**Half Reaction Practice**

**Directions:** Choose at least any 3 questions from the table below. On a separate sheet of paper, answer all 7 questions about EACH equation you choose. Use the model below to help you.

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| --- | --- | --- | --- | --- |
| Equation # | Unbalanced Equation |  | Equation # | Unbalanced Equation |
| 1 | Zn + Fe3+ 🡪 Zn2+ + Fe |  | 5 | Zn + Cr3+ 🡪 Zn2+ + Cr |
| 2 | Al + Ni2+ 🡪 Al3+ Ni |  | 6 | Ag+ + Ni 🡪 Ag + Ni2+ |
| 3 | Cu + Ag+ 🡪 Cu2+ + Ag |  | 7 | Cu2+ + Fe 🡪 Cu + Fe3+ |
| 4 | Ag+ + Pb 🡪 Pb2+ + Ag |  | 8 | Cu + Al3+ 🡪 Cu2+ + Al |

**Unbalanced equation:** Fe + Cu2+ 🡪 Fe3+ + Cu

1. **Using oxidation numbers as evidence, state why the above reaction is a redox reaction.**
	1. *Iron goes from 0 to +3 and copper goes from +2 to 0. The changes in oxidation state indicate a redox reaction occurred.*
2. **What is happening in the above reaction in terms of electrons?**
	1. *Iron is losing electrons, while copper is gaining electrons.*
3. **Identify and explain why which element is oxidized, and which is reduced.**
	1. *Iron is oxidized because the oxidation number increases, meaning electrons are lost.*
	2. *Copper is reduced because the oxidation number decreases, meaning electrons are gained.*
4. **Identify which reactant is the oxidizing agent, and which is the reducing agent.**
	1. *Fe0 is the reducing agent (because it is oxidized) and Cu2+ is the oxidizing agent (because it is reduced).*

*6 moles of electrons are lost, and 6 moles of electrons are gained*

1. **Write out the balanced oxidation and reduction half reaction.**
	1. **First, show oxidation and reduction.**
	2. **Second, add the electrons for each half reaction.**
	3. **Third, check that the electrons lost equals the electrons gained.**

*Oxidation: 2(Fe0 🡪 Fe3+ + 3e-) becomes 2Fe0* 🡪 *2Fe3+ + 6e-*

*Reduction: 3 (2e- + Cu2+ 🡪 Cu0) becomes 6 e- + 3Cu2+* 🡪 *3Cu0*

1. **Write out the balanced redox reaction.**

*Balanced: 2Fe0 + 3Cu2+ 🡪 2Fe3+ + 3Cu0*

1. **Explain how the balanced redox reaction shows both conservation of mass and conservation of charge.**

*The above balanced equation shows conservation of mass because there are 2 moles of iron on each sides of the equation, and 3 moles of copper on each side of the equation. It shows conservation of charge because the sum of the charges on the left side is (+6), and the sum of the charges on the right side is (+6). Both sides of the equation have the same net charge. In addition, from the balanced half-reactions, we see the electrons lost by Fe0 is equal to the electrons gained by Cu2+.*