# Stoichiometry Worksheet and Key 

$$
2 \mathrm{KClO}_{3} \rightarrow 2 \mathrm{KCl}+3 \mathrm{O}_{2}
$$

1. How many moles of $\mathrm{O}_{2}$ will be formed from 1.65 moles of $\mathrm{KClO}_{3}$ ?

$$
\begin{array}{l|l|}
1.65 \mathrm{~mol} \mathrm{KClO}_{3} & \ldots \mathrm{~mol} \mathrm{O}_{2} \\
\hline & \ldots \mathrm{~mol} \mathrm{KClO}_{3}
\end{array}=\left[\begin{array}{l}
\mathrm{mol} \mathrm{O}
\end{array}\right.
$$

2. How many moles of $\mathrm{KClO}_{3}$ are needed to make 3.50 moles of KCl ?

3. How many moles of KCl will be formed from 2.73 moles of $\mathrm{KClO}_{3}$ ?


$$
4 \mathrm{Fe}+3 \mathrm{O}_{2} \rightarrow 2 \mathrm{Fe}_{2} \mathrm{O}_{3}
$$

4. How many moles of $\mathrm{Fe}_{2} \mathrm{O}_{3}$ are produced when 0.275 moles of Fe is reacted?

$$
\begin{array}{l|l|l}
0.275 \mathrm{~mol} \mathrm{Fe} & & =\ldots \mathrm{mol} \mathrm{Fe}_{2} \mathrm{O}_{3}
\end{array}
$$

5. How many moles of $\mathrm{Fe}_{2} \mathrm{O}_{3}$ are produced when 31.0 moles of $\mathrm{O}_{2}$ is reacted?

$$
\begin{array}{l|l|} 
& \\
& =
\end{array}
$$

6. How many moles of $\mathrm{O}_{2}$ are needed to react with 8.9 moles of Fe ?


$$
2 \mathrm{H}_{2} \mathrm{O} \rightarrow 2 \mathrm{H}_{2}+\mathrm{O}_{2}
$$

7. How many moles of $\mathrm{O}_{2}$ are produced when 1.26 moles of $\mathrm{H}_{2} \mathrm{O}$ is reacted?
8. How many moles of $\mathrm{H}_{2} \mathrm{O}$ are needed to produce 55.7 moles of $\mathrm{H}_{2}$ ?
9. If enough $\mathrm{H}_{2} \mathrm{O}$ is reacted to produce 3.40 moles of $\mathrm{H}_{2}$, then how may moles of $\mathrm{O}_{2}$ must have been made? (a bit challenging, but just think about it and you can probably figure it out)

$$
2 \mathrm{KClO}_{3} \rightarrow 2 \mathrm{KCl}+3 \mathrm{O}_{2}
$$

10. How many grams of $\mathrm{O}_{2}$ will be formed from 3.76 grams of $\mathrm{KClO}_{3}$ ?

| $3.76 \mathrm{~g} \mathrm{KClO}_{3}$ | $1 \mathrm{~mol} \mathrm{KClO}_{3}$ | $\ldots \mathrm{~mol} \mathrm{O}_{2}$ | $\ldots \mathrm{~g} \mathrm{O}_{2}$ |
| :---: | :---: | :---: | :---: |
|  | $122.55 \mathrm{~g} \mathrm{KClO}_{3}$ | $\ldots \mathrm{~mol} \mathrm{KClO}_{3}$ | $\ldots \mathrm{~mol} \mathrm{O}$ |$|=-\quad \mathrm{g} \mathrm{O}_{2}$

11. How many grams of $\mathrm{KClO}_{3}$ are needed to make 30.0 grams of KCl ?

| 30.0 g KCl | $\ldots \mathrm{mol} \mathrm{KCl}^{2}$ | $\mathrm{~mol} \mathrm{KClO}_{3}$ | $\ldots \mathrm{~g} \mathrm{KClO}_{3}$ |
| :---: | :---: | :---: | :---: |
|  | $\ldots \quad \mathrm{~g} \mathrm{KCl}$ | $\ldots \mathrm{mol} \mathrm{KCl}$ | $\ldots \mathrm{mol} \mathrm{KClO}_{3}$ |$=\_\quad \mathrm{g} \mathrm{KClO}_{3}$

12. How many grams of KCl will be formed from 2.73 g of $\mathrm{KClO}_{3}$ ?


$$
4 \mathrm{Fe}+3 \mathrm{O}_{2} \rightarrow 2 \mathrm{Fe}_{2} \mathrm{O}_{3}
$$

