**Chemistry 2.4 AS 91164** Demonstrate understanding of bonding, structure, properties and energy changes

Writing Excellence answers to **Thermochemical Calculations** questions



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| **Thermochemical Calculations QUESTION** | |
| **Question:**  Hexane, C6H14, like pentane, will combust (burn) in sufficient oxygen to produce carbon dioxide gas and water.  **Pentane combustion**: C5H12(l) + 8O2(*g*) → 5CO2(*g*) + 6H2O(l) Δr*H* º = −3509 kJ mol–1  **Hexane combustion:** 2C6H14(l) + 19O2(*g*) → 12CO2(*g*) + 14H2O(l) Δr*H* º = −8316 kJ mol–1  Justify which alkane – pentane or hexane – will produce more heat energy when 125 g of each fuel is combusted in sufficient oxygen.  *M*(C5H12) = 72.0 g mol–1 *M*(C6H14) = 86.0 g mol–1  (An equation and n=m/M are required for this type of thermochemical calculation) | |
| **ANSWER** | |
| 1. Calculate the amount of **energy per mol** from the equation  (divide Δr*H*° by number mol of substance in equation) – substance 1 |  |
| 2. calculate the **number of mols** of the known (K)  n = m/M |  |
| 3. multiply amount of energy per mol (step 1) by number of mols calculated (step 2) to get **energy per mass**  *Answer with units, sign plus 3sgf* |  |
| 4. Calculate the amount of **energy per mol** from the equation  (divide Δr*H*° by number mol of substance in equation) – substance 2 |  |
| 5. calculate the **number of mols** of the known (K)  n = m/M |  |
| 6. multiply amount of energy per mol (step 4) by number of mols calculated (step 5) to get  **energy per mass**  *Answer with units, sign plus 3sgf* |  |
| 7. compare both substances with **summary** statement |  |

NOTE: The white column is how your answer would appear on your test paper so make sure you **write out complete sentences**. The grey area is just to help you structure your answer and would not appear in the question.