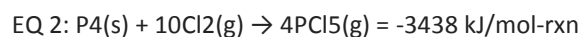


Answer on Question #55556 – Chemistry – General chemistry

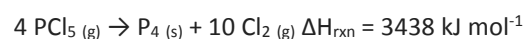
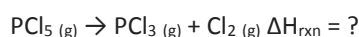
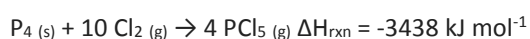
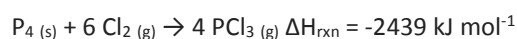
Question:

The reaction between phosphorous, $P_4(s)$, and chlorine, $Cl_2(g)$, is exothermic and leads to either $PCl_3(g)$ or $PCl_5(g)$ depending on the stoichiometric amount of $Cl_2(g)$ used. Given the following two chemical equations (EQ 1 and EQ 2) and their associated enthalpy changes for the formation of $PCl_3(g)$ and $PCl_5(g)$;

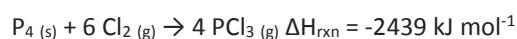


- Calculate the expected enthalpy change for the decomposition of one mole of $PCl_5(g)$ shown in equation 3 (EQ 3).
- Calculate the expected enthalpy change for the decomposition of 10.50 g of $PCl_5(g)$ shown in equation 3 (EQ 3).

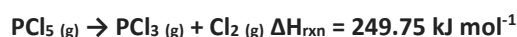
Solution:



+



=



$$Q = -\Delta H_{rxn} n = -\Delta H_{rxn} m/M = -249.75 \text{ kJ mol}^{-1} * 10.50 \text{ g} / 208.22 \text{ g mol}^{-1} = -12.59 \text{ kJ}$$

Answer: **-12.59 kJ (reaction is endothermic)**