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IS Cycle simulation using ProSimPlus

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Sulfur-Iodine (S-I) cycle is the most promising thermochemical cycle for water splitting to produce hydrogen in order to substitute the fossil fuels in the future. The HYTHEC project (European Commission funded research project SES6-CT-2004-502704) aims at improving and evaluating the S-I cycle and compare it to Westinghouse hybrid cycle. The flowsheeting and simulation work within HYTHEC has been performed using ProSimPlus, the general steady-sate process simulation software edited by ProSim. In particular, flowsheets of the H2SO4 decomposition and HI decomposition sections have been developed and simulated using ProSimPlus within the framework of the HYTHEC project.

The benefits of using ProSimPlus for simulation of these processes within a collaborative project will be demonstrated. Emphasis will be put on :

- openness of the software (CAPE-OPEN compliance, user added modules coded in VBS,…) allowing each partner to introduce its own know-how or to customize existing unit operation models (use of membranes, experimental vapor-liquid data…);
- convergence methods to tackle large flowsheets and complex unit operations: reactive distillation for HI section have been widely investigated and will be presented;
- capability to model highly non-ideal systems thanks to Simulis® Thermodynamics, a mixture physical properties and fluid phase equilibria calculation server embedded in ProSimPlus. The ability to introduce new experimental data obtained during the project for HI section to develop a new thermodynamic model will be shown.