Challenge 6: Coupled reactions

The process of reducing $Fe_2O_3(s)$ to elements, $Fe(s)$ and $O_2(g)$, is endogonic ($\Delta G > 0$) at temperature 1200 °C (ΔG = +420 kJ/mol).

In order to reduce rust (Fe_2O_3) to metallic iron, industrial processes react the $O_2(g)$ that is produced with carbon to form $CO_2(g)$ (ΔG = –400 kJ/mol).

Show how 1 mole of $Fe_2O_3(s)$ is reduced spontaneously to $Fe(s)$ in the presence of $C(s)$.

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