

20 OXIDATION-REDUCTION REACTIONS

Practice Problems

In your notebook, solve the following problems.

SECTION 20.1 THE MEANING OF OXIDATION AND REDUCTION

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

	Ox	Red	RA	OA
1. $2\text{Sr} + \text{O}_2 \rightarrow 2\text{SrO}$	Sr	O_2	Sr	O_2
2. $2\text{Li} + \text{S} \rightarrow 2\text{Li}_2\text{S}$	Li	S	Li	S
3. $2\text{Cs} + \text{Br}_2 \rightarrow 2\text{CsBr}$	Cs	Br_2	Cs	Br_2
4. $3\text{Mg} + \text{N}_2 \rightarrow \text{Mg}_3\text{N}_2$	Mg	N_2	Mg	N_2
5. $4\text{Fe} + 3\text{O}_2 \rightarrow 2\text{Fe}_2\text{O}_3$	Fe	O_2	Fe	O_2
6. $\text{Cl}_2 + 2\text{NaBr} \rightarrow 2\text{NaCl} + \text{Br}_2$	Br^-	Cl_2	Br^-	Cl_2
7. $\text{Si} + 2\text{F}_2 \rightarrow \text{SiF}_4$	Si	F_2	Si	F_2
8. $2\text{Ca} + \text{O}_2 \rightarrow 2\text{CaO}$	Ca	O_2	Ca	O_2
9. $\text{Mg} + 2\text{HCl} \rightarrow \text{MgCl}_2 + \text{H}_2$	Mg	H^+	Mg	H^+
10. $2\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2$	Na	H_2O	Na	H_2O

SECTION 20.2 OXIDATION NUMBERS

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

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|----------------------|--------------------------|--------------------------|--------------------------|
| a. Sn 0 | c. S^{2-} -2 | e. Se 0 | g. Sn^{4+} $+4$ |
| b. K^+ $+1$ | d. Fe^{3+} $+3$ | f. Mg^{2+} $+2$ | h. Br^- -1 |

2. Calculate the oxidation number of chromium in each of the following formulas.

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|---------------------------------|---|-------------------------|-----------------------------|
| a. Cr_2O_3 $+3$ | b. $\text{H}_2\text{Cr}_2\text{O}_7$ $+6$ | c. CrSO_4 $+2$ | d. CrO_4^{2-} $+6$ |
|---------------------------------|---|-------------------------|-----------------------------|

3. Use the changes in oxidation number to determine which elements are oxidized and which are reduced in these reactions. (Note: It is not necessary to use balanced reactions.)

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|---|----|-----|
| a. $\text{C} + \text{H}_2\text{SO}_4 \rightarrow \text{CO}_2 + \text{SO}_2 + \text{H}_2\text{O}$ | Gx | red |
| b. $\text{HNO}_3 + \text{HI} \rightarrow \text{NO} + \text{I}_2 + \text{H}_2\text{O}$ | C | S |
| c. $\text{KMnO}_4 + \text{HCl} \rightarrow \text{MnCl}_2 + \text{Cl}_2 + \text{H}_2\text{O} + \text{KCl}$ | I | N |
| d. $\text{Sb} + \text{HNO}_3 \rightarrow \text{Sb}_2\text{O}_5 + \text{NO} + \text{H}_2\text{O}$ | Cl | Mn |
| | Sb | N |

4. For each reaction in problem 3 above, identify the oxidizing agent and reducing agent.

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|---|----|----|
| | OA | RA |
| a | S | C |
| b | N | I |
| c | Mn | Cl |
| d | N | Sb |