13. How many grams of $\mathrm{Fe}_{2} \mathrm{O}_{3}$ are produced when 42.7 grams of Fe is reacted?

| 42.7 g Fe | $\ldots$ | mol Fe | $\mathrm{mol} \mathrm{Fe}_{2} \mathrm{O}_{3}$ |
| :---: | :---: | :---: | :---: |
|  | $\ldots$ | $\mathrm{~g} \mathrm{Fe}_{2} \mathrm{O}_{3}$ |  |
|  | $\ldots \mathrm{~mol} \mathrm{Fe}$ | $\mathrm{mol} \mathrm{Fe}_{2} \mathrm{O}_{3}$ |  |$=\_\_\quad \mathrm{g} \mathrm{Fe}_{2} \mathrm{O}_{3}$

14. How many grams of $\mathrm{Fe}_{2} \mathrm{O}_{3}$ are produced when 17.0 grams of $\mathrm{O}_{2}$ is reacted?

15. How many grams of $\mathrm{O}_{2}$ are needed to react with 125 grams of Fe ?

$\qquad$

Some cars can use butane $\left(\mathrm{C}_{4} \mathrm{H}_{10}\right)$ as fuel:

$$
2 \mathrm{C}_{4} \mathrm{H}_{10}+13 \mathrm{O}_{2} \rightarrow 8 \mathrm{CO}_{2}+10 \mathrm{H}_{2} \mathrm{O}
$$

16. How many grams of $\mathrm{CO}_{2}$ are produced from the combustion of 100 . grams of butane?

17. How many grams of $\mathrm{O}_{2}$ are needed to react with of 100 . grams of butane?

| $100 . \mathrm{g} \mathrm{C}_{4} \mathrm{H}_{10}$ |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- |
|  |  |  |  | $=\quad \mathrm{g} \mathrm{O}_{2}$ |

18 How many grams of $\mathrm{H}_{2} \mathrm{O}$ are produced when 5.38 g of $\mathrm{O}_{2}$ is reacted?

## KEY

$$
2 \mathrm{KClO}_{3} \rightarrow 2 \mathrm{KCl}+3 \mathrm{O}_{2}
$$

1. How many moles of $\mathrm{O}_{2}$ will be formed from 1.65 moles of $\mathrm{KClO}_{3}$ ?

| $1.65 \mathrm{~mol} \mathrm{KClO}_{3}$ | $\underline{3} \mathrm{~mol} \mathrm{O}_{2}$ |
| :--- | :--- |
| $\underline{2} \mathrm{~mol} \mathrm{KClO}$ |  |$|=\underline{2.48} \mathrm{~mol} \mathrm{O}_{2}$

2. How many moles of $\mathrm{KClO}_{3}$ are needed to make 3.50 moles of KCl ?

3. How many moles of KCl will be formed from 2.73 moles of $\mathrm{KClO}_{3}$ ?


$$
4 \mathrm{Fe}+3 \mathrm{O}_{2} \rightarrow 2 \mathrm{Fe}_{2} \mathrm{O}_{3}
$$

4. How many moles of $\mathrm{Fe}_{2} \mathrm{O}_{3}$ are produced when 0.275 moles of Fe are reacted?

$$
\begin{array}{c|c|}
0.275 \mathrm{~mol} \mathrm{Fe} & 2 \mathrm{~mol} \mathrm{Fe}_{2} \mathrm{O}_{3} \\
\hline & 4 \mathrm{~mol} \mathrm{Fe}
\end{array}=\underline{0.138} \mathrm{~mol} \mathrm{Fe}_{2} \mathrm{O}_{3}
$$

5. How many moles of $\mathrm{Fe}_{2} \mathrm{O}_{3}$ are produced when 31.0 moles of $\mathrm{O}_{2}$ are reacted?

$$
\begin{array}{c|c|}
31.0 \mathrm{~mol} \mathrm{O}_{2} & 2 \mathrm{~mol} \mathrm{Fe}_{2} \mathrm{O}_{3} \\
\hline & 3 \mathrm{~mol} \mathrm{O}_{2}
\end{array}=\underline{20.7} \mathrm{~mol} \mathrm{Fe}_{2} \mathrm{O}_{3}
$$

6. How many moles of $\mathrm{O}_{2}$ are needed to react with 8.9 moles of Fe ?

| 8.9 mol Fe | $3 \mathrm{~mol} \mathrm{O}_{2}$ |
| :--- | :--- |
|  | 4 mol Fe |$=\underline{6.7} \mathrm{~mol} \mathrm{O}_{2}$

7. How many moles of $\mathrm{O}_{2}$ are produced when 1.26 moles of $\mathrm{H}_{2} \mathrm{O}$ is reacted?

| $1.26 \mathrm{~mol} \mathrm{H}_{2} \mathrm{O}$ | $1 \mathrm{~mol} \mathrm{O}_{2}$ |
| :--- | :--- |
|  | $2 \mathrm{~mol} \mathrm{H}_{2} \mathrm{O}$ |$=.630 \mathrm{~mol} \mathrm{O}_{2}$

