

#63426 Chemistry, General Chemistry

Chapter 15 (15.89)

An equilibrium mixture of H_2 , I_2 , and HI at 458°C contains 0.112 mol H_2 , 0.112 mol I_2 , and 0.775 mol HI in a 5.00-L vessel.

- 1) What are the equilibrium partial pressure of HI when equilibrium is reestablished following the addition of 0.200 mol of HI ?
- 2) What are the equilibrium partial pressure of I_2 when equilibrium is reestablished following the addition of 0.200 mol of HI ?
- 3) What are the equilibrium partial pressure of H_2 when equilibrium is reestablished following the addition of 0.200 mol of HI ?

Answer:

$$\text{H}_2 = 0.112 \text{ moles}$$

$$\text{I}_2 = 0.112 \text{ moles}$$

$$\text{HI} = 0.775 \text{ moles}$$

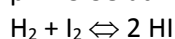
$$T = 458 + 273 = 731 \text{ K}$$

$$pV = nRT$$

$$p = nRT/V$$

$$p = (0.112 + 0.112 + 0.775) \cdot 0.0821 \text{ L-atm/mole-K} \cdot 731 \text{ K} / 5 \text{ L}$$

$$p = 29.98 \text{ atm}$$



We have 0.775 moles of HI and adding 0.2 moles of HI more for a total of 0.975 moles HI

Prior to adding some extra amount of HI

$$p_{\text{H}_2} = p_{\text{I}_2} = 29.98 \text{ atm} \cdot 0.112 = 3.36 \text{ atm}, p_{\text{HI}} = 23.23 \text{ atm}$$

With added 0.2 moles of HI , we now have HI moles = 0.975 and total moles = 1.199

$$p \text{ with } 1.199 \text{ moles gas is equal to: } 1.199 \text{ moles} \cdot 0.0821 \text{ L-atm/mole-K} \cdot 731 \text{ K} / 5 \text{ L}$$

$$p_2 = 14.4 \text{ atm}$$

$$p_{\text{H}_2} = p_{\text{I}_2} = 14.4 \text{ atm} \times (0.112/1.199) = 1.34 \text{ atm}$$

Answer provided by <https://www.AssignmentExpert.com>