Every day more carbon dioxide (CO₂) is released into the air from the burning of fossil fuels. Build 3 CO₂ molecules and place them on their pictures in the air.

The oceans absorb more CO₂ from the air. Move the 3 CO₂ molecules into the ocean as shown with the dotted lines. Build 3 H₂O molecules and place them on their pictures.

Carbon dioxide (CO₂) and water (H₂O) react to produce carbonic acid. Take apart the 3 CO₂ and 3 H₂O molecules. Use the bricks to build 3 molecules of carbonic acid (H₂CO₃). Place them on their pictures.

The hydrogens in carbonic acid [H₂CO₃] are not tightly attached. One hydrogen can easily fall off. Take off 1 hydrogen from each carbonic acid molecule. Place the hydrogens and bicarbonates (HCO₃⁻) on their pictures and leave them there. Start the next reaction with new bricks.

3 CO₂ + 3 H₂O → 3 H₂CO₃ → 3H + 3 HCO₃⁻

Making Bicarbonate

Calcium (Ca) and carbonate (CO₃) are molecules that are dissolved in ocean water. Build the models of Ca and CO₃ and place them on their pictures.

More CO₂ in the air creates many free hydrogens in the ocean. Move 1 hydrogen as shown with the dotted line. Place it on its picture.

Too many free hydrogens interfere with normal ocean chemistry. Add the H to CO₂ and place the bicarbonate (HCO₃⁻) on its picture. Place the unused Ca on its picture below. Read the conclusion.

Conclusion

Burning fossil fuels releases CO₂ into the air. Additional CO₂ in the air is absorbed by the ocean and more free hydrogens are created. The process of creating more free hydrogens in the ocean is called acidification.

When ocean acidification occurs, the free hydrogens bond to carbonates, making it harder for sea creatures to make chalk. Weaker shells are produced and there are fewer healthy coral reefs in the ocean.

Making Less Chalk

CO₃⁻ + Ca⁺ + H⁺ → HCO₃⁻ + Ca⁺