Finding Heats of Reaction from Heats of Formation

1) Calcium carbonate decomposes at high temperature to form carbon dioxide and calcium oxide:

$$CaCO_3 \rightarrow CO_2 + CaO$$

Given that the heat of formation of calcium carbonate is –1207 kJ/mol, the heat of formation of carbon dioxide is –394 kJ/mol, and the heat of formation of calcium oxide is –635 kJ/mol, determine the heat of reaction.

2) Carbon tetrachloride can be formed by reacting chlorine with methane:

$$CH_4 + 2\ Cl_2 \rightarrow CCl_4 + 2\ H_2$$

Given that the heat of formation of methane is –75 kJ/mol and the heat of formation of carbon tetrachloride is –135 kJ/mol, determine the heat of reaction.

3) When potassium chloride reacts with oxygen under the right conditions, potassium chlorate is formed:

$$2\ KCl + 3\ O_2 \rightarrow 2\ KClO_3$$

Given that the heat of formation of potassium chloride is –436 kJ/mol and the heat of formation of potassium chlorate is –391 kJ/mol, determine the heat of reaction.