**% Composition of Calcium Carbonate in Eggshells**

* **Question:** How do you differentiate between physical and chemical changes?
* **Introduction:** As calcium carbonate (CaCO3) is a component of seashells and eggshells that gives them their strength and hardness. Because calcium carbonate is a base, it will react with acids to form a salt and water. The complete reaction of calcium carbonate with hydrochloric acid is:

CaCO3(s) + HCl (aq) 🡪 CO2 (g) + CaCl2 (aq) + H2O (l)

The portion of the shell that is not calcium carbonate does not react with acid and remains as a solid.

* **Safety:** Goggles, gloves and aprons must be worn on Day 1. Hydrochloric acid is a strong acid.

**Data Table**

*(Copy into your lab notebook before lab day.)*

|  |  |
| --- | --- |
|  | ***Mass (g)*** |
| ***Day 1******Original Eggshell (crushed)*** |  |
| ***Day 2******Empty Filter Paper*** |  |
| ***Day 3******Dry Filter Paper w/ Unreacted Eggshell*** |  |

* **Procedure:** (✓ *each of the steps as you complete them.)*

Day 1

* 1. Label a plastic tray with you and your lab partner’s names.
* 2. Peel an egg. Remove all the membranes from the shell and place the just the clean shell pieces in your plastic tray.
* 3. With your mortar and pestle, crush your egg shell.
* 4. Place your clean, empty plastic tray on the electronic balance. Press “zero” and leave it on your balance.
* 5. Place your crushed egg shell into the plastic tray, measure and record mass.
* 6. Place your crushed egg shell into your 250mL beaker (labeled with your name and period).
* 7. Using your graduated cylinder, measure out 25mL of 3M HCl and pour this into your beaker.
* 8. Store your beaker overnight in the place indicated by your teacher.
* 9. Clean your lab station

Day2

* 10. Obtain a piece of filter paper, write your initials on the edge with pencil, then record the mass of the paper.
* 11. Place the filter paper in the funnel, in the ring stand, and place a 100ml beaker (labeled with your name and period) below the funnel.
* 12. Filter your HCl-eggshell solution through the filter paper, capturing any unreacted eggshell in the paper. With your microspatula, scrape out as much unreacted eggshell out of the beaker and onto the filter paper as possible.
* 13. With your distilled water, make sure you rinse all bits of unreacted egg shell out of the beaker and onto the filter paper. Make judicious use of the water so as not to overtop the filter paper.
* 14. Place the beaker with the funnel to filter and dry overnight in the place indicated by your teacher.
* 15. Clean your lab station.
* **Calculations:**
1. **Balanced Equation** Write the balanced equation for the reaction. Include(states).
2. **Mass of Original (crushed) Eggshell**

Subtract the mass of the empty plastic tray from the original (crushed) eggshell in plastic tray. The difference is the mass of the original eggshell.

 *mass of original eggshell in plastic tray*

*- mass of empty plastic tray*

 *mass of original eggshell*

1. **Mass of Unreacted Eggshell**

Subtract the mass of the empty filter paper from the dry filter paper w/ unreacted eggshell. The difference is the mass of the unreacted eggshell.

 *mass of dry filter paper w/unreacted eggshell*

*- mass of empty filter paper*

 *mass of unreacted eggshell*

1. **Mass of Calcium Carbonate**

Subtract the mass of the unreacted eggshell (answer #3) from the original eggshell mass (answer #2). The difference is the mass of the calcium carbonate.

 *mass of original eggshell*

*- mass of unreacted eggshell*

 *mass of calcium carbonate*

1. **Percent Composition of Calcium Carbonate in an Eggshell.**

Divide the mass of calcium carbonate (answer #4) by the original eggshell mass (answer #2) and then multiply by 100.

 *mass of calcium carbonate / mass of original eggshell x 100*

EXTRA CREDIT: Which came first – the chicken or the egg? Explain.