

Mercury and Potassium Permanganate

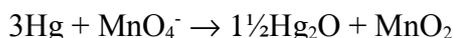
Mercury is oxidised by potassium manganate(VII) with the formation of manganese(IV) oxide, MnO_2 , and potassium hydroxide and an oxide of mercury. 50.0cm^3 of 0.0200mol dm^{-3} potassium manganate(VII) solution oxidise 0.600g of mercury. Work out the equation for the reaction.

$$\begin{aligned}\text{amount of mercury} &= \text{mass} / \text{RAM} \\ &= 0.6 / 201 \\ &= 2.99 \times 10^{-3} \text{ mol}\end{aligned}$$

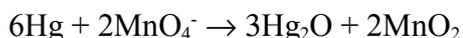
$$\begin{aligned}\text{amount of Mn(VII)} &= (\text{conc.} \times \text{vol.})/1000 \\ &= (0.02 \times 50)/1000 \\ &= 1 \times 10^{-3} \text{ mol}\end{aligned}$$

	(Mercury)	(Mn(VII))	
amount	2.99×10^{-3}	1×10^{-3}	\rightarrow
ratio	3	1	
equation	$3\text{Hg}(0) +$	Mn(VII)	$\rightarrow 3\text{Hg(I)} + \text{Mn(IV)}$

This is a redox reaction. The Mn(VII) has gained three electrons to form Mn(IV). Therefore each Hg atom must have lost 1 electron to form Hg(I). The equation written as above just including the species which are oxidised and reduced is basically the answer. Now you have to put in the actual species involved. The actual species for the mercury(I) oxide is Hg_2O . Therefore



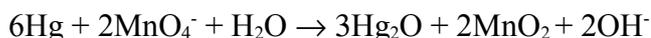
or



put in OH^- on the RHS such that charge balances



Put H_2O on the LHS such that hydrogen and oxygen balance



Put in the K^+ spectator ions

