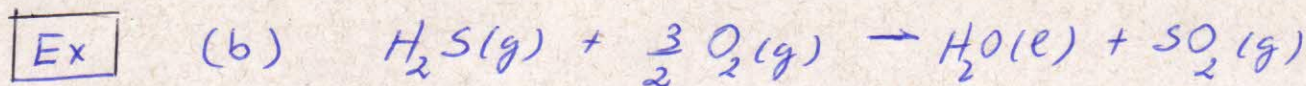


PART E B - TERMODINÂMICA QUÍMICA

$$(5) \quad \Delta \bar{H}_r^\circ = \sum_i \nu_i \Delta H_f^\circ (\text{Produtos}) - \sum_i \nu_i \Delta H_f^\circ (\text{Reagentes})$$

RESULTADOS

$\Delta \bar{H}_r^\circ$	$\Delta \bar{U}_r^\circ$ (kJ/mol)
(a) - 285,4	- 287,90
(b) - 562,04	- 558,32
(c) 142,0	144,48
(d) 178,5	175,82



$$\Delta H_r^\circ = (\Delta H_f^\circ \text{H}_2\text{O}(\text{l}) + \Delta H_f^\circ \text{SO}_2(\text{g})) - (\Delta H_f^\circ \text{H}_2\text{S}(\text{g}) + \frac{3}{2} \Delta H_f^\circ \text{O}_2(\text{g}))$$

$$\Delta H_r^\circ = -285,83 - 296,81 - (-20,6 + 0) = -562,04 \text{ kJ/mol}$$

$$\Delta U_r^\circ = \Delta H_r^\circ - (\Delta n)RT \quad \Delta n = 1 - \left(\frac{3}{2} + 1\right) = -\frac{3}{2}$$

$$R = 8,314 \text{ J K}^{-1} \text{ mol}^{-1}, \quad T = 298,15 \text{ K} \quad RT = 2,48 \text{ kJ/mol}$$

$$\Delta U_r^\circ = -558,32 \text{ kJ/mol}$$

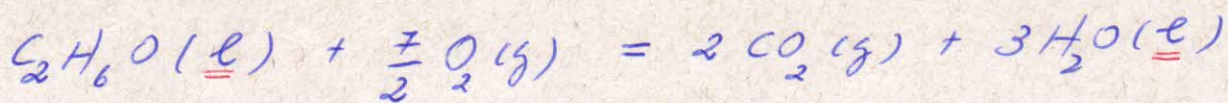
⑥ $\Delta H = q$ (Na cond. pressão constante)

(a) Etanol C_2H_6O $\bar{M} = 46 \text{ g/mol}$

$$\begin{array}{ccc} 3,0539 \text{ g} & \longrightarrow & -90,447 \text{ kJ} \\ 46 \text{ g} & & x \end{array}$$

$$x = -1362,4 \text{ kJ/mol}$$

(b) Reações de combustão (298,15 K)



$$\Delta H_c^\circ = 2 \Delta H_f^\circ(CO_2) + 3 \Delta H_f^\circ(H_2O(l)) - \Delta H_f^\circ(\text{Etanol})$$

$$-1362,4 = 2 \cdot (-393,51) + 3(-285,83) - \Delta H_f^\circ(\text{Etanol})$$

$$\boxed{\Delta H_f^\circ(\text{Etanol}) = -282,14 \text{ kJ/mol}}$$

$$\textcircled{7} \quad \Delta H_r^\circ = \sum_i \nu_i \Delta H_f^\circ(\text{Prod}) - \sum_j \nu_j \Delta H_f^\circ(\text{Reag})$$

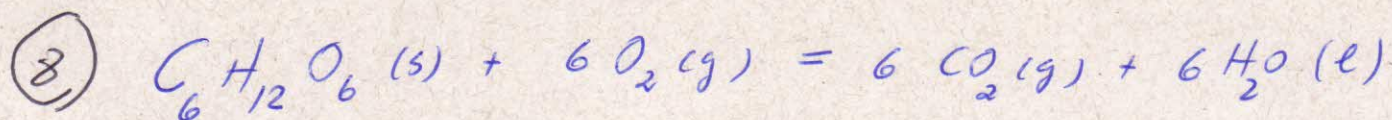
$$\Delta S_r^\circ = \sum_i \nu_i S_i^\circ(\text{Prod}) - \sum_j \nu_j S_j^\circ(\text{Reag})$$

VALORES
TABELADOS

ν_i, ν_j : coeficientes estequiométricos da reação.

Resultados

Reações	ΔH_r° (kJ/mol)	ΔS_r° (J/kmol)
(a)	-157	-93,07
(b)	-184,6	77,93
(c)	-562,04	-195,19
(d)	178,3	158,77



$$\Delta H_r^\circ = 6 \cdot (-394) + 6 \cdot (-286) - (-1268 + 6 \cdot 0)$$

$$\Delta H_r^\circ = -2364 - 1716 + 1268 = -2.812 \text{ kJ/mol}$$

$$\Delta S_r^\circ = (6 \cdot (212) + 6 \cdot 70) - (212 + 6 \cdot (205)) =$$

$$\Delta S_r^\circ = 1692 - 1442 = 230 \text{ J/kmol}$$

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$$\Delta G_r^\circ = \Delta H_r^\circ - T \Delta S_r^\circ = -2812 - \frac{298,15 \times 230}{1000} = -2.880,6$$

- 68,57 kJ/mol kJ/mol