

Steel slag upgrading and PCC production

Publieke samenvatting / Public summary

Aanleiding

Potential options to recover, re-use and valorize components in residue streams resulting from recent research, offer the possibility to develop new innovative processes, both process technology and process routes, providing solutions for existing challenges regarding the continuity of operation as faced by two major industries: Steel industry: - 50% of the produced steel slag has no applications and are piled up; - CO₂ emission reduction is essential. Chemical industry: - hydrochloric acid is produced as a side product from several chemical processes, a major overproduction is foreseen in the coming decades; - several industrial processes produce calcium chloride containing process water, of which brines are at present often still disposed into open water. In view of environmental and upcoming scarcity aspects and upcoming restrictions, recovery and re-use of salt and water is preferred. Arcelor Mittal ((AM, steel Industry), AkzoNobel (AN, chemical industry), University of Leuven (KUL, knowledge institute) and Innovation Concepts (IC, SME) decided to combine their knowledge, skills and capabilities to face these challenges and find solutions.

Doelstelling

In the last two years, the project partners have performed research to explore possibilities and to study principles to stabilize and to upgrade steel slag and neutralize hydrochloric acid, whilst capturing CO₂ from industrial processes, to produce high-value PCC and to upgrade calcium chloride process water. The objective of this project is to arrive at one combined and integrated robust batch

Projectinformatie / Project information

Projectnummer / Project number

TKITOEWP-20-12

Subsidiebedrag / Grant amount

€ 211.375,00

Algemene informatie / General information

Penvoerder / Secretariat

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process with synthesized feeds on lab scale, offering sufficient economic perspective. The goals of this project are (1) to further develop and optimize the individual process steps, (2) to investigate whether and, if so, how these steps can be modified to allow alignment of the steps into an integrated process, and (3) to perform a technical, environmental and economic assessment of the integrated process flow sheet. (TRL 3 -> 5).

Korte omschrijving

1) Optimizing steel slag preparation and the leaching process 2) Intensifying the CO₂ contact, optimize CO₂ source, PCC precipitation process and technologies 3) Development of separation of the chloride/calcium components in the process water 4) Revealing relation between required produced PCC quality and foreseen PCC application 5) Development of the integral batch process on lab scale and analysis of the economic perspective 6) Project management and sustainability assessment

Resultaat

The envisaged result of this project is the identification, development and optimisation of individual process steps and of an integrated overall and optimized batch process for artificial streams on lab scale, which has been assessed from the technical, environmental and economic perspective. (TRL 3 -> 5; project envisages to provide readiness to start with TRL 6 development). At the end of the project, a go-or-no-go analysis will advise the partners on the continuation of the collaboration to the next implementation phases (these phases are outside scope of this project) , i.e investigating whether the integral process still performs sufficiently well in a batch process on lab scale with real process stream compositions and development of a continuous process (TRL 6) and, next, proof that the continuous process performs sufficiently well on a representative (but not yet production) scale in a real and relevant industrial environment (TRL 7). Partners are committed to go to a full-scale unit within 5 years if the results are positive.

De data in deze applicatie is afkomstig van de Rijksdienst voor Ondernemend Nederland (RVO) en wordt in samenwerking met de Topsector Energie ontsloten.

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