

Practice Exam 2 Key

① B

② C

③ D $100\% \xrightarrow{1} 50\% \xrightarrow{2} 25\% \xrightarrow{3} 12.5\% \xrightarrow{4} 6.25\%$

④ B

⑤ A

⑥ A *Remember: Overall Rate Law matches slow step rate law

⑦ D

⑧ D

⑨ E

$$\text{Rxn 1: } K = 59 = \frac{[AB_2]}{[A][B]^2} \quad \text{Rxn 3: } K = 478 = \frac{[AB_3]}{[A][B]^3}$$

$$\text{Rxn 2: } K = \frac{[AB_3]}{[AB_2][B]} = \frac{478}{59} = \frac{K_3}{K_1}$$

⑩ A

⑪ B

$$K_p = K_c [(0.08206)(400)]^{2-4} =$$

$$K_c = 4.4 \times 10^4$$

⑫ D

⑬ C

$$Q = .292 < .33 \text{ so } \rightarrow \text{ to P}$$

⑭ D

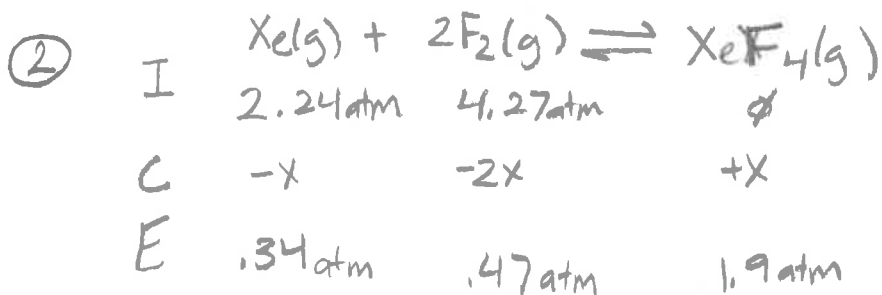
⑮ C

⑯ B

$$\textcircled{1} \quad \ln\left(\frac{k_2}{k_1}\right) = \frac{E_a}{R} \left(\frac{1}{T_1} - \frac{1}{T_2} \right) \quad \frac{k_2}{k_1} = e^{11.74} = 126082$$

\uparrow 4.60×10^{-6} \uparrow 275 \uparrow 364

$$\boxed{k_2 = .58 \text{ s}^{-1}}$$



$$x = 1.9 \text{ atm}$$

$$K_p = \frac{1.9}{(.47)^2 (.34)} = \boxed{25.3}$$

M/s (typo in exam!)

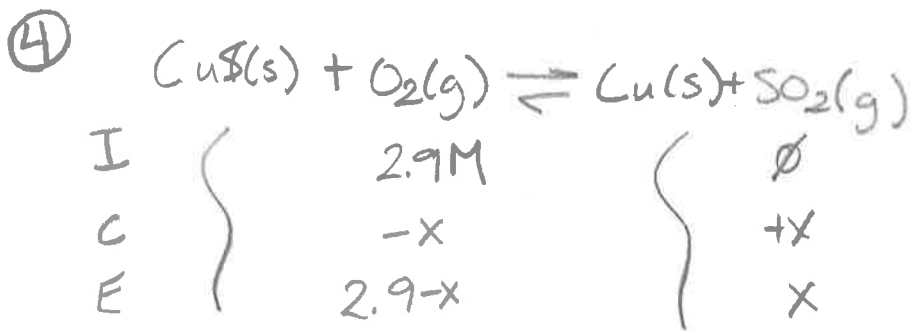
$$\textcircled{3} \quad \text{rate} = k [\text{S}_2\text{O}_8^{2-}]^x [\text{I}^-]^y$$

$$x: \text{Rxn 1+2} : [] \times 1.5 \\ \text{rate} \times 1.5 \quad \text{so 1st order}$$

$$y: \text{Rxn 2+3} : [] \times 2 \\ \text{rate} \times 2 \quad > \text{1st order}$$

$$\text{Using Rxn 1: } k = 36.03 \frac{1}{\text{M}\cdot\text{s}}$$

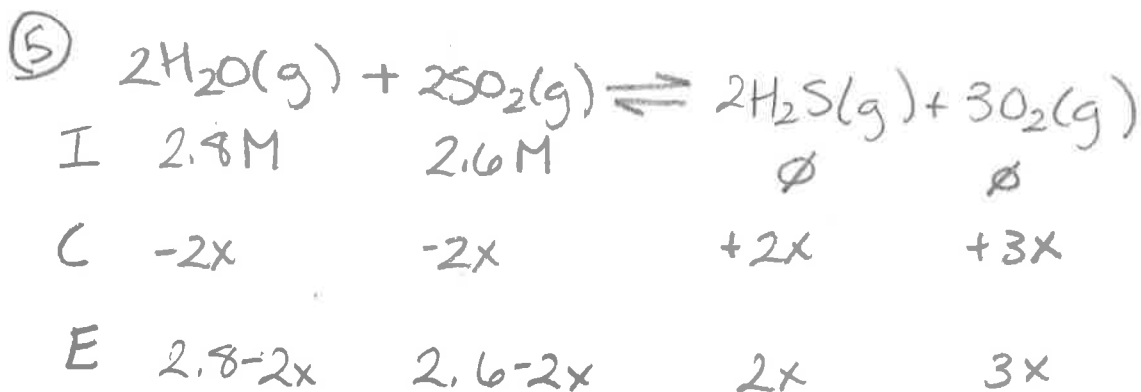
$$\text{so Rate} = 36.03 \frac{1}{\text{M}\cdot\text{s}} [\text{S}_2\text{O}_8^{2-}] [\text{I}^-]$$



$$1.5 = \frac{x}{2.9-x}$$

$$x = 1.74$$

$$2.9 - 1.74 = \boxed{1.16 \text{ M O}_2}$$



$$1.3 \times 10^{-6} = \frac{(2x)^2 (3x)^3}{(2.8-2x)^2 (2.6-2x)^2}$$

assume x is small

$$1.3 \times 10^{-6} = \frac{108x^5}{2.8^2 \cdot 2.6^2}$$

$$x = .058 \text{ M}$$

Valid?

$$\frac{.058}{2.6} = 2.2\% \quad \checkmark$$

$$[\text{H}_2\text{S}] = 2x = \boxed{.115 \text{ M}}$$