Bubble point measurement for the system of zirconium tetrachloride & hafnium tetrachloride at high pressure

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The bubble point pressures of ZrCl4, HfCl4 mixture were determined using a synthetic method in an experimental apparatus that include an invariable volume equilibrium cell. The bubble points of the system were measured at ZrCl4 mole fractions from 0 up to 1 and within the temperature and pressure range of 440 – 490℃ as well as 2.3 – 5.6 Mpa, respectively. The agreement between the experimental data and the predicted data by using Peng – Robinson equation of state was demonstrated efficiently. The results showed that the Peng – Robinson equation of state provided the satisfactory prediction for this mixture. Furthermore, due to the obtained interaction parameter, the feasibility of distillation process including the conventional distillation process and distillation column with bottom flashing heat pump was determined at the high pressure condition. This study showed that the use of the heat pump configuration saves up to 61.8% in term of total annualized cost (TAC). This research was supported by a grant from the Fundamental R&D Program for Integrated Technology of Industrial Materials funded by the Ministry of Knowledge Economy, Republic of Korea.