

$$m_1 = m_2$$

$$\rho_1 A_1 V_1 = \rho_2 A_2 V_2$$

$$V_2 = V_1 \left( \frac{\rho_1}{\rho_2} \right) \left( \frac{A_1}{A_2} \right)$$

Problem 2. 30 pts.

High energy steam at 30 MPa and 520°C enters a nozzle at 1.0 m/s. The inlet area is 5 cm<sup>2</sup>, and the outlet area is 2 cm<sup>2</sup>. The outlet conditions are 0.3 MPa and 370°C.

What is the outlet velocity, assuming steady state?

$$= V_1 \left( \frac{v_2}{v_1} \right) \left( \frac{A_1}{A_2} \right)$$

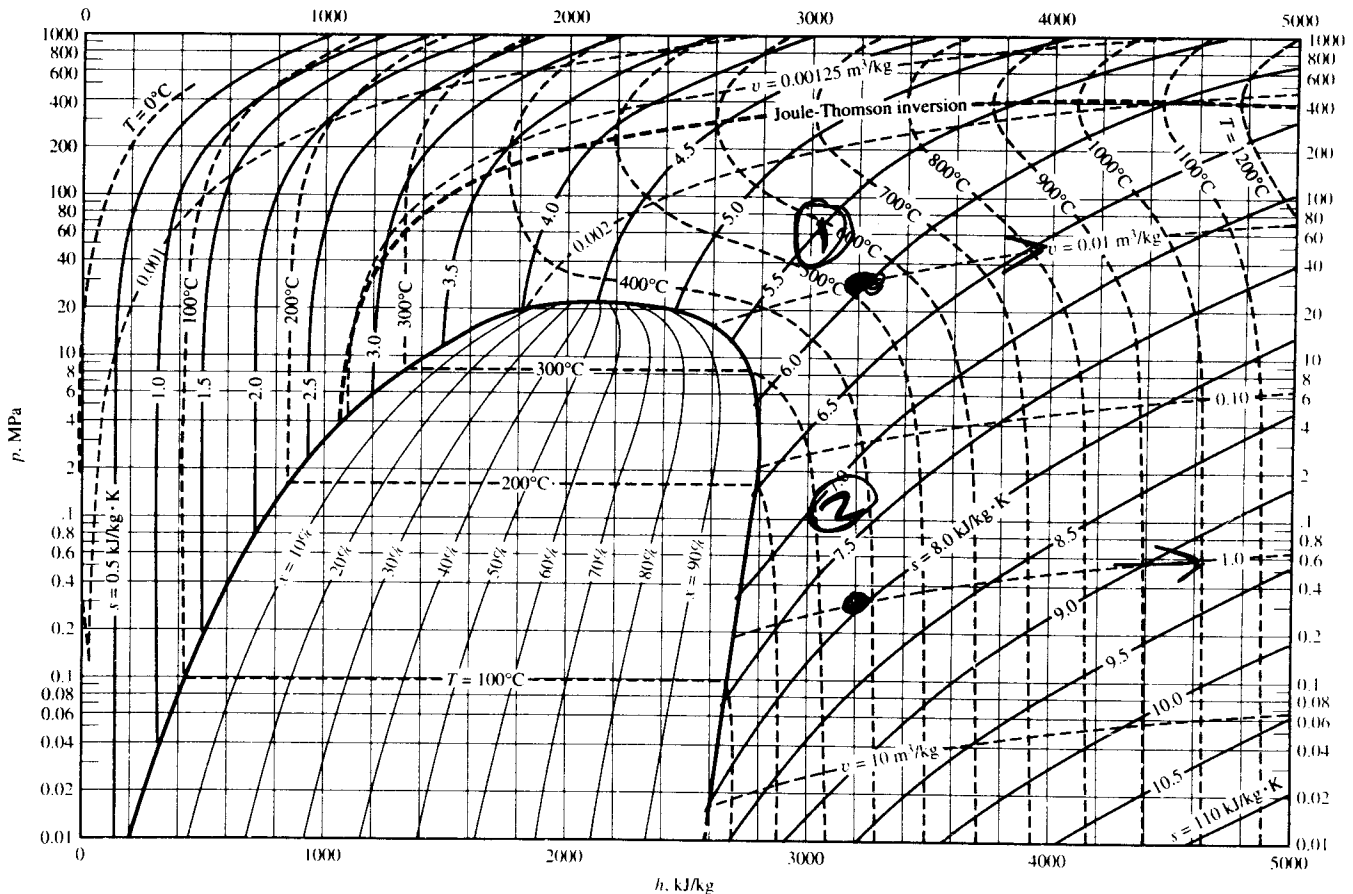


Chart A-7-3 Water  $ph$  diagram. (Source: Based on data and formulations from Haar, Lester, John S. Gallagher, and George S. Kell, *NBS/NRC Steam Tables*, Hemisphere, 1984.)

from graph,  $v_1 = 0.01 \frac{m^3}{kg}$ ,  $v_2 = 1.0 \frac{m^3}{kg}$

$$V_2 = 1.0 \frac{m}{s} \left( \frac{1}{0.01} \right) \left( \frac{5}{2} \right)$$

$$= 250 \frac{m}{s}$$