

Objective 1

1. Dynamic equilibrium exists once a reversible reaction ceases to change its ratio of reactants/products, but substances move between chemicals at equal rate, no net change.

2. a. $K = \frac{[\text{NO}_2][\text{N}_2\text{O}]}{[\text{NO}]^3}$

b. $K = \frac{[\text{S}_2][\text{H}_2]^4}{[\text{CH}_4][\text{H}_2\text{S}]^2}$

c. $K = \frac{[\text{CO}]^4}{[\text{Ni}(\text{CO})_4]}$

d. $K = \frac{[\text{F}^-][\text{H}^+]}{[\text{HF}]}$

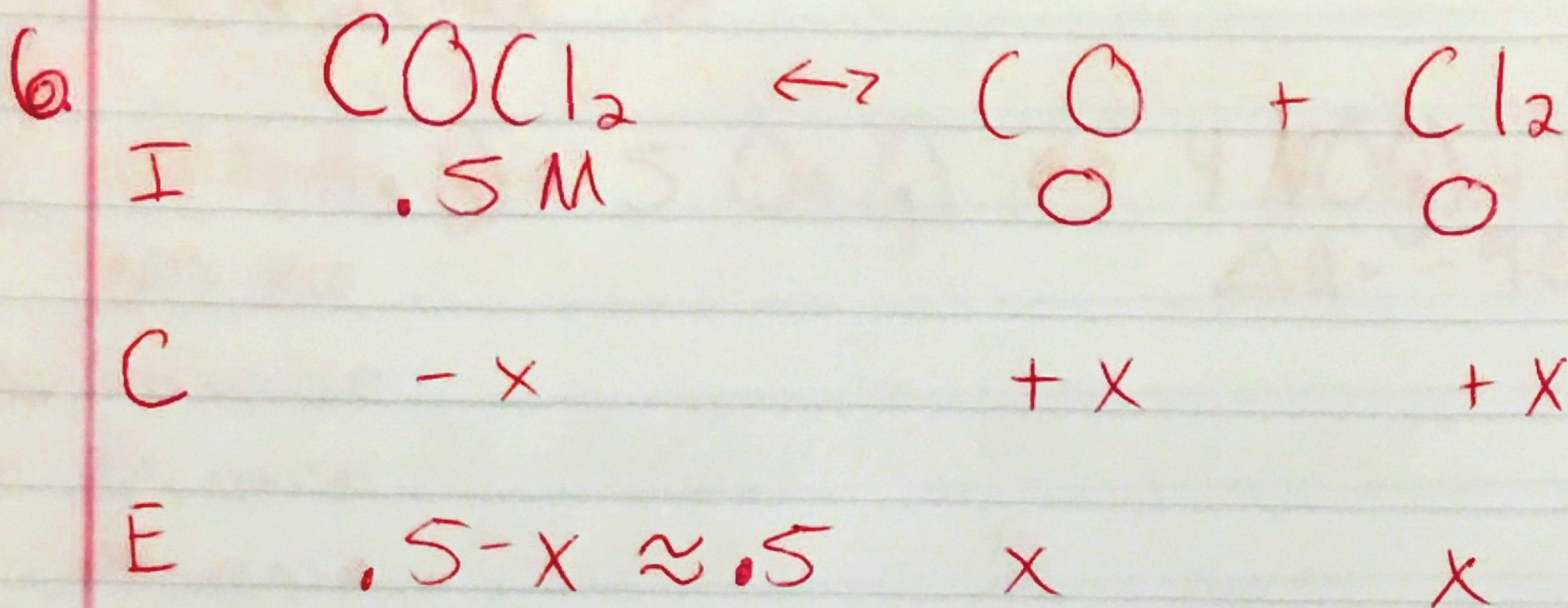
e. $K = \frac{[\text{Ag}^+]^2}{[\text{Zn}^{+2}]}$

3. $K = \frac{[\text{H}_2][\text{I}_2]}{[\text{HI}]^2} = \frac{4.79 \times 10^{-4} \cdot 4.79 \times 10^{-4}}{(3.53 \times 10^{-3})^2} = \boxed{.0184}$

4. $K = \frac{[\text{NO}_2]^2}{[\text{NO}]^2[\text{O}_2]} = \frac{(15.5)^2}{(.0542)^2(.127)} = \boxed{6.4 \times 10^5}$

