Chapter 17 Problem 62 [†]

Given
$T_i = 10\ ^\circ C$
$T_f = 35\ ^\circ C$
$V_f = 75\ L$
$\beta = 95 \times 10^{-5}\ K^{-1}$

Solution
Find the volume placed in the tank which will not over flow when the gas warms up.

The volume expansion is given by

$$\beta = \frac{\Delta V/V}{\Delta T}$$

This leads to the formula

$$\Delta V = \beta V \Delta T$$

Substitute in the provided values gives

$$\Delta V = (95 \times 10^{-5}\ K^{-1})(75\ L)(35\ ^\circ C - 10\ ^\circ C)$$

The expansion tank must handle the volume

$$\Delta V = 1.78\ L$$

[†]Problem from Essential University Physics, Wolfson