1. The equation $\mathrm{N}_{2}+3 \mathrm{H}_{2} \rightarrow 2 \mathrm{NH}_{3}$ means that 1 g of $\mathrm{N}_{2}$ reacts with 3 g of $\mathrm{H}_{2}$ to form 2 g of $\mathrm{NH}_{3}$.
[A] True
[B] False
2. Balance the following equation for the reaction where hydrogen sulfide gas burns in oxygen gas to form gaseous water and sulfur dioxide gas.
$\mathrm{H}_{2} \mathrm{~S}(\mathrm{~g})+\mathrm{O}_{2}(\mathrm{~g}) \rightarrow \mathrm{SO}_{2}(\mathrm{~g})+\mathrm{H}_{2} \mathrm{O}(\mathrm{g})$
3. Which equation shows a conservation of mass?
(1) $\mathrm{Na}+\mathrm{Cl}_{2} \rightarrow \mathrm{NaCl}$
(3) $\mathrm{H}_{2} \mathrm{O} \rightarrow \mathrm{H}_{2}+\mathrm{O}_{2}$
(2) $\mathrm{Al}+\mathrm{Br}_{2} \rightarrow \mathrm{AlBr}_{3}$
(4) $\mathrm{PCl}_{5} \rightarrow \mathrm{PCl}_{3}+\mathrm{Cl}_{2}$
4. When the equation

$$
\mathrm{NH}_{3}+\ldots \mathrm{O}_{2} \rightarrow \_\mathrm{HNO}_{3}+\ldots \mathrm{H}_{2} \mathrm{O}
$$

is completely balanced using smallest whole numbers, the coefficient of $\mathrm{O}_{2}$ would be
(1) 1
(3) 3
(2) 2
(4) 4
3. When the equation

$$
-\mathrm{Ca}\left(\mathrm{ClO}_{3}\right)_{2} \rightarrow \mathrm{CaCl}_{2}+\ldots \mathrm{O}_{2}
$$

is correctly balanced, the coefficient in front of the $\mathrm{O}_{2}$ will be
(1) 1
(3) 3
(2) 2
(4) 4
4. When the equation

$$
\underset{2}{\mathrm{Fe}_{2}(\mathrm{~g})} \mathrm{O}_{3}(\mathrm{~s})+{ }_{-}^{\mathrm{CO}(\mathrm{~g})} \rightarrow \__{-} \mathrm{Fe}(l)+{ }_{-} \mathrm{CO}
$$

is correctly balanced using the smallest whole numbers, the coefficient of $\mathrm{Fe}(l)$ is
(1) 1
(3) 3
(2) 2
(4) 4
5. When the equation

$$
\mathrm{C}_{2} \mathrm{H}_{6}+\ldots \mathrm{O}_{2} \rightarrow \text { CO } \mathrm{CO}_{2}+\ldots \mathrm{H}_{2} \mathrm{O}
$$

is correctly balanced, the coefficient in front of $\mathrm{O}_{2}$ will be
(1) 7
(3) 3
(2) 10
(4) 4
6. When the equation

$$
\ldots \mathrm{Cu}_{2} \mathrm{~S}+\ldots \mathrm{O}_{2} \rightarrow \ldots \mathrm{Cu}_{2} \mathrm{O}+\ldots \mathrm{SO}_{2}
$$

is completely balanced using smallest whole numbers the coefficient of the $\mathrm{O}_{2}$ would be
(1) 5
(3) 3
(2) 2
(4) 4
7. Which equation is correctly balanced?
(1) $\mathrm{CaO}+2 \mathrm{H}_{2} \mathrm{O} \rightarrow \mathrm{Ca}(\mathrm{OH})_{2}$
(2) $\mathrm{NH}_{3}+2 \mathrm{O}_{2} \rightarrow \mathrm{HNO}_{3}+\mathrm{H}_{2} \mathrm{O}$
(3) $\mathrm{Ca}(\mathrm{OH})_{2}+2 \mathrm{H}_{3} \mathrm{PO}_{4} \rightarrow \mathrm{Ca}_{3}\left(\mathrm{PO}_{4}\right)_{2}+3 \mathrm{H}_{2} \mathrm{O}$
(4) $\mathrm{Cu}+\mathrm{H}_{2} \mathrm{SO}_{4} \rightarrow \mathrm{CuSO}_{4}+\mathrm{H}_{2} \mathrm{O}+\mathrm{SO}_{2}$
8. $\quad \mathrm{Ba}\left(\mathrm{NO}_{3}\right)_{2}(\mathrm{aq})+\mathrm{Na}_{2} \mathrm{SO}_{4}(\mathrm{aq}) \rightarrow$ ${ }_{4}(\mathrm{~s})$

What type of reaction is shown above?
(1) synthesis
(3) single replacement
(2) decomposition
(4) double replacement
9. $\quad \mathrm{N}_{2}(\mathrm{~g})+3 \mathrm{H}_{2}(\mathrm{~g}) \leftrightarrow 2 \mathrm{NH}_{3}(\mathrm{~g})$

What type of reaction is shown above?
(1) synthesis
(3) single replacement
(2) decomposition
(4) double replacement
10. $\quad 2 \mathrm{SO}_{3}(\mathrm{~g}) \leftrightarrow 2 \mathrm{SO}_{2}(\mathrm{~g})+\mathrm{O}_{2}(\mathrm{~g})$

What type of reaction is shown above?
(1) synthesis
(3) single replacement
(2) decomposition
(4) double replacement
11. $\quad \mathrm{Mg}(\mathrm{s})+2 \mathrm{HCl}(\mathrm{aq}) \leftrightarrow \mathrm{MgCl}_{2}(\mathrm{aq})+\mathrm{H}_{2}(\mathrm{~g})$

What type of reaction is shown above?
(1) synthesis
(3) single replacement
(2) decomposition
(4) double replacement
12. $2 \mathrm{NH}_{3}(\mathrm{~g}) \leftrightarrow \mathrm{N}_{2}(\mathrm{~g})+3 \mathrm{H}_{2}(\mathrm{~g})$

What type of reaction is shown above?
(1) synthesis
(3) single replacement
(2) decomposition
(4) double replacement
13. Which equation represents a double replacement reaction?
(1) $2 \mathrm{Na}+2 \mathrm{H}_{2} \mathrm{O} \rightarrow 2 \mathrm{NaOH}+\mathrm{H}_{2}$
(2) $\mathrm{CaCO}_{3} \rightarrow \mathrm{CaO}+\mathrm{CO}_{2}$
(3) $\mathrm{LiOH}+\mathrm{HCl} \rightarrow \mathrm{LiCl}+\mathrm{H}_{2} \mathrm{O}$
(4) $\mathrm{CH}_{4}+2 \mathrm{O}_{2} \rightarrow \mathrm{CO}_{2}+2 \mathrm{H}_{2} \mathrm{O}$

## Answer Key

1. 4
2. 2
3. 3
4. 2
5. 1
6. 3
7. 2
8. 4
9. 1
10. $\quad 2$
11. 3
12. 2
13. 3

Give the symbol (or symbols) that necessary to indicate each of the following in a chemical reaction:
16. solid
17. liquid
18. gas
19. dissolved in water
20. "yields" (makes)
21. "yields in a reversible reaction"
22. "substance " $X$ " is used as a catalyst when A yields B and C
23. List the diatomic elements:
24. In number 22, indicate the reactant(s) and the product(s)

