

Balancing with Oxidation Numbers

Honors Chemistry

Use oxidation numbers to indicate which atoms lose or gain electrons. Draw brackets showing the atoms involved in oxidation and reduction. Then, balance the reaction by using coefficients.

- $$\overset{+3}{\text{Fe}}_2\overset{-2}{\text{O}}_3 + \overset{+2}{\text{C}}\overset{-2}{\text{O}} \rightarrow \overset{\phi}{\text{Fe}} + \overset{+4}{\text{C}}\overset{-2}{\text{O}}_2$$

$+2 \times 3 = +6$
 $-3 \times 2 = -6$
- $$\overset{\phi}{\text{Mg}} + \overset{\phi}{\text{O}}_2 \rightarrow \overset{+2}{\text{Mg}}\overset{-2}{\text{O}}$$

$+2 \times 2 = +4$
 $-2 \times 2 = -4$
- $$\overset{\phi}{\text{Cl}}_2 + \overset{-1}{\text{I}} \rightarrow \overset{-1}{\text{Cl}} + \overset{\phi}{\text{I}}_2$$

$+1 \times 2 = +2$
 $-1 \times 2 = -2$
- $$\overset{+1}{\text{H}}\overset{+6}{\text{S}}\overset{-2}{\text{O}}_4 + \overset{+1}{\text{H}}\overset{-1}{\text{I}} \rightarrow \overset{+1}{\text{H}}\overset{-2}{\text{S}} + \overset{\phi}{\text{I}}_2 + \overset{+1}{\text{H}}\overset{-2}{\text{O}}$$

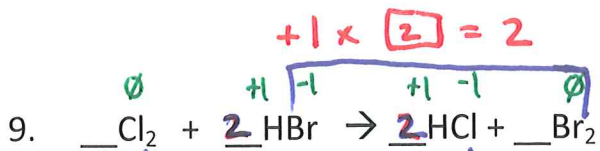
$+1 \times 8 = +8$
 $-8 \times 1 = -8$
- $$\overset{\phi}{\text{Al}} + \overset{+4}{\text{Mn}}\overset{-2}{\text{O}}_2 \rightarrow \overset{+3}{\text{Al}}\overset{-2}{\text{O}}_3 + \overset{\phi}{\text{Mn}}$$

$+3 \times 4 = +12$
 $-4 \times 3 = -12$
- $$\overset{+4}{\text{S}}\overset{-2}{\text{O}}_2 + \overset{+1}{\text{H}}\overset{+3}{\text{N}}\overset{-2}{\text{O}}_2 \rightarrow \overset{+1}{\text{H}}\overset{+6}{\text{S}}\overset{-2}{\text{O}}_4 + \overset{+2}{\text{N}}\overset{-2}{\text{O}}$$

$+2 \times 1 = +2$
 $-1 \times 2 = -2$
 $+2 \times 3 = +6$
- $$\overset{+1}{\text{H}}\overset{+5}{\text{N}}\overset{-2}{\text{O}}_3 + \overset{+1}{\text{H}}\overset{-2}{\text{S}} \rightarrow \overset{+2}{\text{N}}\overset{-2}{\text{O}} + \overset{\phi}{\text{S}} + \overset{+1}{\text{H}}\overset{-2}{\text{O}}$$

$-3 \times 2 = -6$
 $+3 \times 2 = +6$
- $$\overset{\phi}{\text{Al}} + \overset{+1}{\text{H}}\overset{+6}{\text{S}}\overset{-2}{\text{O}}_4 \rightarrow \overset{+3}{\text{Al}}\overset{+6}{\text{S}}\overset{-2}{\text{O}}_4 + \overset{\phi}{\text{H}}_2$$

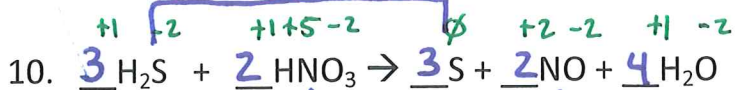
$-1 \times 6 = -6$



$$+1 \times [2] = 2$$

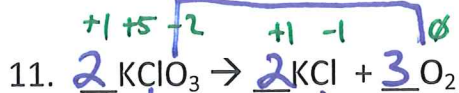
$$-1 \times [2] = 2$$

$$+2 \times [3] = 6$$



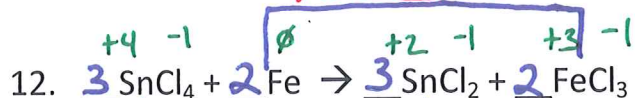
$$-3 \times [2] = 6$$

$$+2 \times [6] = 12$$

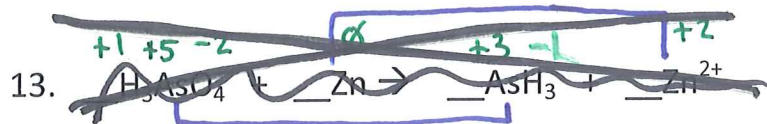


$$-6 \times [2] = 12$$

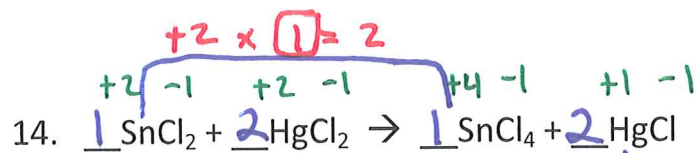
$$+3 \times [2] = 6$$



$$-2 \times [3] = 6$$



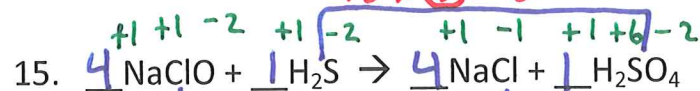
DO NOT DO!



$$+2 \times [1] = 2$$

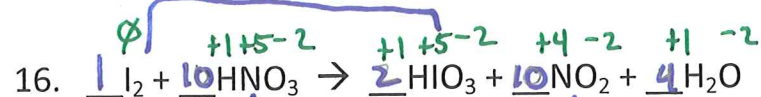
$$-1 \times [2] = 2$$

$$+8 \times [1] = 8$$



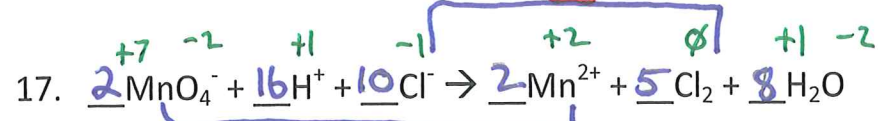
$$-2 \times [4] = 8$$

$$+5 \times [2] = 10$$



$$-1 \times [10] = 10$$

$$+1 \times [10] = 10$$



$$-5 \times [2] = 10$$