Question #78297

What is the ΔHo of the equation 2C6H6 (l) + 15O2 → 12CO2 (g) + 6H2O (g)? Given: ΔHfo C6H6 = 49.00 kJ/mol, ΔHfo CO2 = –394 kJ/mol, ΔHfo H2O = –242 kJ/mol.

A. ΔHo = –6,082 kJ

B. ΔHo = –6,278 kJ

C. ΔHfo = –6,082 kJ

D. ΔHfo = –6,278 kJ

E. ΔHfo = 6,278 kJ

The right answer is B. ΔHo = –6,278 kJ.

Solution:

Hess's law for enthalpy of formation for a single reaction carried out under standard state (T=298.15 K, P = $1*10^5$ Pa) [1]:

$$\Delta H_f^0 = \sum \Delta H_f^0(products) - \sum \Delta H_f^0(reactants)$$

The equation for this particular case:

$$\Delta H_f^0 = \left(12 * (-394) + 6 * (-242)\right) - (2 * 49) = -6180 - 98 = -6278 \text{ kJ/mol}$$

So, the right answer is B. ΔHo = –6,278 kJ.

Reference:

[1] https://en.wikipedia.org/wiki/Hess%27s_law