Selected Papers from the 10TH European Congress of Chemical Engineering – ECCE10 – Nice, France

The 10th European Congress of Chemical Engineering (ECCE10) was held in conjunction with the 3rd European Congress of Applied Biotechnology (ECAB3) and the 5th EPIC European Process Intensification Conference (EPIC5) in Nice, France, from September 27th to October 1st, 2015. These events were organized by the French Society of Chemical Engineering (SFGP) under the auspice of the European Federation of Chemical Engineering (EFCE) and the European Society of Biochemical Engineering Sciences (ESBES).

Approximately 1800 people from all around the world (67 nationalities) attended the conference. The participation of industrialists (25 %) and students (31 %) was remarkable.

The scientific program was impressive, being composed of 5 symposia, 4 workshops, 6 plenary lectures, 82 keynotes, and more than 700 oral communications organized in 202 sessions and 900 poster communications. These covered vast chemical and biochemical engineering topics, which reflected the latest scientific trends in their field and several special issues of different peer-reviewed journals will be published.

This special issue section in *The Canadian Journal of Chemical Engineering* is based on a strong selection of communications in the scientific sessions dealing with polymer engineering, chemical reaction engineering, and energy. It has been done thanks to the efficient and important work of the referees, the Editor-in-Chief of the journal, and of the selected authors.

From the polymer engineering session, Sheibat-Othman et al. investigate the modelling of particle growth under saturated and starved conditions in emulsion polymerization. Their model allows describing the broadening of the particle size distribution and accounts for the effects of restricted diffusion inside the monomer-swollen polymer particles.

Concerning the topic of chemical reactor engineering, three papers are proposed. Augier et al. present an investigation of the impact of a non-ideal—but realistic—distribution on the conversion in a trickle bed reactor. This work is based on apparent kinetics of hydroprocessing reactions implemented to remove heteroatoms such as nitrogen and sulphur from heavy cuts of crude oil. Experimental hydrodynamic results are compared to CFD simulations coupled with the chemical kinetic model and the effect of maldistribution on the reaction performance is discussed. Finally, the authors propose a method to reduce the CFD model to a 1D Multi-Exit reactor model.

Guinand et al. elaborate a mathematical model based on parameters estimated from measured calorimetric data to reproduce the real dynamics of a chemical system. They propose a new approach based on three steps in order to minimize the experimental measurements necessary. This method was studied on the reaction system involved in the Morton International Inc. accident in New Jersey.

Bengaouer et al. present a simulation model of a fixed-bed reactor exchanger dedicated to the CO_2 methanation reaction using accurate heat transport and kinetic parameters obtained from experimental characterization works. Numerical and experimental methanation results are compared under reference conditions.

From the energy session, Dimitrova et al. propose a methodology for the efficiency optimization of a vehicle energy system. Energy integration techniques are used to recover waste heat. An adapted methodology is used to design the organic Rankine cycle (ORC) as a waste heat recovery technology and to test the influence of the external temperature on its efficiency. This is applied on a vehicle with a diesel engine; the energy integrated configuration of the vehicle is defined and the cost of the additional equipment is estimated. The performance indicators of the energy integration technology of the internal combustion engine are proposed.

In their paper, Kalliski et al. present a framework for the definition and calculation of real-time resource efficiency indicators (RTREI) for batch processes based on the allocation of resource and energy consumptions to the individual batches. A statistical analysis of tendencies shows the impact of problems with individual batches on the resource efficiency and reveals slow dynamics that call for optimization, such as catalyst deterioration. Furthermore, losses due to changes in external factors can be identified and reduced by optimization of the operational parameters for subsequent batches.

With the selected papers published in the other international journals, we hope that this special issue section will reflect the secientific quality of the contributions received at the ECCE10-ECAB3-EPIC5 Conference.

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