

Electrochemistry: Balancing Oxidation-Reduction Reactions: Student Review Notes

You should:

- understand oxidation numbers to the point where they are second nature
- be able to identify the oxidizing agent, i.e. the species reduced
- be able to identify the reducing agent, i.e. the species oxidized
- learn the technique below to balance oxidation-reduction reactions

Here's a pretty good (quick and painless) Redox balancing technique

Step 1. Identify the species that's oxidized and the one that's reduced and break the reaction into two half-reactions.

One for the oxidation \longrightarrow The oxidation half-reaction
 One for the reduction \longrightarrow The reduction half-reaction

Step 2. Do all the rest of these steps

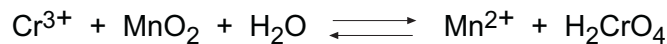
In acid solution

1. Balance all atoms other than H and O
2. Balance O with H₂O
3. Balance H with H⁺
4. Balance charge (both sides have to have the same net charge) by adding electrons, e⁻
5. Add the two half-reactions so that the e⁻'s cancel algebraically
6. Cancel species that appear on both sides of the equation
7. Check and make sure everything is balanced

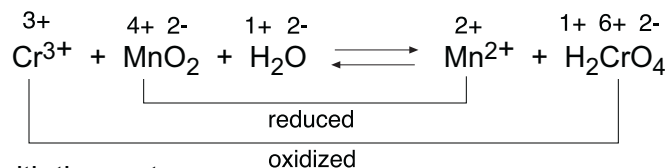
In basic solution

1. Do everything exactly the same as in acid solution (steps 1 to 5)
2. For each H⁺ that remains, add an OH⁻ to both sides of the equation
3. On the side with H⁺, add the H⁺ and the OH⁻ together to get H₂O
4. These should algebraically cancel with H₂O that's on the other side
5. Check and make sure everything's balanced

For example: Balance this reaction



1. Assign everybody oxidation numbers:



2. It's in acid solution (H₂CrO₂) so proceed with those steps.

