

# Physical and Chemical Changes – Making Toffee

## 4<sup>th</sup> Grade

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### References:

- Amy Nolan – from 4<sup>th</sup> grade science education class offered by Ashland University

### Benchmarks:

SLC/GLI #: PS-1, PS-2

### Objectives:

The objective of this lesson is to show further examples of physical and chemical changes by making toffee, and have students figure out what is going on and which changes in the cooking process are physical and which are chemical.

### Materials:

- Stovetop, 9 x 13 inch pan, pot, and spoon, candy thermometer
- 1 1/3 cup white sugar
- 1 cup butter
- 3 tablespoons water
- 1 tablespoon light corn syrup
- 1/8 teaspoon salt
- 1 teaspoon vanilla
- chocolate bars

### Initial Demonstration:

There is no initial demonstration except to maybe to discuss safety in the kitchen around the stovetop.

### Target Observations:

- Be careful when working with hot things and the stove.

### Procedure:

Students will help make the toffee. The recipe is as follows: Grease a 9x13 pan with butter. Mix sugar, butter, water, salt, and corn syrup together and bring to a soft crack stage, 300-310 degrees Fahrenheit. Pour into pan, cover with chocolate bars and spread chocolate when melted. Cut into pieces once cooled.

Have students answer the following questions about physical and chemical changes:

- 1.) What type of change happened to the butter? Physical or chemical. Describe.
- 2.) Which ingredients were solids when we started?
- 3.) What type of change happened when we mixed all the ingredients together and heated it? Physical or chemical. Describe.
- 4.) What type of change happened when we poured the toffee onto the greased pan? Physical or chemical? Describe.
- 5.) List any other changes you saw occur while making the toffee.

**Target Observations:**

- Both physical and chemical changes occurred while cooking the toffee.
- Some physical changes include the melting of the butter, the melting of the chocolate, the hardening of the toffee when it was finished, and the mixing together of the dry ingredients.
- Some chemical changes include the sugar caramelized through cooking and turned into the toffee through a form of polymerization.

**Target Revised Model:**

- There are many physical and chemical changes that happen in every day life. Many of these happen during cooking and baking.

**Summary:**

This lesson shows examples of physical and chemical changes that are apparent in cooking toffee. Students will discuss and understand what physical and chemical changes happen in making this recipe. They will actually make the toffee and will hopefully think about what physical and chemical changes went into making it when they eat it.