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Development of a phenomenological model for a battle reactor

Rosemonica Bezerra De Jesus and **K Pontes**
University Federal of Bahia, Brazil

This article refers to a phenomenological model of a batch reactor. Using an energy balance model it was possible to predict the heating and cooling behavior inside the reactor and how the temperature varies with the applied voltage. This work will be used for later emphasis on polymer syntheses, especially the hydrolytic synthesis of caprolactam, in order to obtain a product with a higher value-added market, nylon 6. Given the difficulty of temperature control when operating with nylon 6, silicone oil (nylon-like characteristics) was used for system testing and data collection. In this way, the system boils down to a heating tank, with heating via electrical resistance. Thus, the focus of the present study will be on modeling the reactor using silicone oil. The study will be done obtaining dynamic measurements of temperature in order to be able to present a phenomenological model of the reactor. For the validation of the model, we used data collected in the plant from a step-type test. In this way, this text aims to develop the phenomenological model of the system in order to better understand the dynamics of the heating and thus enable future control studies. The model represented a satisfactory behavior of the reactor in question, presenting an average relative error of 4.3%.

Biography

Rosemonica Bezerra De Jesus is currently in a Master's degree program for Industrial Engineering and Chemical Engineer at the Federal University of Bahia (UFBA) Brazil. She has experience with projects, research and innovation. She has ability to use process simulators (ASPEN, HYSYS and UNISIM) and other engineering softwares such as MATLAB, AutoCAD and MsProject. In addition, she has knowledge in modeling, simulation, control and optimization of chemical and petrochemical processes.

rosemonicab@hotmail.com

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Page 72