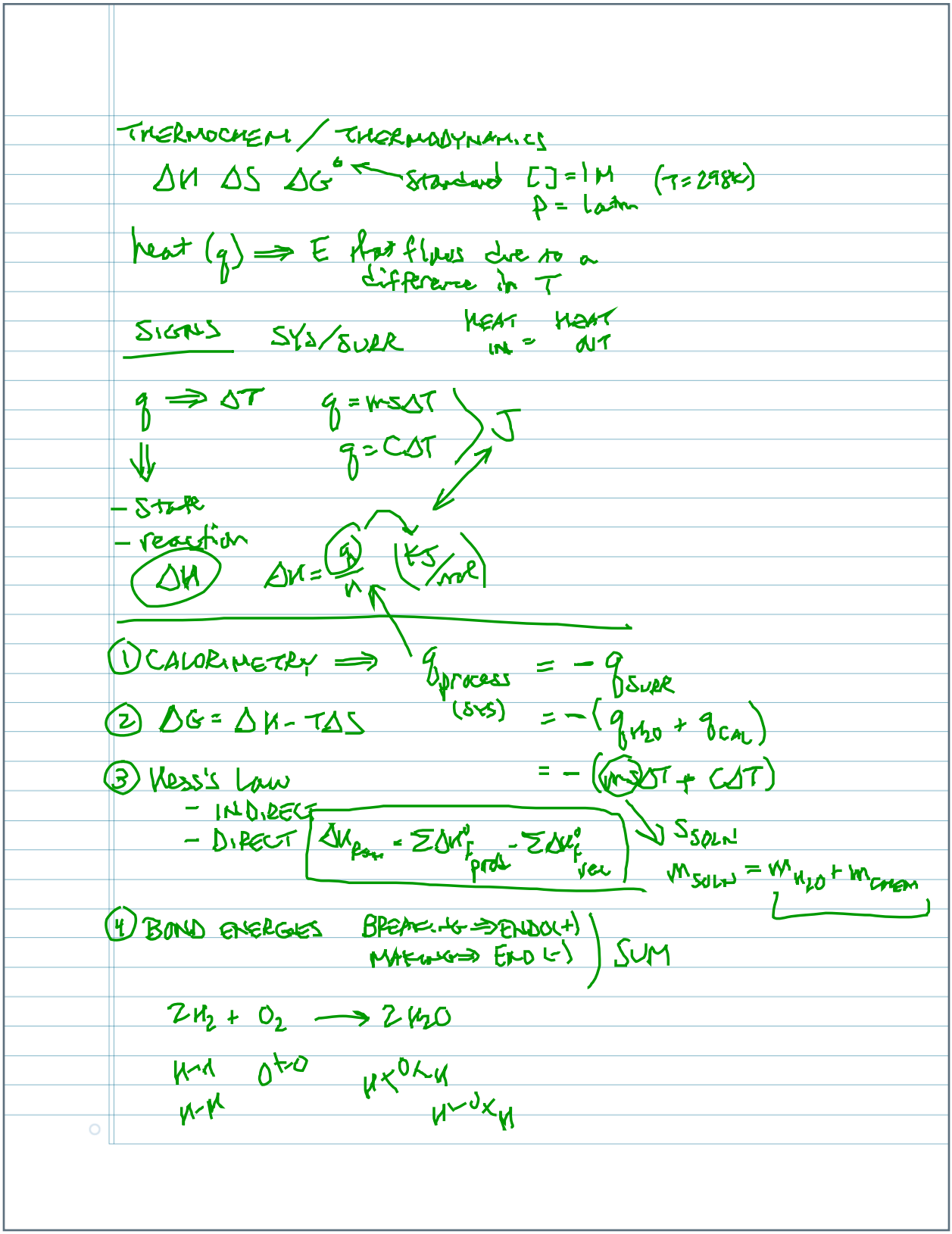

THERMOCHEM / THERMODYNAMICS

ΔH ΔS ΔG° ← Standard [ ] = 1 M ($T = 298K$)
$P = 1$ atm

heat (q) ⟹ E that flows due to a difference in T

SIGNS SYS/SURR HEAT IN = HEAT OUT

$q \Rightarrow \Delta T$ $q = ms\Delta T$, $q = C\Delta T$ } J

- State
- reaction

ΔH $\Delta H = \frac{q}{n}$ (kJ/mol)

① CALORIMETRY ⟹ $q_{process\ (SYS)} = -q_{SURR}$
$= -(q_{H_2O} + q_{CAL})$
$= -(ms\Delta T + C\Delta T)$

② $\Delta G = \Delta H - T\Delta S$

③ Hess's Law
- INDIRECT
- DIRECT $\Delta H_{rxn} = \sum \Delta H^\circ_{f\ prod} - \sum \Delta H^\circ_{f\ reac}$

$m_{SOLN} = m_{H_2O} + m_{CHEM}$

④ BOND ENERGIES BREAK ⟹ ENDO (+)
MAKE ⟹ EXO (−) } SUM

$2H_2 + O_2 \longrightarrow 2H_2O$

H-H O=O H-O-H

THERMOCHEMICAL EQNS $(2A + 1B \rightarrow 1C + 3D)$ $\Delta H = 123\ kJ/mol_{RXN}$

kJ ⟷ mol

WORK $= -P\Delta V$ (external) → SYS

SYS EXPANDS $\Delta V(+)$ work (−)

NO ΔV $\Delta E = \Delta H$ YES $\Delta V \rightarrow \Delta E = q + w$

THERMODYNAMICS ⟶ REACTION THERMO-FAVORED "SPONTANEOUS"

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

$\Delta G^\circ = \Delta H^\circ - T\Delta S^\circ$

(−) → @EQ [P] > [R]

$\Delta G = \Delta G^\circ + RT\ln Q$

@EQ $\Delta G = 0$ $Q = K$

$\Delta G^\circ = -RT\ln K$