8. How many moles of $\mathrm{H}_{2} \mathrm{O}$ are needed to produce 55.7 moles of $\mathrm{H}_{2}$ ?

$$
\begin{array}{l|l|}
55.7 \mathrm{~mol} \mathrm{H}_{2} & 2 \mathrm{~mol} \mathrm{H}_{2} \mathrm{O} \\
\hline & 2 \mathrm{~mol} \mathrm{H}_{2}
\end{array}=55.7 \mathrm{~mol} \mathrm{H}_{2} \mathrm{O}
$$

9. If enough $\mathrm{H}_{2} \mathrm{O}$ is reacted to produce 3.40 moles of $\mathrm{H}_{2}$, then how may moles of $\mathrm{O}_{2}$ must have been made? (a bit challenging, but just think about it and you can probably figure it out)

$$
\begin{array}{l|l|}
3.40 \mathrm{~mol} \mathrm{H}_{2} & 1 \mathrm{~mol} \mathrm{O}_{2} \\
\hline & 2 \mathrm{~mol} \mathrm{H}_{2}
\end{array}=\underline{1.70} \mathrm{~mol} \mathrm{O}
$$

$$
2 \mathrm{KClO}_{3} \rightarrow 2 \mathrm{KCl}+3 \mathrm{O}_{2}
$$

10. How many grams of $\mathrm{O}_{2}$ will be formed from 3.76 grams of $\mathrm{KClO}_{3}$ ?

| $3.76 \mathrm{~g} \mathrm{KClO}_{3}$ | $1 \mathrm{~mol} \mathrm{KClO}_{3}$ | $\underline{3} \mathrm{~mol} \mathrm{O}_{2}$ | $\underline{32.00 \mathrm{~g} \mathrm{O}_{2}}$ |
| :--- | :--- | :--- | :--- |
|  | $122.55 \mathrm{~g} \mathrm{KClO}_{3}$ | $\underline{2} \mathrm{~mol} \mathrm{KClO}_{3}$ | $\underline{1} \mathrm{~mol} \mathrm{O}$ |
| 2 |  |  |  |$|=\underline{1.47} \mathrm{~g} \mathrm{O}_{2}$

11. How many grams of $\mathrm{KClO}_{3}$ are needed to make 30.0 grams of KCl ?

| 30.0 g KCl | $\underline{1} \mathrm{~mol} \mathrm{KCl}$ | $\underline{2} \mathrm{~mol} \mathrm{KClO}_{3}$ | $\underline{122} .55 \mathrm{~g} \mathrm{KClO}^{2}$ |
| :--- | :--- | :--- | :--- |
|  | $\underline{74.55} \mathrm{~g} \mathrm{KCl}$ | $\underline{2} \mathrm{~mol} \mathrm{KCl}$ | $\underline{1} \mathrm{~mol} \mathrm{KClO}_{3}$ |$|=\underline{49.3} \mathrm{~g} \mathrm{KClO}_{3}$

12. How many grams of KCl will be formed from $2.73 \mathrm{~g} \mathrm{of}^{\mathrm{KClO}}{ }_{3}$ ?

| $2.73 \mathrm{~g} \mathrm{KClO}_{3}$ | $\underline{1} \mathrm{~mol} \mathrm{KCl} \mathrm{O}_{3}$ | $\underline{2} \mathrm{~mol} \mathrm{KCl}$ | $\underline{74.55 \mathrm{~g}}$ |  |
| :--- | :--- | :--- | :--- | :--- |
|  | $\underline{122.55} \mathrm{~g} \mathrm{KClO}_{3}$ | $\underline{2} \mathrm{~mol} \mathrm{KCl} \mathrm{O}$ | $\underline{1} \mathrm{~mol} \mathrm{KCl}$ | 1.66 g KCl |

$$
4 \mathrm{Fe}+3 \mathrm{O}_{2} \rightarrow 2 \mathrm{Fe}_{2} \mathrm{O}_{3}
$$

13. How many grams of $\mathrm{Fe}_{2} \mathrm{O}_{3}$ are produced when 42.7 grams of Fe is reacted?

| 42.7 g Fe | $\underline{1} \mathrm{~mole} \mathrm{Fe}$ | $\underline{2} \mathrm{~mol} \mathrm{Fe}_{2} \mathrm{O}_{3}$ | $\underline{159} .70 \mathrm{~g} \mathrm{Fe}_{2} \mathrm{O}_{3}$ |
| :--- | :--- | :--- | :--- | :--- |
|  | $\underline{55.85} \mathrm{~g} \mathrm{Fe}$ | $\underline{4} \mathrm{~mol} \mathrm{Fe}$ | $\underline{1} \mathrm{~mol} \mathrm{Fe}_{2} \mathrm{O}_{3}$ |$|=\underline{61.0} \mathrm{~g} \mathrm{Fe}_{2} \mathrm{O}_{3}$

