent chromium compound, sodium dichromate is carcinogenic, referenced for example in lung cancer. Further, human exposure can cause impaired fertility, heritable genetic damage and harm to unborn children. It is also corrosive and exposure may produce severe eye damage or blindness. As such, the need for safer alternative solutions to the use of dichromate is key to guarantee safe operations and improve the environmental performance of sodium chlorate production.

There is already awareness from the EU authorities to this challenge and the use of sodium dichromate is under a temporary authorization (until 2028) while alternatives are being developed.

The aim of this PhD proposal is to find an effective and safe alternative to sodium dichromate usage that can be applied to the existing industrial production process of sodium chlorate at HyChem.

In this line of investigation, the goal is to combine a substitution of dichromate as pH buffer for the electrolyte, combined with specific cathodic coating and/or using nanomaterials resistant to both corrosion and wear.