

Effect of internal pressure on permeation characteristics of polymers commonly used for liners in high pressure hydrogen tanks

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Under the hydrostatic pressure, the polymer liner of type IV hydrogen tank suffers very high mechanical constraints due to compression onto the rigid composite shell reinforcement. These constraints are responsible for the thinning of the material thickness on the one hand, and for the decrease of the internal macromolecular movement on the other hand, which have antagonistic effects on the gas permeation. The behaviour of different polymer samples, like high or low density polyethylene (ldpe, hdpe) or polyethylene terephthalate (pet) or polymethyl methacrylate (pmma), under pressures up to 150bar and constant temperature conditions are investigated, compared and discussed in the present study. Obtained results will contribute to the understanding of the polymer behaviour inside the tank, but will also help in choosing the suitable material in regards to the application and will lead to a better prediction of the hydrogen loss.