THE LAW OF MASS ACTION

$$aA + bB \rightleftharpoons cC + dD$$

$$Q = \frac{[C]^c [D]^d}{[A]^a [B]^b} = K$$ (IN M) — K DEPENDS ONLY ON T

FOR GASES:

$$Q = \frac{P_C^c P_D^d}{P_A^a P_B^b} = K$$ (IN ATM)

START WITH 1.00 ATM OF H_2 AND 1.00 ATM OF I_2:

	$H_{2(g)}$	+	$I_{2(g)}$	$\rightleftharpoons$	$2HI_{(g)}$
INITIAL	1.00		1.00		0
EQUIL	0.213		0.213		1.573

← USE A TABLE TO ORGANIZE YOUR DATA

$$Q = \frac{P_{HI}^2}{P_{H_2} P_{I_2}} = \frac{(1.573)^2}{(0.213)(0.213)} = 54 = K$$

NOW, ADD 1.00 ATM I_2

	$H_{2(g)}$	+	$I_{2(g)}$	$\rightleftharpoons$	$2HI_{(g)}$
INITIAL	0.213		1.213		1.573
EQUIL	0.0612		1.061		1.878

$$Q = \frac{P_{HI}^2}{P_{H_2} P_{I_2}} = \frac{(1.878)^2}{(0.0612)(1.061)} = 54 = K$$

LAW OF MASS ACTION: Q = K AT EQUILIBRIUM

LeCHATLIER'S PRINCIPLE:

SYSTEMS WILL ALWAYS MOVE TOWARD EQUILIBRIUM

$$Hb + 4O_2 \rightleftharpoons Hb(O_2)_4$$

SYSTEM AT EQUILIBRIUM → (APPLY STRESS: $O_2 \uparrow$) → SYSTEM NO LONGER AT EQUILIBRIUM → (SYSTEM SHIFTS ⇒ $Hb + 4O_2 \rightleftharpoons Hb(O_2)_4$) → SYSTEM AT EQUILIBRIUM