$2\,Al_{(s)} + Fe_2O_{3(s)} \longrightarrow 2\,Fe_{(s)} + Al_2O_{3(s)} + 852\,kJ$

10.0 g Al, 35.0 g Fe_2O_3 reacted; the actual yield was 19.2 g Fe.
Calculate a) the % yield b) how much heat was released

$10.0\,g\,Al \times \frac{1\,mol}{26.98\,g} \times \frac{2\,mol\,Fe}{2\,mol\,Al} = 0.371\,mol\,Fe$

$35.0\,g\,Fe_2O_3 \times \frac{1\,mol}{159.70\,g} \times \frac{2\,mol\,Fe}{1\,mol\,Fe_2O_3} = 0.438\,mol\,Fe$

$0.371\,mol\,Fe \times \frac{55.85\,g}{1\,mol} = 20.7\,g\,Fe$ Theoretical yield

$\%\,yield = \frac{19.2\,g}{20.7\,g} \times 100\% = 92.8\%$

$19.2\,g\,Fe \times \frac{1\,mol\,Fe}{55.85\,g} \times \frac{-852\,kJ}{2\,mol} = -146\,kJ$

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1993B

a) $1.00 \text{ mol } O_2 \times \frac{2 \text{ mol } MnO_2}{1 \text{ mol } O_2} \times \frac{1 \text{ mol } I_2}{1 \text{ mol } MnO_2} \times \frac{2 \text{ mol } S_2O_3^{2-}}{1 \text{ mol } I_2}$

$= 4.00 \text{ mol } S_2O_3^{2-}$ $\quad n_{O_2} : n_{S_2O_3^{2-}}$ $\quad 1:4$

b) $50.0 \text{ mL } H_2O$ $\quad 4.86 \text{ mL}$ $\quad 0.0112 \text{ M } S_2O_3^{2-}$ $\quad n_{O_2} = ?$

$\text{mol} = M \times L = (0.0112 \text{ M})(0.00486 \text{ L}) = 5.44 \times 10^{-5} \text{ moles } S_2O_3^{2-}$

$5.44 \times 10^{-5} \text{ mol } S_2O_3^{2-} \times \frac{1 \text{ mol } O_2}{4 \text{ mol } S_2O_3^{2-}} = 1.36 \times 10^{-5} \text{ mol } O_2$

$M_{O_2} = \frac{1.36 \times 10^{-5} \text{ mol}}{0.0500 \text{ L}} = 2.72 \times 10^{-4} \text{ M } O_2$

↓ to make 1.00 L

2.72×10^{-4} moles O_2

$V = \frac{nRT}{P} = \frac{(2.72 \times 10^{-4} \text{ mol})(0.082 \frac{\text{atm} \cdot \text{L}}{\text{mol} \cdot \text{K}})(298 \text{ K})}{1 \text{ atm}}$

$V = 6.65 \times 10^{-3} \text{ L} \rightarrow 6.65 \text{ mL}$

of dry O_2 gas