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Helium contamination through plastic walls

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The concentration of impurities in Helium gas is an important parameter for a recovery and liquefaction plant. A low level of impurities is necessary to maintain an optimum liquefaction rate in any kind of liquefier. The main origin of the impurities is the contamination with air that enters the helium mainstream at some point in the recovery cycle.

In this work we study the main sources for impurities in a helium recovery plant, and propose the way to reduce it.

Experimental measurements of the change in oxygen content, with sensitivity below 1ppm, have been performed for helium gas before and after circulating through metal and plastic hoses. Also, the dependence of the impurities concentration with the time of permanence of helium inside a recovery gasbag has been measured, and a model has been developed. This model is useful to estimate the helium impurities concentration in a helium recovery plant.

Finally, an analysis of the impurities composition reveals a different Nitrogen/Oxygen ratio in the helium contaminated through plastic walls compared with the one existing in air (approximately 80/20). This difference is due by the difference of the nitrogen and oxygen diffusivity through plastic walls and should be taken into account in the design of the helium recovery plants.

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