(1) Write the unbalanced equation for the reaction.

\[ \text{Fe}^{2+} + \text{Cr}_2\text{O}_7^{2-} \rightarrow \text{Fe}^{3+} + \text{Cr}^{2+} \]

(2) Separate the equation into two half-reactions.

(3) Balance the atoms other than O and H atoms in each half-reaction separately.

(4) For reaction in an acidic medium, add H\(_2\)O to balance the O atoms and H\(^+\) to balance the H atoms. If the reaction is in basic solution, add one OH\(^-\) per H\(^+\) on both sides to neutralize the H\(^+\) ions. Combine H\(^+\) and OH\(^-\) to form H\(_2\)O.

(5) Add electrons to one side of each half-reaction to balance the charges.

(6) Equalize the number of electrons in the two half-reactions by multiplying one or both half-reactions by appropriate coefficients.

(7) Add the two half-reactions and balance the final equation by inspection. The electrons on both sides must cancel.

(8) Verify that the equation contains the same types and numbers of atoms and the same charges on both sides of the equation.
If you want extra practice, balance the following redox reactions

(1) \( \text{H}_2\text{O}_2 + \text{Fe}^{2+} \rightarrow \text{Fe}^{3+} + \text{H}_2\text{O} \) (in acidic solution)

(2) \( \text{Cu} + \text{HNO}_3 \rightarrow \text{Cu}^{2+} + \text{NO} + \text{H}_2\text{O} \) (in acidic solution)

(3) \( \text{CN}^- + \text{MnO}_4^- \rightarrow \text{CNO}^- + \text{MnO}_2 \) (in basic solution)

(4) \( \text{Br}^- + \text{BrO}_3^- \rightarrow \text{Br}_2 \) (in acidic solution)

(5) \( \text{S}_2\text{O}_3^{2-} + \text{I}_2 \rightarrow \text{I}^- + \text{S}_4\text{O}_6^{2-} \) (in acidic solution)

(6) \( \text{Mn}^{2+} + \text{H}_2\text{O}_2 \rightarrow \text{MnO}_2 + \text{H}_2\text{O} \) (in basic solution)

(7) \( \text{Bi(OH)}_3 + \text{SnO}_2^{2-} \rightarrow \text{SnO}_3^{2-} + \text{Bi} \) (in basic solution)

(8) \( \text{Cr}_2\text{O}_7^{2-} + \text{C}_2\text{O}_4^{2-} + \text{Cr}^{3+} + \text{CO}_2 \) (in acidic solution)

(9) \( \text{ClO}_3^- + \text{Cl}^- \rightarrow \text{ClO}_2 \) (in acidic solution)