

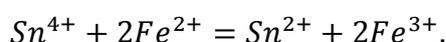
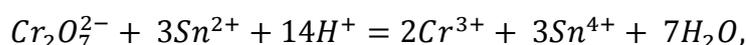
## Answer on the question #54222 – Chemistry – Physical Chemistry

### Question:

4.9 gr  $K_2Cr_2O_7$  is taken to prepare 0.1 litre of the solution. 10 ml of this solution is further taken to oxidise  $Sn^{2+}$  ion into  $Sn^{4+}$  ion. The  $Sn^{4+}$  so produced is used in 2nd reaction to prepare  $Fe^{3+}$  ion, then the millimoles of  $Fe^{3+}$  ion formed will be (assume all other components are in sufficient amounts).

### Solution:

The equations of chemical reactions are:



According to these equations, the number of moles of  $Cr_2O_7^{2-}$  anions and number of moles of  $Fe^{3+}$  ions relate as:

$$n(Cr_2O_7^{2-}) = \frac{n(Sn^{4+})}{3},$$

$$n(Sn^{4+}) = \frac{n(Fe^{3+})}{2},$$

$$n(Fe^{3+}) = 2n(Sn^{4+}) = 2 \times 3 \times n(Cr_2O_7^{2-}).$$

Number of moles of  $Cr_2O_7^{2-}$  can be calculated from the solution preparation data:

$$n(Cr_2O_7^{2-}) = \frac{m(K_2Cr_2O_7^{2-})}{M(K_2Cr_2O_7^{2-})} \times \frac{V(sample)}{V(total)} = \frac{4.9}{294.185} \times \frac{0.01}{0.1} = 1.666 \text{ mmol}.$$

Then, the number of moles of  $Fe^{3+}$  is:

$$n(Fe^{3+}) = 6 \times n(Cr_2O_7^{2-}) = 9.994 \text{ mmol}.$$

**Answer:** 9.994 mmol (millimoles) of  $Fe^{3+}$  is formed.