1 Calculate the enthalpy change for this reaction using the enthalpies of formation shown.

$$TiCl_4(s) + 2Mg(s) \rightarrow 2MgCl_2(s) + Ti(s)$$
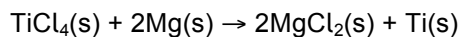
Δ_fH / kJ mol^{-1} $TiCl_4(s)$ = –912 $MgCl_2(s)$ = –642

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2 Calculate the enthalpy of combustion of butane, $C_4H_{10}(g)$, given the following data.

Δ_fH $C_4H_{10}(g)$ = –125 kJ mol^{-1} Δ_cH C(s) = –394 kJ mol^{-1} Δ_cH $H_2(g)$ = –286 kJ mol^{-1}

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3 Ethene reacts with hydrogen as shown: $CH_2=CH_2(g) + H_2(g) \rightarrow CH_3CH_3(g)$ ΔH = –99 kJ mol^{-1}

Calculate the bond enthalpy for the C=C bond using this data and the following bond enthalpies.

C-H = 413,   H-H = 463,   C-C = 348 kJ mol^{-1}

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4 1.22 g of propan-1-ol, $C_3H_7OH(l)$, was burned in a spirit burner and used to heat 50.0 g of water in a copper calorimeter. The temperature of the water rose by 52°C. Calculate the enthalpy of combustion of propan-1-ol determined by this experiment. The specific heat capacity of the solution is 4.18 J K^{-1} g^{-1}.

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