ANSWER: Hess’s Law 2008

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| **Evidence** | **Achievement** | **Merit** | **Excellence** |
| Desired Equation = EqA – EqB – 2EqC + 3EqD  (NH2)2CO(*s*)+ 3O2(*g*) → CO2(*g*) + 2H2O() + 2NO2(*g*)  ∆r*H* = –632  2NO(*g*) + 3H2O(*g*) → 2NH3(*g*) + 2O2(*g*) ∆r*H* = +453  2NO2(*g*) → 2NO(*g*) + O2(*g*) ∆r*H*= +114  3H2O() → 3H2O(*g*) ∆vap*H* = +123  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  (NH2)2CO(*s*) + H2O(*l*) → CO2(*g*) + 2NH3(*g*)  ∆r*H* = ∆r*H* (EqA) – ∆r*H* (EqB) – 2∆r*H* (EqC) + 3∆vap*H*(EqD)  = –632 + 906 + 2 × 57 + 3 × 41  = –632 + 453 + 114 + 123 = 58 kJ mol–1  **Be careful with this question!**  **Many students left out the H2O (both liquid and gaseous states)** | • Reactants and products correctly identified for all four equations with states for H2O  OR  • Calculation correct with one error. | • Numerical value correct | * Numerical value correct with sign and unit(s). |

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