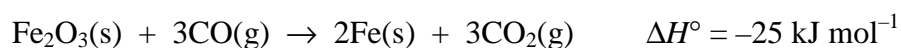
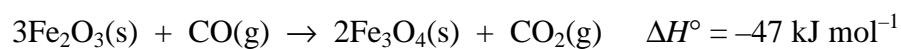


Marks
5

- Carbon monoxide is commonly used in the reduction of iron ore to iron metal. Iron ore is mostly haematite, Fe_2O_3 , in which case the complete reduction reaction is:



Incomplete reduction, however, results in the formation of magnetite, Fe_3O_4 :



Use these heats of reaction to calculate the enthalpy change when one mole of magnetite is reduced to iron metal using carbon monoxide.

Answer:

Another iron oxide that can be formed as an intermediate during reduction is FeO. Use the following table of thermochemical data to show whether the formation of FeO from Fe_3O_4 is spontaneous or not at 25 °C.

	$\Delta_f H^\circ$ (kJ mol ⁻¹)	S° (J K ⁻¹ mol ⁻¹)
FeO	-272	61
Fe ₃ O ₄	-1118	146
CO	-111	198
CO ₂	-394	214