Pregunta 47:

Buenos dias, tal y como se indica en la referencia adjunta del libro de Zemansky, pg 280 apartado 11.2. El efecto Joule-thomson es utilizado como metodo de licuefaccion de gases, ya que si T<T_inv, siendo T_inv la temperatura de inversion del gas, el gas disminuye de temperatura permitiendo la licuefaccion, si por el contrario la temperatura es mayor a la temperatura de licuefaccion, T>T_inv, la temperatura del gas aumenta. Por tanto, la temperatura no es constante en el proceso Joule-thomson, que es lo que se da como correcto en la pregunta 47.

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11.2
LIQUEFACTION OF GASES BY THE JOULE-THOMSON EXPANSION

An inspection of the isenthalpic curves and the inversion curve of Fig. 11-2 shows that, for the Joule-Thomson expansion to give rise to cooling, the initial temperature of the gas must be below the point where the inversion curve intercepts the temperature axis, that is, below the maximum inversion temperature. Otherwise, the Joule-Thomson expansion raises the temperature of the gas. For many gases, room temperature is already below the maximum inversion temperature, so that no precooling is necessary. Thus, if air is compressed to a pressure of 200 atm and a temperature of 52°C, then, after throttling to a pressure of 1 atm, it will be cooled to 23°C. On the other hand, if helium originally at 200 atm and 52°C is throttled to 1 atm, its temperature will rise to 64°C.

Figure 11-3 shows that, before the Joule-Thomson expansion can produce cooling in hydrogen, the hydrogen must be cooled below 200 K. Liquid nitrogen at 77 K is used for this purpose. To produce Joule-Thomson cooling in helium, the helium needs to be cooled below 43 K. Liquid hydrogen is sometimes used as a refrigerant, with appropriate precautions. Table 11.1 gives the