

Chapter 20 Worksheet: Redox ANSWERS

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

- $2\text{Sr} + \text{O}_2 \longrightarrow 2\text{SrO}$ Sr^0 to Sr^{2+} ; oxidized/reducing agent O^0 to O^{2-} ; reduced/ox. ag.
- $2\text{Li} + \text{S} \longrightarrow \text{Li}_2\text{S}$ Li^0 to Li^{+} ; oxidized/red. ag. S^0 to S^{2-} ; reduced/ox. ag.
- $2\text{Cs} + \text{Br}_2 \longrightarrow 2\text{CsBr}$ Cs^0 to Cs^{+} ; oxidized/red. ag. Br^0 to Br^{-} ; reduced/ox. ag.
- $3\text{Mg} + \text{N}_2 \longrightarrow \text{Mg}_3\text{N}_2$ Mg^0 to Mg^{2+} ; oxidized/red. ag. N^0 to N^{3-} ; reduced/ox. ag.
- $4\text{Fe} + 3\text{O}_2 \longrightarrow 2\text{Fe}_2\text{O}_3$ Fe^0 to Fe^{3+} ; oxidized/red. ag. O^0 to O^{-} ; reduced/ox. ag.
- $\text{Cl}_2 + 2\text{NaBr} \longrightarrow 2\text{NaCl} + \text{Br}_2$ Cl^0 to Cl^{-} ; reduced/ox. ag. Br^{-} to Br^0 ; oxidized/red. ag.
- $\text{Si} + 2\text{F}_2 \longrightarrow \text{SiF}_4$ Si^0 to Si^{4+} ; oxidized/red. ag. F^0 to F^{-} ; reduced/ox. ag.
- $\text{Mg} + 2\text{HCl} \longrightarrow \text{MgCl}_2 + \text{H}_2$ Mg^0 to Mg^{2+} ; oxidized/red. ag. H^{+} to H^0 ; reduced/o.a.
- $2\text{Na} + 2\text{H}_2\text{O} \longrightarrow 2\text{NaOH} + \text{H}_2$ Na^0 to Na^{+} ; oxidized/r.a. H^{+} to H^0 ; reduced/o.a.

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

- | | | | | | | |
|------------|----------|--------------------|---------------------|---------------------|------------|-------------|
| a. sulfate | b. Sn | c. S^{2-} | d. Fe^{3+} | e. Sn^{4+} | f. nitrate | g. ammonium |
| 2- | 0 | 2- | 3+ | 4+ | 1- | 1+ |

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

- | | | | | |
|----------------------------|---------------------------------------|--------------------|-------------|---------------|
| a. Cr_2O_3 | b. $\text{Na}_2\text{Cr}_2\text{O}_7$ | c. CrSO_4 | d. chromate | e. dichromate |
| 3+ | 6+ | 2+ | 7+ | 6+ |

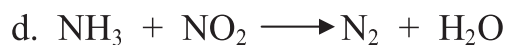
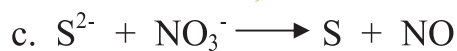
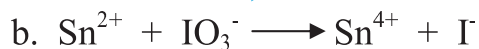
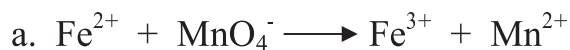
13. Use the changes in oxidation numbers to determine which elements are oxidized and which are reduced in these reactions. (Note: it is not necessary to use balanced equations)

- $\text{C} + \text{H}_2\text{SO}_4 \longrightarrow \text{CO}_2 + \text{SO}_2 + \text{H}_2\text{O}$ C^0 to C^{4+} ; oxidized S^{6+} to S^{4+} ; reduced
- $\text{HNO}_3 + \text{HI} \longrightarrow \text{NO} + \text{I}_2 + \text{H}_2\text{O}$ N^{5+} to N^{2+} ; reduced I^{-} to I^0 ; oxidized
- $\text{KMnO}_4 + \text{HCl} \longrightarrow \text{MnCl}_2 + \text{Cl}_2 + \text{H}_2\text{O} + \text{KCl}$ Mn^{7+} to Mn^{2+} ; reduced
 Cl^{-} to Cl^0 ; oxidized
- $\text{Sb} + \text{HNO}_3 \longrightarrow \text{Sb}_2\text{O}_3 + \text{NO} + \text{H}_2\text{O}$ Sb^0 to Sb^{3+} ; oxidized N^{5+} to N^{2+} ; red.

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

- oxidizing agent: sulfur reducing agent: carbon
- oxidizing agent: nitrogen reducing agent: iodine
- oxidizing agent: manganese reducing agent: chlorine
- oxidizing agent: nitrogen reducing agent: antimony

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



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

