1. \( \text{O}_2 + \text{N}_2 \rightarrow \text{N}_2\text{O}_4 \) \( \text{N}_2\text{O}_4 \) is a very explosive compound.

2. \( \text{Cs} + \text{O}_2 \rightarrow \text{Cs}_2\text{O} \) Cesium oxide is used in infrared cameras.

3. \( \text{Be} + \text{H}_2\text{O} \rightarrow \text{Be(OH)}_2 + \text{H}_2 \) Beryllium hydroxide melts at 1000\(^\circ\text{C} \) but hydrogen melts at -259\(^\circ\text{C} \).

4. \( \text{N}_2\text{H}_4 + \text{O}_2 \rightarrow \text{H}_2\text{O} + \text{N}_2 \) Hydrazine (\( \text{N}_2\text{H}_4 \)) was used as rocket fuel by the Germans in World War 2.

5. \( \text{Al} + \text{Cl}_2 \rightarrow \text{AlCl}_3 \) \( \text{AlCl}_3 \) is used to make antiperspirant.

6. \( \text{CO} + \text{H}_2 \rightarrow \text{CH}_3\text{OH} \) Methanol is used in gasoline antifreeze.

7. \( \text{CaO} + \text{C} \rightarrow \text{CaC}_2 + \text{CO} \) Calcium oxide is also called quicklime. It produces an intense glow called "limelight".

8. \( \text{C}_3\text{H}_8 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O} \) \( \text{C}_3\text{H}_8 \) is called propane. It is for barbeques and as a cleaner fuel in some vehicles.

9. \( \text{Fe(NO}_3\text{)}_3 + \text{NaF} \rightarrow \text{FeF}_3 + \text{NaNO}_3 \) Iron (III) fluoride is used to ceramics production.
10. \[ \text{Al} + \text{H}_3\text{PO}_4 \rightarrow \text{AlPO}_4 + \text{H}_2 \]

Aluminum phosphate is used in cake mixes to help make the cake rise.

11. \[ \text{Mg(OH)}_2 + \text{HCl} \rightarrow \text{MgCl}_2 + \text{H}_2\text{O} \]

Stomach acid (HCl) can be neutralized with Mg(OH)$_2$, also called Milk of Magnesia.

12. \[ \text{Mg} + \text{Au(OH)}_3 \rightarrow \text{Mg(OH)}_2 + \text{Au} \]

Gold (III) hydroxide is used to plate objects with a thin gold coating.

13. \[ \text{C} + \text{Cl}_2 + \text{F}_2 \rightarrow \text{CFCl}_3 \]

Chlorofluorocarbons are compounds used in air conditioners and refrigerators. They act as a catalyst to damage the ozone layer.

14. \[ \text{K} + \text{H}_2\text{O} \rightarrow \text{KOH} + \text{H}_2 \]

Potassium hydroxide is a basic or alkaline substance. This is why K is called an “alkali metal”.

Bonus: \[ \text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O} + \text{energy} \]

This reaction in your brain cells provided the energy needed to solve these problems!