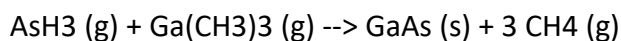


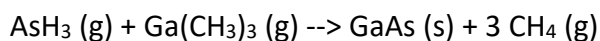
Answer on Question #66860 - Chemistry - General Chemistry

Question: Gallium arsenide (GaAs) is an important compound to the electronics industry. It is produced in the following reaction between arsine (AsH₃) and trimethyl gallium (Ga(CH₃)₃):



If this reaction is initiated at 750°C between 1.00 atm of Ga(CH₃)₃ and 1.00 atm of AsH₃ in a rigid 1L vessel, and 1.00 × 10⁻⁵ mol of AsH₃ is left to dispose of at the end of the reaction, what is the equilibrium constant, K_p?

Solution:



$$K_p = K \cdot (R \cdot T)^{\Delta n}$$

$$K = \frac{[\text{CH}_4]^3}{[\text{AsH}_3] \cdot [\text{Ga}(\text{CH}_3)_3]}$$

$$p \cdot V = n \cdot R \cdot T$$

$$n(\text{AsH}_3) = \frac{101325 \cdot 0.001}{8.314 \cdot 1023} = 0.012 \text{ mol}$$

Initial	0.012 M	0.012 M	0 M	0 M
-x	-0.01199	-0.01199	-	+0.03597
Equilibrium	0.00001	0.00001	-	+0.03597

$$K = \frac{0.03597^3}{0.00001 \cdot 0.00001} = 4.6 \cdot 10^5$$

$$K_p = K \cdot (R \cdot T)^{\Delta n} = 4.6 \cdot 10^5 \cdot (8.314 \cdot 1023)^2 = 3.3 \cdot 10^{13}$$

Answer: 3.3 · 10¹³

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