5. $K = \frac{[\text{NH}_3]^2}{[\text{N}_2][\text{H}_2]^3} = 1.45 \times 10^{-5} = \frac{x^2}{.432 \cdot (.928)^3}$

$x = [\text{NH}_3] = \boxed{.00224 \text{ M}}$

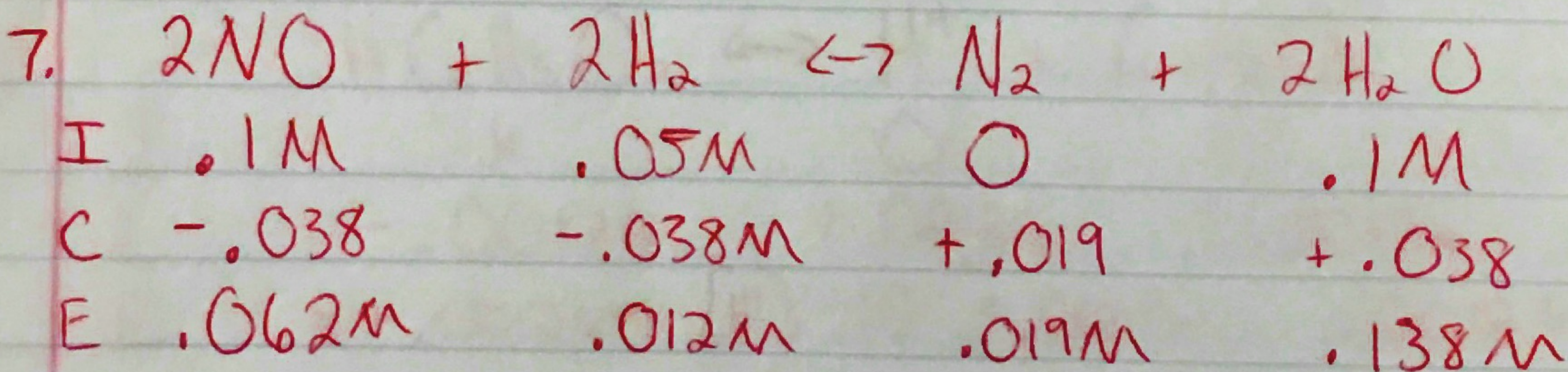


$$K = \frac{[\text{CO}][\text{Cl}_2]}{[\text{COCl}_2]} = \frac{x \cdot x}{.5} = 8.3 \times 10^{-4}$$

$$x = .0204$$

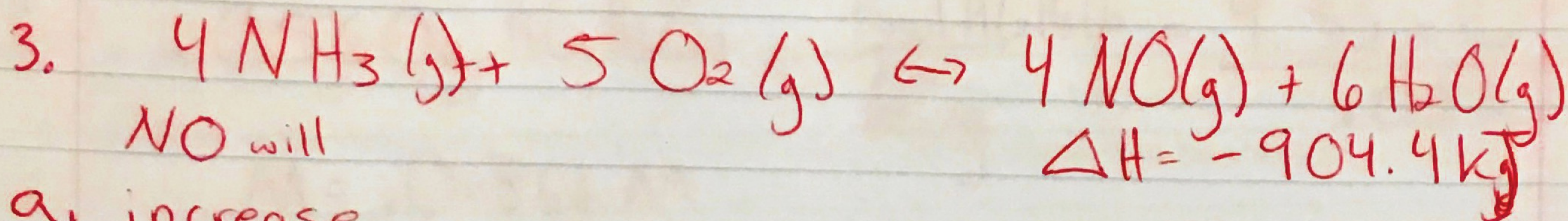
At equilibrium:

$$[\text{COCl}_2] \approx .5 \text{ M} \quad [\text{CO}] = .0204 \text{ M} \quad [\text{Cl}_2] = .0204 \text{ M}$$



$$K = \frac{[\text{N}_2][\text{H}_2\text{O}]^2}{[\text{NO}]^2[\text{H}_2]^2} = \frac{(.019) \cdot (.138)^2}{(.062)^2 \cdot (.012)^2} = \boxed{6.5 \times 10^2}$$

