② ΔH° C_nH_{2n+2} $\Delta H = -2220$ kJ/mol

$C_nH_{2n+2} + X O_2 \rightarrow n CO_2 + \frac{(2n+2)}{2} H_2O$

$(n+1)\, H_2O$

a)

$-2220 = n \cdot \Delta H_f^\circ CO_2 + (n+1)\Delta H_f^\circ H_2O$

b) $-2220 = n \cdot (-393) + (n+1)(-286)$

$-2220 = -393n - 286n - 286$

$-2220 + 286 = -679\, n$

$-1934 = -679\, n \rightarrow n \simeq 2,8 \simeq \boxed{3}$

$\boxed{C_3H_8}$

$PV = nRT$

$n = \frac{P \cdot V}{R \cdot T} = \frac{1 \cdot 50}{0,082 \cdot 298} = \boxed{2,05 \text{ mol}}$

$\frac{1 \text{ mol hidrocarbo}}{\text{desprede } 2220 \text{ kJ}} = \frac{2,05 \text{ mol}}{X}$

$\boxed{X = 4542,5 \text{ kJ}}$

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③ $H_2O(l) \rightleftharpoons H_2O(s)$ $\Delta H = -6$ kJ/mol

$\Delta S = -22$ J/mol·K

a) $\Delta G = -6 - 298 \cdot (-22 \cdot 10^{-3}) = -6 + 6,56 = \boxed{0,56}$

$\Delta G > 0$ NO ESP.

$T = -10 + 273 = 263$ K.

$\Delta G = -6 - 263 \cdot (-22 \cdot 10^{-3}) = -6 + 5,79 = -0,21$

$\Delta G < 0$ ESP.