E-Tandem: Innovation in e-fuel production
From laboratory scale to continuous production

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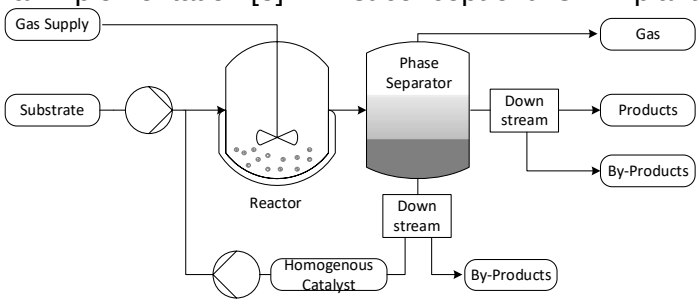
With the European Green Deal, the EU has decided to create a climate neutral economy by 2050, i.e. to reduce greenhouse gas emissions to zero [1]. The transport sector accounts for a large share of emissions, so a key aspect is the substitution of fossil fuels for mobility and transport [2]. While electrification is the preferred approach for private transportation, other concepts are needed for the decarbonisation of transport sectors, such as heavy goods vehicles or shipping. One promising approach is the use of e-fuels. These greener, liquid energy sources are artificially produced only from renewable electricity and renewable resources and can also be used in conventional internal combustion engines. Overall, e-fuels can be classified as CO_2-neutral [3]. The EU project E-TANDEM aims to realise an efficient and direct production of a new, higher oxygenated, diesel-like e-fuel for marine and heavy-duty transport. This involves the use of CO_2 as the only carbon source and renewable electricity as the only energy. The fuel is produced in a hybrid catalytic process that combines three catalytic pathways: High pressure electrocatalytic syngas production from CO_2 and water, coupled with a tandem catalytic e-syngas conversion. In this tandem reaction, the heterogeneously catalysed olefin-selective Fischer-Tropsch reaction is coupled with the homogeneously catalysed olefin-reducing hydroformylation to produce long-chain alcohols, which can either be used directly as fuel or they can be converted into long-chain ethers in a further step [4]. Having demonstrated that the tandem reaction is feasible in batch mode in the laboratory, the new e-fuel production concept will be demonstrated in continuous operation in a miniplant as a first step towards industrial implementation [5]. A first concept of this miniplant is shown below.



Literature:
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[2] https://www.europarl.europa.eu, 2019 (last accessed 20.05.2024).
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Funded by the European Union

Funded by the European Union under grant number 101083700.