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Chemical Reactions - Hydroxides Formation

Given and Introduction:

Given:

- CaO (calcium oxide) is mixed with H_2O (water)
- The product is Ca(OH)_2 (calcium hydroxide)

Objective: Identify the name of the product formed.

Step-by-step Solution:

Step 1:

Identify the reactants and products in the chemical reaction.

- Reactants: CaO and H_2O

- Product: Ca(OH)_2

Explanation:

Calcium oxide (CaO) reacts with water (H_2O) to form calcium hydroxide (Ca(OH)_2).

Supporting Statement: The given reaction is a typical combination reaction where a metal oxide reacts with water to form a metal hydroxide.

Step 2:

Write the balanced chemical equation for the reaction.

$$\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca(OH)}_2$$

Explanation:

In this reaction, one mole of calcium oxide reacts with one mole of water to form one mole of calcium hydroxide.

Supporting Statement: Writing the balanced equation ensures that the law of conservation of mass is obeyed.

Step 3:

Determine the name of the product formed.

- Ca(OH)_2 is known as Calcium hydroxide.

Explanation:

The product formed is named based on the ions it contains—calcium ion Ca^{2+} and hydroxide ions OH^-.

Supporting Statement: Identifying the chemical names aids in understanding the composition and nomenclature of compounds.

Step 4:

Cross-check the correct option from the given choices.

1. Calcium oxide
2. Calcium (II) oxide
3. **Calcium hydroxide**
4. Calcium (II) hydroxide

Explanation: Calcium hydroxide is the correct name for Ca(OH)_2. It is not necessary to indicate the oxidation state of calcium with "(II)" as calcium generally forms a +2 cation.

Supporting Statement: Ensuring the selected option reflects the accurate chemical terminology.

Final Solution:

The name of the product Ca(OH)_2 is **Calcium hydroxide**.

This completes the solution, adhering to chemical naming conventions and ensuring clarity in the identification of the product formed.