Half – Reactions

1. Identify the following reactions as oxidation or reduction reactions.
   a. $Na \rightarrow Na^{+} + e^{-}$
   b. $Cr_2O_7^{2-} + 14H^{+} + 6e^{-} \rightarrow 2Cr^{3+} + 7H_2O$
   c. $2Cl^{-} \rightarrow Cl_2 + 2e^{-}$
   d. $Br_2 + 2e^{-} \rightarrow 2Br^{-}$
2. Which of the following reactions is an oxidation reaction and which is a reduction reaction?
   a. $Cd\ (s) \rightarrow Cd^{2+}\ (aq) + 2^{e-}$
   b. $I^{3-}\ (aq) + 2e^{-} \rightarrow 3I^{-}\ (aq)$
3. Write balanced equations for the following half-reactions.
   a. Reduction of Pt^{2+} to Pt _____
   b. Oxidation of Fe^{2+} to Fe^{3+} _____
   c. Reduction of S to S^{2-} _____
   d. Reduction of Br_2 to Br- _____
   e. Oxidation of Au to Au^{3+} _____
   f. Oxidation of Cu^{2+} to Cu _____
4. Balance and rewrite the following equations, showing the half-reactions that are really occurring.
   a. $PbO\ (aq) + Mg\ (s) \rightarrow MgO + Pb$ _____
   b. $Fe(s) + H_2O\ (e) \rightarrow Fe_2O_3\ (aq) + H_2\ (g)$ _____
   c. $AgBr\ (aq) + Pt\ (s) \rightarrow PtBr_2\ (aq) + Ag\ (s)$ _____
   d. $Ni\ (s) + Al(NO_3)_3 \rightarrow Ni(NO_3)_2 + Al$ _____

Half -Reactions *(Answer Key)*

1. Identify the following reactions as oxidation or reduction reactions.

   a. $Na \rightarrow Na^{+} + e^{-}$ ***oxidation***

   b. $Cr_2O_7^{2-} + 14H^{+} + 6e^{-} \rightarrow 2Cr^{3+} + 7H_2O$ ***reduction***

   c. $2Cl^{-} \rightarrow Cl_2 + 2e^{-}$ ***oxidation***

   d. $Br_2 + 2e^{-} \rightarrow 2Br^{-}$ ***reduction***

2. Which of the following reactions is an oxidation reaction and which is a reduction reaction?

   a. $Cd\ (s) \rightarrow Cd^{2+}\ (aq) + 2e^{-}$ ***oxidation***

   b. $I^{3-}\ (aq) + 2e^{-} \rightarrow 3I^{-}\ (aq)$ ***reduction***

3. Write balanced equations for the following half-reactions.

   a. Reduction of Pt^{2+} to Pt $\boldsymbol{Pt^{+2} + 2e^{-} \rightarrow Pt}$

   b. Oxidation of Fe^{2+} to Fe^{3+} $\boldsymbol{Fe^{+2} \rightarrow Fe^{+3} + 1e^{-}}$

   c. Reduction of S to S^{2-} $\boldsymbol{S + 2e^{-} \rightarrow S^{-2}}$

   d. Reduction of Br_2 to Br- $\boldsymbol{Br_2 + 2e^{-} \rightarrow 2Br^{-}}$

   e. Oxidation of Au to Au^{3+} $\boldsymbol{Au \rightarrow Au^{+3} + 3e^{-}}$

   f. Oxidation of Cu^{2+} to Cu $\boldsymbol{Cu^{+2} + 2e^{-} \rightarrow Cu}$

4. Balance and rewrite the following equations, showing the half-reactions that are really occurring.

   a. $PbO\ (aq) + Mg\ (s) \rightarrow MgO + Pb$ $\boldsymbol{Pb^{+2} + 2e^{-} \rightarrow Pb;\ Mg \rightarrow Mg^{+2} + 2e^{-}}$

   b. $Fe(s) + H_2O\ (e) \rightarrow Fe_2O_3\ (aq) + H_2\ (g)$ $\boldsymbol{6H^{+} + 6e^{-} \rightarrow 3H_2;\ 2Fe \rightarrow 2Fe^{+3} + 6e^{-}}$

   c. $AgBr\ (aq) + Pt\ (s) \rightarrow PtBr_2\ (aq) + Ag\ (s)$ $\boldsymbol{2Ag^{+} + 2e^{-} \rightarrow 2Ag;\ Pt \rightarrow Pt^{+2} + 2e^{-}}$

   d. $Ni\ (s) + Al(NO_3)_3 \rightarrow Ni(NO_3)_2 + Al$ $\boldsymbol{2Al^{+3} + 6e^{-} \rightarrow 2Al;\ 3Ni \rightarrow 3Ni^{+2} + 6e^{-}}$

