

$\ominus \Delta H$ Exothermic \Rightarrow release/lose heat (OUT)
 $\oplus \Delta H$ Endothermic \Rightarrow Gain heat (IN)

Exo
 $R \rightarrow P + \text{heat}$

ENDO
 $R + \text{heat} \rightarrow P$

(2) $N_2 + 3H_2 \rightleftharpoons 2NH_3 + 92KJ$
(g) (g) (g)

$H_{rxn} < 0$
 $N_2 + 3H_2 \rightarrow 2NH_3$

Apr 7-8:41 AM

1 Frame (Body) + 1 engine + 4 tires \Rightarrow 1 car

(Mole ratio) 1 : 1 : 4 : 1 \rightarrow 1

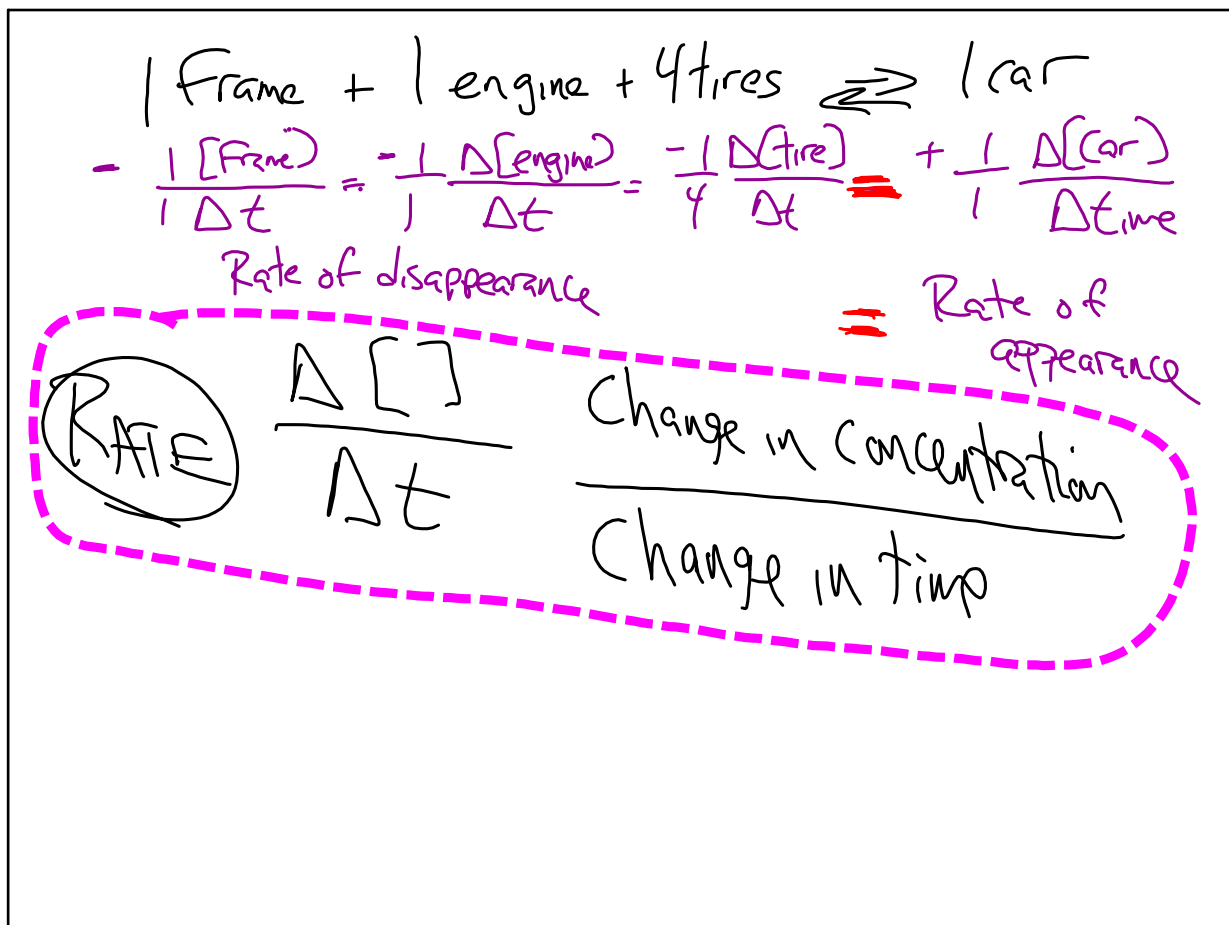
Apr 7-8:57 AM

(Reaction)	1 Frame + 1 engine + 4 tires	\rightleftharpoons	1 car
[Initial]	100		100
[Change]	-20		+20
[Equilibrium]	80		120

Mole Ratio

RICE TABLE

Apr 7-9:05 AM



Apr 7-9:13 AM

$$\frac{2}{3} \frac{3}{1} \frac{2}{1} \text{NH}_3 \quad \text{N}_2(\text{g}) + 3 \text{H}_2(\text{g}) \rightleftharpoons 2 \text{NH}_3(\text{g})$$
① Balanced eqn

② Rate of disappearance expression

$$-\frac{\Delta[\text{N}_2]}{\Delta t} = -\frac{1}{3} \frac{\Delta[\text{H}_2]}{\Delta t} = \frac{+1}{2} \frac{\Delta[\text{NH}_3]}{\Delta t}$$

Solve for The rate of appearance of NH_3 in terms of disappearance of H_2

$$\begin{aligned} *2 \quad -\frac{1}{3} \frac{\Delta[\text{H}_2]}{\Delta t} &= \frac{+1}{2} \frac{\Delta[\text{NH}_3]}{\Delta t} \quad *2 \\ \rightarrow -\frac{2}{3} \frac{\Delta[\text{H}_2]}{\Delta t} &= \frac{\Delta[\text{NH}_3]}{\Delta t} \end{aligned}$$

