

Spontaneity of Reaction

Answers

Worksheet A

A. 1. a, b, c 2. d 3. d 4. b 5. c, d

B. 1. Spontaneity is T dependent, increasing as T increases.

2. no

3. yes

4. ≈ 340 K ($\approx 67^\circ\text{C}$)

5. 0.018

OR: ΔG is nonspontaneous at lower temps

+ becomes spontaneous at higher temps

C. 56°C

D. 1. no

2. yes; above 2.2×10^4 K

3. no

Worksheet C

A. 1. b, c, d, e

2. a, ~~g~~

3. c

4. b, c, ~~e~~

~~5. b~~

~~B. 19.66 kJ~~

OOPS! OMIT this one

C. ~~1.14 atm~~

$$\begin{aligned}\Delta H_{\text{rxn}} &= \sum \Delta H_f(\text{prod}) - \sum \Delta H_f(\text{react}) \\ &= [3(0.0) + 4(-241.8)] - [2(95.0) + 2(33.84)] \\ &= -1225 \text{ kJ}\end{aligned}$$

$$\begin{aligned}\Delta S_{\text{rxn}} &= \sum S^\circ(\text{prod}) - \sum S^\circ(\text{react}) \\ &= [3(0.1915) + 4(0.1887)] - [2(0.2385) + 2(0.2404)] \\ &= +0.3715 \text{ kJ/K}\end{aligned}$$

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

$$= -1225 - (298)(0.3715)$$

$$= -1335 \text{ kJ}$$

Reaction is spontaneous at 25°C