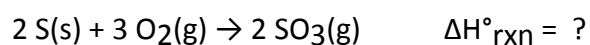1. Sodium metal reacts with water to produce hydrogen gas and sodium hydroxide. When 0.575 g of sodium is added to 100.00 g of water, the temperature of the resulting solutions rises from 25.00 C° to 35.75 C°. If the specific heat of the solution is 4.18 J/(g · C°), calculate ΔH for the reaction, in kJ/mol.
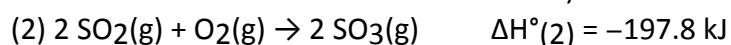
2. According to the following thermochemical equation, what mass of H_2O (in g) must form in order to produce 975 kJ of energy?

    $SiO_2(s)$ + 4 HF(g) → $SiF_4(g)$ + 2 H_2O(l)   ΔH°rxn = − 184 kJ
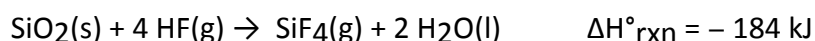
3. Use the standard reaction enthalpies given below to determine ΔH°rxn for the following reaction:

    2 S(s) + 3 O_2(g) → 2 SO_3(g)   ΔH°rxn = ?

    Given:
    (1) SO_2(g) → S(s) + O_2(g)   ΔH°(1) = +296.8 kJ
    (2) 2 SO_2(g) + O_2(g) → 2 SO_3(g)   ΔH°(2) = −197.8 kJ

4. Compute $\Delta H°$ in kJ for 2 LiH(s) + O$_2$(g) → Li$_2$O(s) + H$_2$O(l)

    (1) 2 LiOH(s) → Li$_2$O(s) + H$_2$O(l) $\Delta H_{(1)}° =$ 379.1 kJ
    (2) LiH(s) + H$_2$O(l) → LiOH(s) + H$_2$(g) $\Delta H_{(2)}° = -111.0$ kJ
    (3) 2 H$_2$(g) + O$_2$(g) → 2 H$_2$O(l) $\Delta H_{(3)}° = -285.9$ kJ
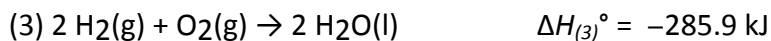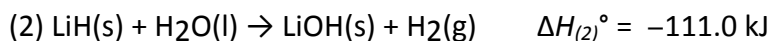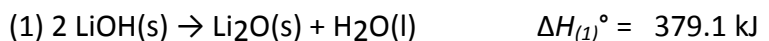
5. Given the heat of formation of the following compounds:
    CO$_2$(g) $\Delta H°_f = -393.5$ kJ/mol
    H$_2$O(l) $\Delta H°_f = -285.9$ kJ/mol
    CH$_3$OH(l) $\Delta H°_f = -238.6$ kJ/mol

    What is the value of the ΔH for combustion of one mole of methanol, CH$_3$OH(l)?

6. Sulfur dioxide reacts with oxygen to form sulfur trioxide. Use the $\Delta H°_f$ and $\Delta H°_{rxn}$ information provided to calculate $\Delta H°_f$ for SO$_3$(g):

    2 SO$_2$(g) + O$_2$(g) → 2 SO$_3$(g) $\Delta H°_{rxn} = -198$ kJ
                                                   $\Delta H°_f$ SO$_2$(g) = -297 kJ/mol

7. Write the chemical equation for the reaction that describes the formation of ammonium bromide at standard state conditions.