Objective 2



NO will

a. increase

b. decrease

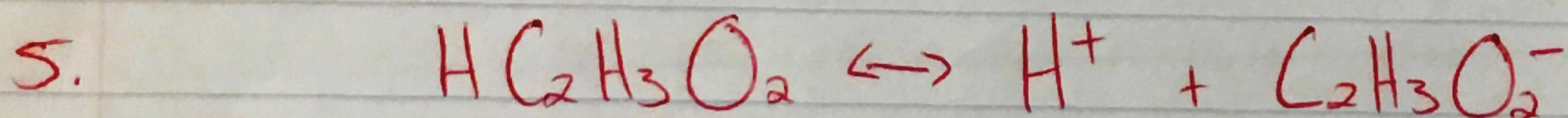
c. decrease

d. decrease

e. no change

f. decrease

4. a. shift right
 b. no effect
 c. no effect



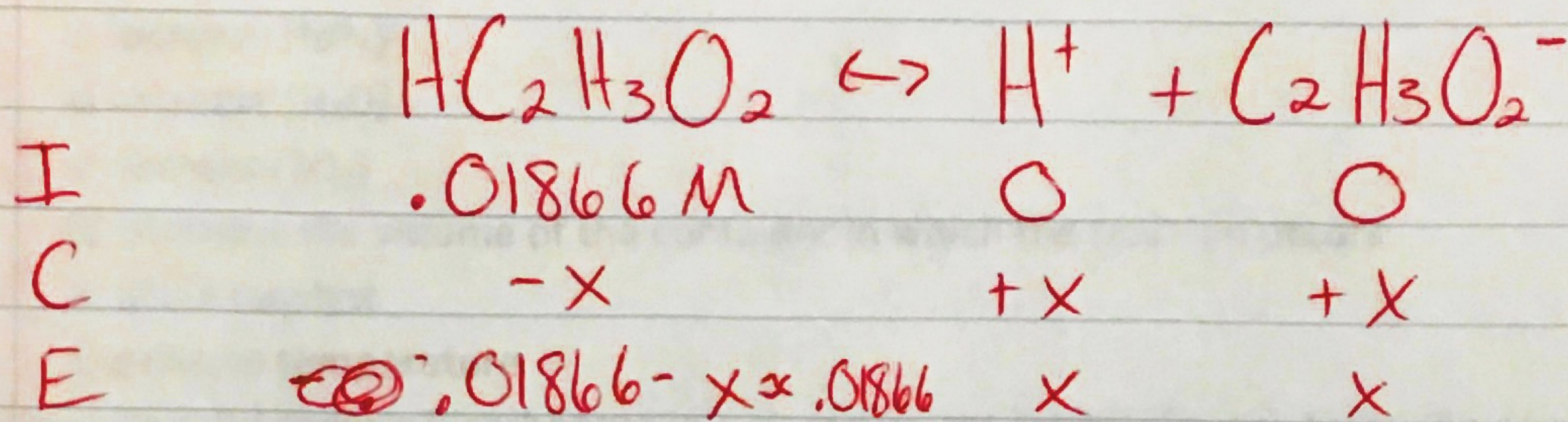
I	X	0	0
C	- .00126	+ .00126	+ .00126
E	$x - .00126 \approx x$	$[\text{H}^+] = 10^{-\text{pH}} = .00126$.00126

$$K_a = \frac{[\text{H}^+][\text{C}_2\text{H}_3\text{O}_2^-]}{[\text{HC}_2\text{H}_3\text{O}_2]} = \frac{.00126 \cdot .00126}{x - .00126 \approx x} = 1.8 \times 10^{-5}$$

$$\frac{1.588 \times 10^{-6}}{x} = 1.8 \times 10^{-5} \quad x = \frac{1.588 \times 10^{-6}}{1.8 \times 10^{-5}} = \boxed{.0882 \text{ M}} = [\text{HC}_2\text{H}_3\text{O}_2]$$

$$6. \quad .0560 \text{ g HC}_2\text{H}_3\text{O}_2 \times \frac{1 \text{ mol HC}_2\text{H}_3\text{O}_2}{60 \text{ g}} = \frac{9.33 \times 10^{-4} \text{ mol}}{.05 \text{ L}}$$

$$M = .01866 \text{ M}$$



$$1.8 \times 10^{-5} = \frac{x^2}{.01866} \quad \bullet \quad x = 5.79 \times 10^{-4}$$

$$\boxed{[\text{H}^+] = 5.8 \times 10^{-4} \text{ M} = [\text{C}_2\text{H}_3\text{O}_2^-]}$$

$$\boxed{[\text{HC}_2\text{H}_3\text{O}_2] = .0181 \approx .01866 \text{ M}}$$