14. How many grams of $\mathrm{Fe}_{2} \mathrm{O}_{3}$ are produced when 17.0 grams of $\mathrm{O}_{2}$ is reacted?

| $17.0 \mathrm{~g} \mathrm{O}_{2}$ | 1 mol O | $\underline{2} \mathrm{~mol} \mathrm{Fe} \mathrm{O}_{3}$ | $\underline{159.70 ~ g ~ F e 2 O}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | $32.00 \mathrm{~g} \mathrm{O}_{2}$ | 3 mol O | $1 \mathrm{~mol} \mathrm{Fe}_{2} \mathrm{O}_{3}$ |  | 56.6 g Fe |

15. How many grams of $\mathrm{O}_{2}$ are needed to react with 125 grams of Fe ?

| 125 g Fe | $\underline{1 \mathrm{~mol} \mathrm{Fe}}$ | $\underline{3} \mathrm{~mol} \mathrm{O}_{2}$ | $\underline{32.00 \mathrm{~g} \mathrm{O}_{2}}$ |  |
| :--- | :--- | :--- | :--- | :--- | :--- |
|  | $\underline{55.85} \mathrm{~g} \mathrm{Fe}$ | $\underline{4} \mathrm{~mol} \mathrm{Fe}$ | $\underline{1} \mathrm{~mol} \mathrm{O}$ | $=\underline{53.7} \mathrm{~g} \mathrm{O}_{2}$ |

Some cars can use butane $\left(\mathrm{C}_{4} \mathrm{H}_{10}\right)$ as fuel:

$$
2 \mathrm{C}_{4} \mathrm{H}_{10}+13 \mathrm{O}_{2} \rightarrow 8 \mathrm{CO}_{2}+10 \mathrm{H}_{2} \mathrm{O}
$$

16. How many grams of $\mathrm{CO}_{2}$ are produced from the combustion of 100 . grams of butane?

$$
\begin{array}{l|l|l|l|}
100 . \mathrm{g} \mathrm{C}_{4} \mathrm{H}_{10} & 1 \mathrm{~mol} \mathrm{C}_{4} \mathrm{H}_{10} & 8 \mathrm{~mol} \mathrm{CO}_{2} & 44.01 \mathrm{~g} \mathrm{CO}_{2} \\
\hline & 58.14 \mathrm{~g} \mathrm{C}_{4} \mathrm{H}_{10} & 2 \mathrm{~mol} \mathrm{C}_{4} \mathrm{H}_{10} & 1 \mathrm{~mol} \mathrm{CO}_{2}
\end{array}=303 \mathrm{~g} \mathrm{CO}_{2}
$$

17. How many grams of $\mathrm{O}_{2}$ are needed to react with of 100 . grams of butane?

$$
\begin{array}{l|l|l|l|}
100 . \mathrm{g} \mathrm{C}_{4} \mathrm{H}_{10} & 1 \mathrm{~mol} \mathrm{C} \mathrm{C}_{4} \mathrm{H}_{10} & 13 \mathrm{~mol} \mathrm{O}_{2} & 32.00 \mathrm{~g} \mathrm{O}_{2} \\
\hline & 58.14 \mathrm{~g} \mathrm{C} \mathrm{C}_{4} \mathrm{H}_{10} & 2 \mathrm{~mol} \mathrm{C}_{4} \mathrm{H}_{10} & 1 \mathrm{~mol} \mathrm{O}_{2}
\end{array}=358 \mathrm{~g} \mathrm{O}_{2}
$$

18 How many grams of $\mathrm{H}_{2} \mathrm{O}$ are produced when 5.38 g of $\mathrm{O}_{2}$ is reacted?

| $5.38 \mathrm{~g} \mathrm{O}_{2}$ | $1 \mathrm{~mol} \mathrm{O}_{2}$ | $10 \mathrm{~mol} \mathrm{H}_{2} \mathrm{O}$ | $18.02 \mathrm{~g} \mathrm{H}_{2} \mathrm{O}$ |
| :--- | :--- | :--- | :--- |
|  | $32.00 \mathrm{~g} \mathrm{O}_{2}$ | $13 \mathrm{~mol} \mathrm{O}_{2}$ | 1 mol H |$=2.33 \mathrm{~g} \mathrm{H} \mathrm{H}$

