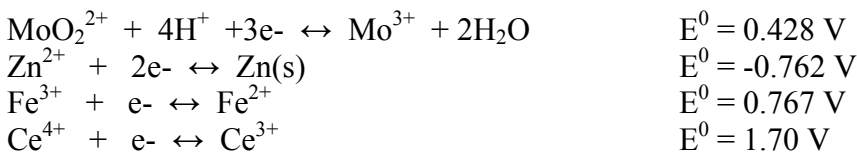


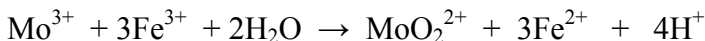
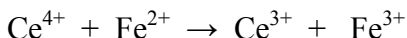
Quiz 8
Chem 311
Fall 2003

Name:

You have performed a re-dox titration experiment to measure the concentration of phosphate ion, PO_4^{3-} . The experiment protocol that you are following calls for precipitation of the phosphate by the addition of Mo to form $(\text{NH}_4)_3\text{PO}_4 \cdot 12\text{MoO}_3(\text{s})$, which is washed and dissolved in sulfuric acid forming the Mo^{6+} ion. Then, the solution is passed through a Jones reductor, which reduces the Mo^{6+} to Mo^{3+} . Mo^{3+} is collected in excess Fe^{3+} in 1 M H_2SO_4 forming MoO_2^{2+} (see Table 16-3) and Fe^{2+} . The Fe^{2+} that is formed is titrated with Ce^{4+} . Calculate the $[\text{PO}_4^{3-}]$ given that the aliquot of original phosphate solution is 25.00 ml and that the titration required 21.43 ml of 0.1204 M Ce^{4+} to reach the endpoint.



Write balance equations



$$\begin{aligned} & [\text{PO}_4^{3-}] \\ &= (21.43 \text{ ml} \cdot (0.1204 \text{ M})) \cdot (1 \text{ mmol Fe}^{2+} / 1 \text{ mmol Ce}^{4+}) \cdot (1 \text{ mmol Mo}^{3+} / 3 \text{ mmol Fe}^{2+}) \\ & \cdot (1 \text{ mmol PO}_4^{3-} / 12 \text{ mmol Mo}) \cdot (1 / 25.00 \text{ ml}) = 0.002867 \text{ M PO}_4^{3-} \end{aligned}$$