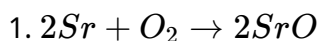


Redox Reactions

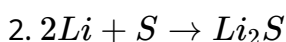


Chapter 20 Worksheet: Redox

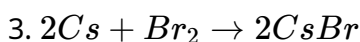
1. Determine what is oxidized and what is reduced in each reaction. Identify the oxidizing agent and the reducing agent, also.



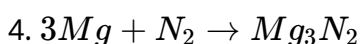
- Sr^0 to Sr^{2+} : oxidized/reducing agent
- O^0 to O^{2-} : reduced/oxidizing agent



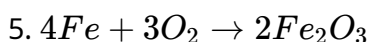
- Li^0 to Li^{1+} : oxidized/reducing agent
- S^0 to S^{2-} : reduced/oxidizing agent



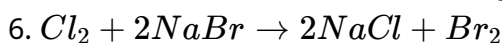
- Cs^0 to Cs^{1+} : oxidized/reducing agent
- Br^0 to Br^{-1} : reduced/oxidizing agent



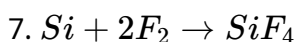
- Mg^0 to Mg^{2+} : oxidized/reducing agent
- N^0 to N^{3-} : reduced/oxidizing agent



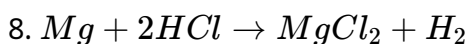
- Fe^0 to Fe^{3+} : oxidized/reducing agent
- O^0 to O^{2-} : reduced/oxidizing agent



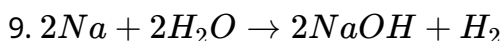
- Cl^0 to Cl^{-1} : reduced/oxidizing agent
- Br^{-1} to Br^0 : oxidized/reducing agent



- Si^0 to Si^{4+} : oxidized/reducing agent
- F^0 to F^{-1} : reduced/oxidizing agent



- Mg^0 to Mg^{2+} : oxidized/reducing agent
- H^{+1} to H^0 : reduced/oxidizing agent



- Na^0 to Na^{1+} : oxidized/reducing agent
- H^{+1} to H^0 : reduced/oxidizing agent

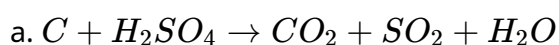
11. Give the oxidation number of each kind of atom or ion.

- a. Sulfate: 2-
 - b. Sn: 0
 - c. S^{2-} : 2-
 - d. Fe^{3+} : 3+
 - e. Sn^{4+} : 4+
 - f. Nitrate: 1-
 - g. Ammonium: 1+
-

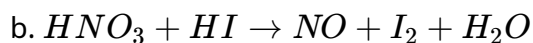
12. Calculate the oxidation number of chromium in each of the following.

- a. Cr_2O_3 : 3+
 - b. $Na_2Cr_2O_7$: 6+
 - c. $CrSO_4$: 2+
 - d. Chromate: 6+
 - e. Dichromate: 6+
-

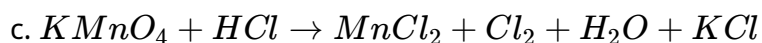
13. Use the changes in oxidation numbers to determine which elements are oxidized and which are reduced in these reactions.



- C^0 to C^{4+} : oxidized
- S^{6+} to S^{4+} : reduced



- N^{5+} to N^{2+} : reduced
- I^{-1} to I^0 : oxidized



- Mn^{7+} to Mn^{2+} : reduced
- Cl^{-1} to Cl^0 : oxidized

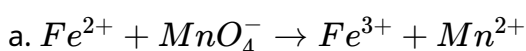


- Sb^0 to Sb^{3+} : oxidized
 - N^{5+} to N^{2+} : reduced
-

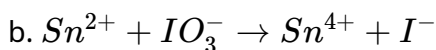
14. For each reaction in problem 13, identify the oxidizing agent and reducing agent.

- a. Oxidizing agent: Sulfur; Reducing agent: Carbon
 - b. Oxidizing agent: Nitrogen; Reducing agent: Iodine
 - c. Oxidizing agent: Manganese; Reducing agent: Chlorine
 - d. Oxidizing agent: Nitrogen; Reducing agent: Antimony
-

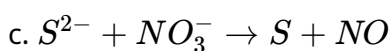
15. Write half-reactions for the oxidation and reduction process for each of the following.



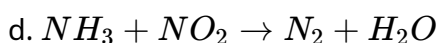
- $Fe^{2+} \rightarrow Fe^{3+} + 1e^-$: oxidation
- $Mn^{7+} + 5e^- \rightarrow Mn^{2+}$: reduction



- $Sn^{2+} \rightarrow Sn^{4+} + 2e^-$: oxidation
- $IO_3^- + 6e^- \rightarrow I^-$: reduction

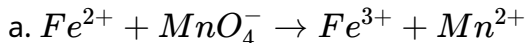


- $S^{2-} \rightarrow S + 2e^-$: oxidation
- $NO_3^- + 4e^- \rightarrow NO$: reduction

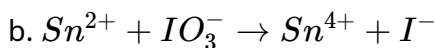


- $N^{3-} \rightarrow N^0 + 3e^-$: oxidation
 - $N^{4+} + 4e^- \rightarrow N^0$: reduction
-

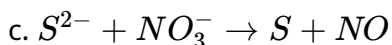
16. Complete and balance each reaction using the half-reaction method.



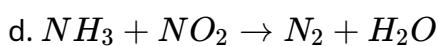
- $MnO_4^- + 8H^+ + 5e^- \rightarrow Mn^{2+} + 4H_2O$
- $Fe^{2+} \rightarrow Fe^{3+} + 1e^-$
- Final: $5Fe^{2+} + MnO_4^- + 8H^+ \rightarrow 5Fe^{3+} + Mn^{2+} + 4H_2O$



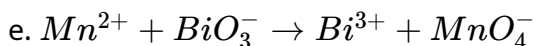
- $3Sn^{2+} + IO_3^- + 6H^+ \rightarrow 3Sn^{4+} + I^- + 3H_2O$



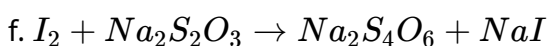
- $3S^{2-} + 2NO_3^- + 8H^+ \rightarrow 3S + 2NO + 4H_2O$



- $8NH_3 + 6NO_2 \rightarrow 7N_2 + 12H_2O$



- $3Mn^{2+} + 5BiO_3^- + 6H^+ \rightarrow 5Bi^{3+} + 3MnO_4^- + 3H_2O$



- $Na_2S_2O_3 + I_2 \rightarrow Na_2S_4O_6 + 2NaI$
-