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Given: Water

initial state: $P_1 = 3 \text{ MPa}$

$T_1 = 500^\circ\text{C}$

final state: sat. vapour ($X=1$)

process: $P=CV$

Find: P_2 and sketch $P-v$ diagram.

Assumptions: cons. of mass $\therefore m_1 = m_2$
and $P=CV$

Sol'n: State 1: from table B.1.3 $\Rightarrow v_1 = 0.11619 \text{ m}^3/\text{kg}$
(state 1 is super heated vapour)

$$\text{State 2: } C = \frac{P_2}{v_2} = \frac{P_1}{v_1} = \frac{3000 \text{ kPa}}{0.11619 \text{ m}^3/\text{kg}} = 25820$$

use trial + error technique to find
 $P_2 + v_2$ from table B.1.2

if $P_2 = 2250 \text{ kPa}$, $v_g = 0.08875 = v_2$

$$\frac{P_2}{v_2} = 25352 \text{ (Low)}$$

if $P_2 = 2500 \text{ kPa}$, $v_2 = v_g = 0.07998$

$$\frac{P_2}{v_2} = 31258 \text{ (High)}$$

$\therefore$ must interpolate to get the right $\frac{P_2}{v_2} = C$

$$\frac{P_2 - 2250 \text{ kPa}}{2500 \text{ kPa} - 2250 \text{ kPa}} = \frac{25820 - 25352}{31258 - 25352}$$

$$\therefore \boxed{P_2 = 2270 \text{ kPa}}$$

process:

