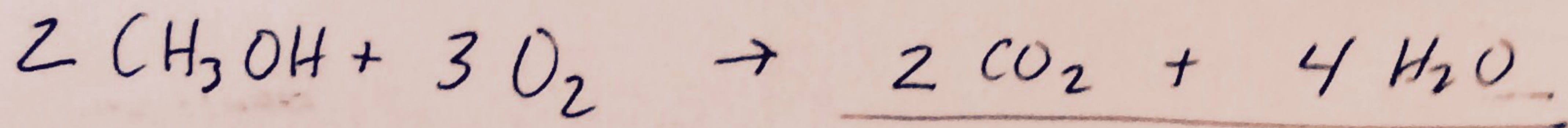


1. * a. $\sum n \Delta H_{\text{products}} - \sum n \Delta H_{\text{reactants}} = \Delta H$



$$\left[\underset{\text{CO}_2}{2(-393.5)} + \underset{\text{H}_2\text{O}}{4(-285.83)} \right] - \left[\underset{\text{CH}_3\text{OH}}{2(-239.07)} + \underset{\text{O}_2}{3(0)} \right]$$

$$-1930.32 - (-478.06) = \boxed{-1452.26 \text{ kJ}}$$

* b.

$$\left[2(213.67) + 4(69.91) \right] - \left[2(127.23) + 3(205.03) \right]$$

$$705.98 - 869.55 = \boxed{-163.57 \text{ J}}$$

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c. $\Delta G = \Delta H - T \Delta S$

$$\boxed{-1452.26 \text{ kJ}} - \left[298 \text{ K} \left(\frac{-163.57 \text{ J}}{1000} \right) \right]$$

↑ turn to kJ

d.

$$-1403.5 \text{ kJ} = \left[2(-394.38) + 4(-237.18) \right] - \left[2(x) + 3(0) \right]$$

$$-1737.48$$

$$- \left[2(x) \right] + \cancel{3(0)}$$

$$-1403.5 \text{ kJ} =$$

$$+1737.48$$

$$+ 1737.48$$

$$\frac{333.98}{-2} = \frac{-2x}{-2} = \boxed{-166.99 \text{ kJ}}$$

3.

2. $q = cm\Delta T$

$$2.1(50)(273 - 100) = \frac{18.165 \text{ kJ}}{-1000 -}$$

$$2. \left[6.01 \text{ kJ} \left(\frac{5.0}{18} \right) \right] = +$$

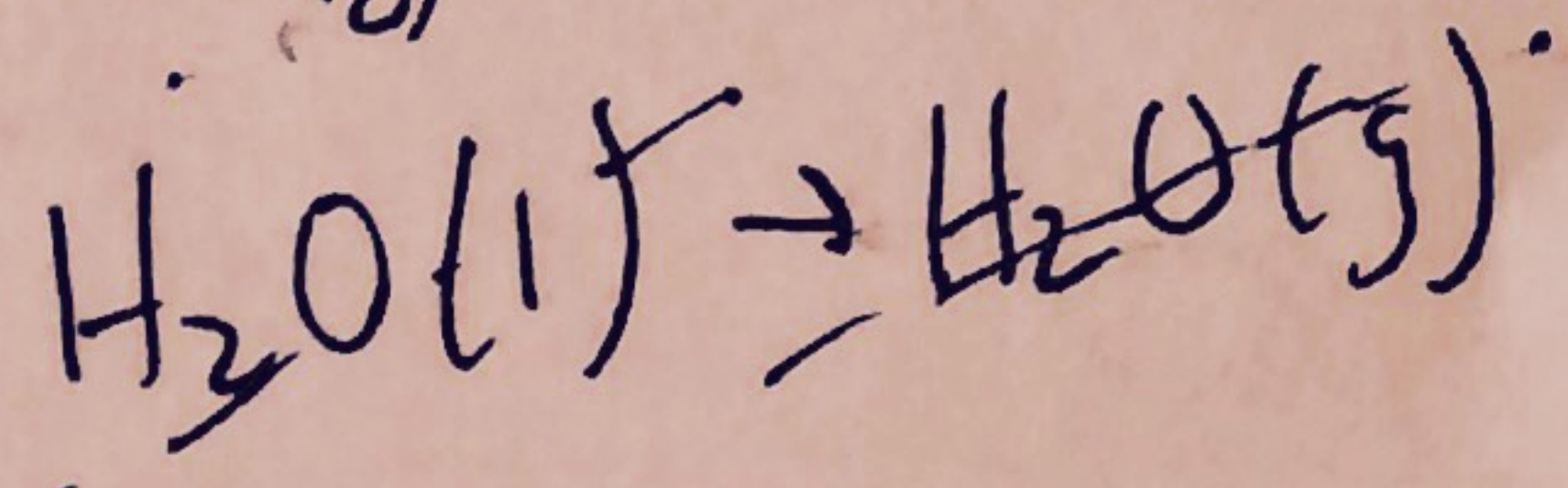
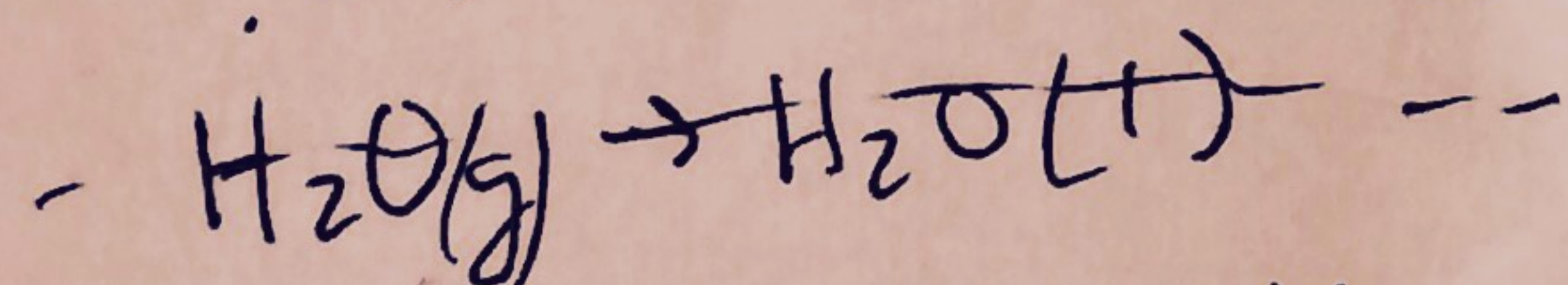
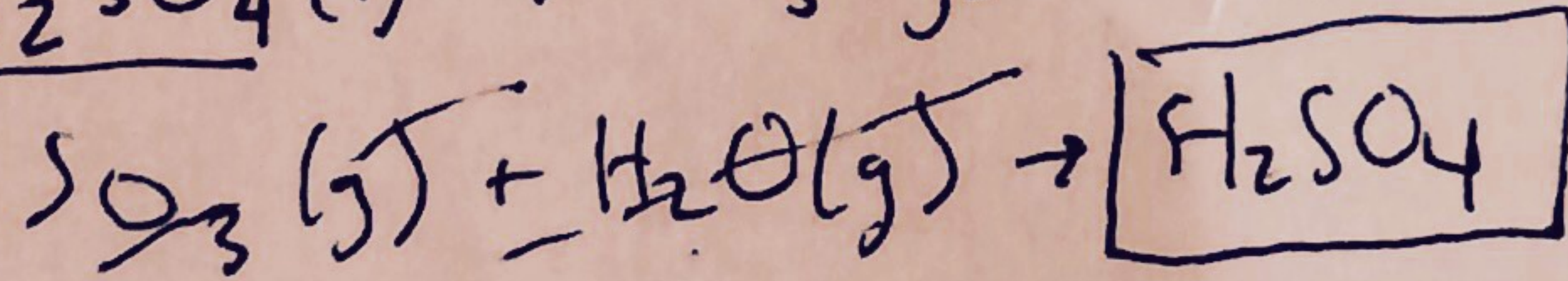
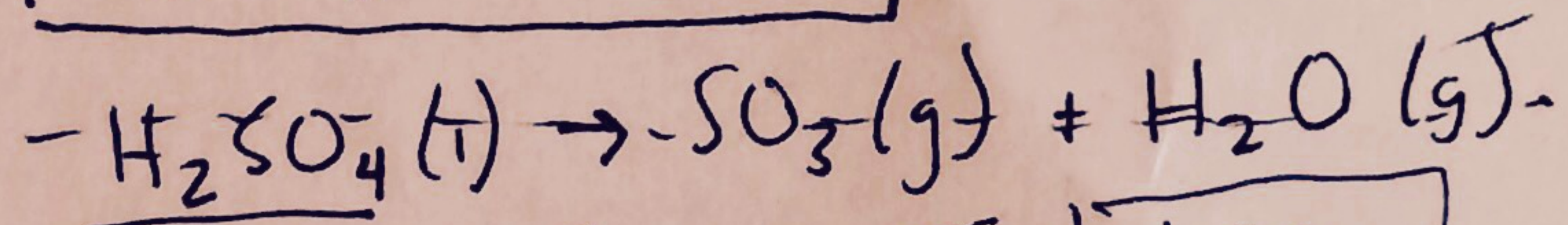
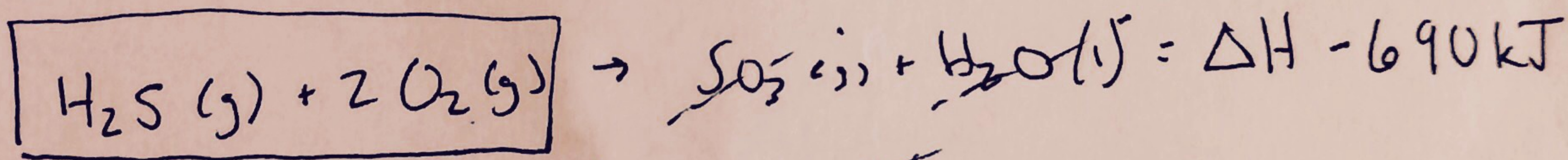
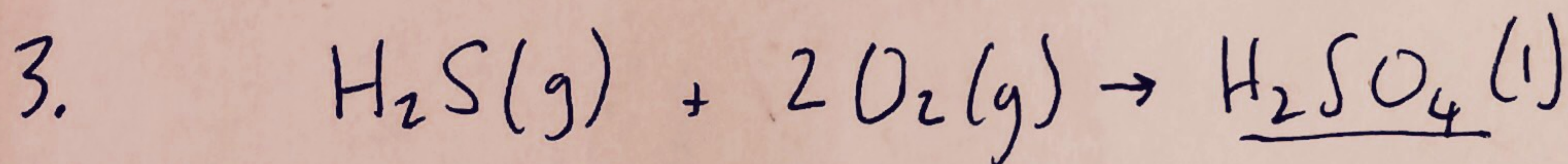
$18 \text{ g/mol H}_2\text{O}$

$$\underline{16.69 \text{ kJ}}$$

3. $q = cm\Delta T$

$$+ 4.18(50)(315 - 273) = \frac{8.778 \text{ kJ}}{-1000 -}$$

$$\underline{43.63 \text{ kJ}}$$



$$+ \Delta H_{-41} \text{ kJ} \quad 41 \text{ kJ}$$

$$\underline{\underline{-854 \text{ kJ}}}$$