PROBLEM 7-13N QUESTION

Pressurizer Sizing Analysis

The size of a pressurizer is determined by the criteria that the vapor volume must be capable of accommodating the largest insurge and the liquid volume must handle the outsurge. The important limitations of the design are that the pressurizer should not be totally liquid filled or the immersion heaters should not be uncovered after possible transients. To size the vapor volume, a maximum insurge is assumed to completely fill the pressurizer with liquid with some of the insurge being diverted to the spray to condense the vapor. Treating the entire pressurizer volume, V_t, as the control volume, find the vapor volume, V_{g1}, which will accommodate the insurge given below.

DATA:

Initial Pressurizer Conditions

Saturation at 2250 psia and 653˚F

Initial liquid mass = 1827 kg

Maximum Insurge (includes spray)

Mass = 2740 kg.

Enthalpy = 1.2×10^6 J/kg

Final Pressurizer Condition

Assume completely filled with liquid at 2250 psia