$$\frac{\Delta[\text{N}_2]}{\Delta t} = \frac{1}{2} \frac{\Delta[\text{NH}_3]}{\Delta t}$$

$$\frac{2 \Delta[\text{N}_2]}{\Delta t} = \frac{\Delta[\text{NH}_3]}{\Delta t}$$

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Equilibrium constant expression

K_{eq}

(aq) = Molarity (concentration) K_c ← concentrations at equilibrium

(g) = Pressure K_p ← pressures of the gases at EQ

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Rate forward = Rate Reverse
rxn rxn

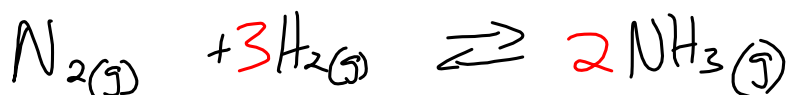
AT EQUILIBRIUM!



$$K_{eq} = \frac{[C]^3}{[A][B]^2} = \frac{(\text{Products})^{\text{coeff}}}{(\text{Reactants})^{\text{coeff}}}$$

or "Mass Action Expression"

Apr 7-9:43 AM



$$K_{eq} = \frac{[NH_3]^2}{[N_2][H_2]^3} = \frac{(0.01)^2}{(0.02)(0.02)^3} = 625$$

$$K_{eq} = \frac{[O_2]^3}{(0.05)^3} = \frac{1.25 \times 10^{-4}}{0.000125}$$

Apr 7-9:47 AM

$$K = \frac{[\text{Prod}]^{\text{coeff}}}{[\text{react}]^{\text{coeff}}}$$

625 $K \gg 1$ | Favors product formation \rightarrow

0.000125 $K \ll 1$ | Favors reactant \leftarrow

Apr 7-10:00 AM

HW

6A + 6B # 1, 2, 3

Apr 7-10:02 AM