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A numerical model to simulate foams during devolatilization of polymers IRFAN KHAN, RAVINDRA DIXIT, Dow Chemical Co — Customers often demand that the polymers sold in the market have low levels of volatile organic compounds (VOC). Some of the processes for making polymers involve the removal of volatiles to the levels of parts per million (devolatilization). During this step the volatiles are phase separated out of the polymer through a combination of heating and applying lower pressure, creating foam with the pure polymer in liquid phase and the volatiles in the gas phase. The efficiency of the devolatilization process depends on predicting the onset of solvent phase change in the polymer and volatiles mixture accurately based on the processing conditions. However due to the complex relationship between the polymer properties and the processing conditions this is not trivial. In this work, a bubble scale model is coupled with a bulk scale transport model to simulate the processing conditions of polymer devolatilization. The bubble scale model simulates the nucleation and bubble growth based on the classical nucleation theory and the popular "influence volume approach." As such it provides the information of bubble size distribution and number density inside the polymer at any given time and position. This information is used to predict the bulk properties of the polymer and its behavior under the applied processing conditions. Initial results of this modeling approach will be presented.

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