2023, April 22

Chemistry 2, Lesson 15

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Cooking

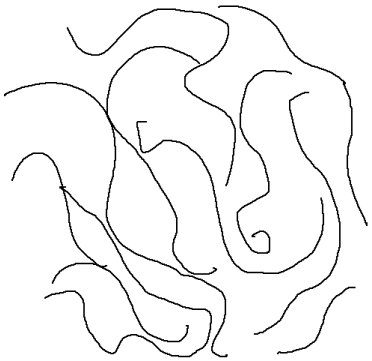
1. Put the chemical changes involved in baking cookies in chronological order. Start by writing "1" next to the first step; then "2" next to the second step, and so on.
   9. Caramelization
   3. Trapped water is released and expands into steam
   1. Butter melts
   5. Egg proteins change shape
   2. Dough spreads out
   4. Changes begin in the proteins (mainly from eggs)
   6. Water boils away at 212°F
   7. Steam inside evaporates
   8. Maillard Reaction (browning)
2. What is an emulsion?

   An emulsion is a substance comprised of two substances that do not mix well, and naturally separate.

3. What is the function of baking soda in cookies?

   Baking soda reacts with the dough, re-forming as gaseous carbon dioxide, that which forms pockets inside of the cookie.

4. Draw the change in the structure of an egg's proteins as the egg (in the cookie dough) is baked.



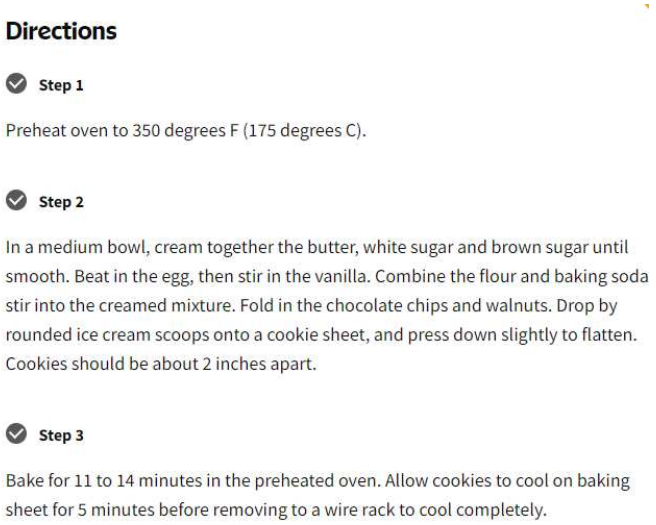
5. At what temperature does the Maillard reaction occur?

   The Maillard reaction occurs at 310°F.

6. The Maillard reaction occurs when ___ and ___ break down and rearrange themselves, forming ring-like structures that reflect light and giving food a distinctive, rich brown color.

   proteins, sugars

7. Look at the recipe picture below. Why won't caramelization happen when you use the following recipe instructions?



Directions

Step 1

Preheat oven to 350 degrees F (175 degrees C).

Step 2

In a medium bowl, cream together the butter, white sugar and brown sugar until smooth. Beat in the egg, then stir in the vanilla. Combine the flour and baking soda stir into the creamed mixture. Fold in the chocolate chips and walnuts. Drop by rounded ice cream scoops onto a cookie sheet, and press down slightly to flatten. Cookies should be about 2 inches apart.

Step 3

Bake for 11 to 14 minutes in the preheated oven. Allow cookies to cool on baking sheet for 5 minutes before removing to a wire rack to cool completely.

   Caramelization requires a minimum oven temperature of 356°F.

Cleaning

1. Why is water alone not an effective way to wash one's hands?

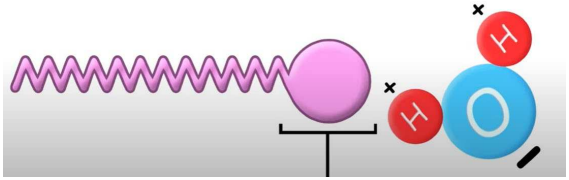
   Hydrophobic substance is required for removing oils.

2. What is the main difference between soaps and detergents?

   Soaps are produced from natural products, and detergents are produced from synthetic products.

3. Surfactants, like soap and detergent, act to (increase | **reduce**) the surface tension of water.

4. Below is an image of a water molecule (H_2O molecule on the right) next to a soap or detergent molecule (on the left). Label the two key parts of a soap/detergent molecule.



In basic, a soap or detergent molecule is comprised of a hydrophilic head and a hydrophobic tail.

5. In 1-3 sentences, explain how soap or detergent works with water to clean a dirty surface.

The hydrophilic heads of detergent molecules attach to water molecules. The hydrophobic tails of detergent molecules attach to oil molecules. The molecules become grouped, and may be washed away together.