Name Answer Key Hour ____

Using Half-Reactions

Honors Chemistry

Identify each as either an oxidation or reduction. Balance the following half-reactions for both atoms and electrons by adding the appropriate number of electrons to the correct side of the equation.

1. $Pb^{2+} + 2e^- \rightarrow Pb$ — Reduction
2. $Na \rightarrow Na^+ + 1e^-$ — oxidation
3. $Mg^{2+} + 2e \rightarrow Mg$ — Reduction
4. $Fe \rightarrow Fe^{3+} + 3e^-$ — oxidation
5. $2Cl^- \rightarrow Cl_2 + 2e^-$ — oxidation
6. $K \rightarrow K^+ + 1e^-$ — oxidation
7. $O_2 + 4e^- \rightarrow 2O^{2-}$ — Reduction
8. $2F^- \rightarrow F_2 + 2e^-$ — Oxidation

Break each equation into two half-reactions. Identify each half-reaction as oxidation or reduction

1. $Cu + 2\,H^+ \rightarrow Cu^{2+} + H_2$

Ox: $Cu \rightarrow Cu^{2+} + 2e^-$

Re: $2H^+ + 2e^- \rightarrow H_2$

2. $2\,Al + 3\,S \rightarrow Al_2S_3$

Ox: $2Al \rightarrow 2Al^{3+} + 6e^-$

Re: $3S + 6e^- \rightarrow 3S^{2-}$

3. $2K + Cl_2 \rightarrow 2KCl$

Ox: $2K \rightarrow 2K^+ + 2e^-$

Re: $Cl_2 + 2e^- \rightarrow 2Cl^-$

4. $2Al + 3F_2 \rightarrow 2AlF_3$

Ox: $2Al \rightarrow 2Al^{3+} + 6e^-$

Re: $3F_2 + 6e^- \rightarrow 6F^-$

Balance each Oxidation-Reduction reaction using the half-reaction method. Show all work!

1. $Na + Br_2 \rightarrow NaBr$

$2Na \rightarrow 2Na^+ + 2e^-$

$Br_2 + 2e^- \rightarrow 2Br^-$

$2Na + Br_2 \rightarrow 2NaBr$

2. $Fe + O_2 \rightarrow Fe_2O_3$

$2Fe \rightarrow 2Fe^{3+} + 6e^-$

$3O_2 + 12e^- \rightarrow 6O^{2-}$

$4Fe \rightarrow 4Fe^{3+} + 12e^-$

$3O_2 + 12e^- \rightarrow 6O^{2-}$

$4Fe + 3O_2 \rightarrow 2Fe_2O_3$

3. $Fe + HBr \rightarrow FeBr_3 + H_2$

$Fe \rightarrow Fe^{3+} + 3e^-$

$2H^+ + 2e^- \rightarrow H_2$

$2Fe \rightarrow 2Fe^{3+} + 6e^-$

$6H^+ + 6e^- \rightarrow 3H_2$

$2Fe + 6HBr \rightarrow 2FeBr_3 + 3H_2$

Br^- = spectator ions

4. $N_2 + H_2 \rightarrow NH_3$

$3H_2 \rightarrow 6H^+ + 6e^-$

$N_2 + 6e^- \rightarrow 2N^{3-}$

$N_2 + 3H_2 \rightarrow 2NH_3$

5. $S + Cl_2 \rightarrow SCl_6$

$S \rightarrow S^{6+} + 6e^-$

$3Cl_2 + 6e^- \rightarrow 6Cl^-$

$S + 3Cl_2 \rightarrow SCl_6$

6. $Fe + AgNO_3 \rightarrow Ag + Fe(NO_3)_3$

$Fe \rightarrow Fe^{3+} + 3e^-$

$3Ag^+ + 3e^- \rightarrow 3Ag$

$Fe + 3AgNO_3 \rightarrow 3Ag + Fe(NO_3)_3$

NO_3^- = spectator ions