EXPERIMENT MANUAL

CANDY CHEMISTRY

THAMES & KOSMOS

WARNING — This is not a toy. Only for use by children 10 years of age or older with continuous adult supervision and assistance. Components in this kit may be sharp, breakable, or have sharp edges. Some experiments require the use of a stove, electric mixer, and high temperatures.

What's in your experiment kit:

Checklist: Find – Inspect – Check off

✔	No.	Description	Qty.	Item No.
☐	1	Forked tool	1	703338
☐	2	Flat stirring tool	1	703339
☐	3	Pick tool	1	703340
☐	4	Chocolate egg mold	1	703341
☐	5	Small shape cutter, flower	1	703342
☐	6	Small shape cutter, diamond	1	703343
☐	7	Dipping fork	1	703344
☐	8	Set of small baking cups	1	703345
☐	9	Sugar spatula	1	703347
☐	10	Set of lollipop sticks	1	771223
☐	11	Candy thermometer	1	703182
		Plastic bag containing:		771221
☐	12	Gummy candy mold, plastic	1	
☐	13	Chocolate mold, plastic	1	
☐	14	Set of plastic wrappers, transparent	1	
☐	15	Set of aluminum foil sheets, red/silver	1	
☐	16	Set candy label stickers (not shown)	1	

It is assumed that you have a stove, electric mixer, and regularly well-equipped kitchen. Read through each experiment to make sure you have everything you need for the experiment.

Additional things you will need:

Ceramic mug, chocolate chips, kettle, spoon, desk lamp, napkin, measuring cups, measuring spoons, food coloring, various bowls, cooking pots, spatula, marble slab or baking sheet, glass jar, pencil or skewer, string, plastic wrap, baking pan, knife, fork, wax paper, vegetable oil, scissors, gum drops, toothpicks, diet cola, Mentos candy, index card, paper, hand mixer, sieve or sifter, storage containers, rice paper, whisk, rolling pin, adhesive tape

Any materials not contained in the kit are marked in ***black italic script*** in the "You will need" boxes.

Refer to each experiment for the recipe ingredients. Ingredients for the recipes are marked in ***pink italic script*** in the "You will need" boxes.

→ Before doing anything else, please check all the parts against the list to make sure that nothing is missing.

→ If you are missing any parts, please contact Thames & Kosmos customer service.

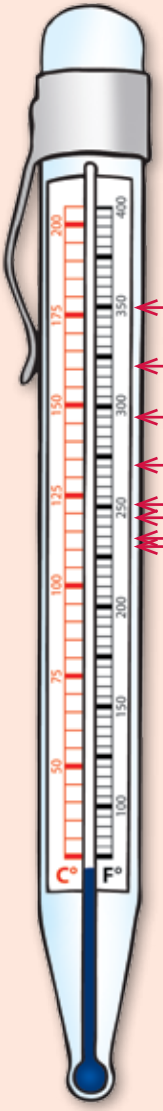
CONTENTS

CHECK IT OUT

You will find supplemental information on pages 7, 9, 15, 16, 19, 23, 24, 28, 33, 36, 37, and 44.

CHECK IT OUT

Sugar Stages



Temperature	Grade of Sugar — Consistency	Uses
>350 °F >176 °C	**Burnt Sugar** — the syrup turns black, gives off smoke, and smells bad	Should not be eaten
320-330 °F 160-166 °C	**Caramel** — the syrup is now golden and gives off the typical caramel smell	Caramel, pralines
295-310 °F 146-154 °C	**Hard Crack** — the light yellow syrup breaks like glass as soon as it is cooled off	Hard candy, drops, lollipops
270-290 °F 132-143 °C	**Soft Crack** — the syrup can be drawn into elastic strings that will partly break	Taffy, toffee, cream candy, butterscotch
250-266 °F 121-130 °C	**Hard Ball** — the syrup can be formed with wet fingers into a sphere	Nougat, gummy candy
244-248 °F 118-120 °C	**Firm Ball** — easily formed, but still sticky	Soft caramels, chewy candy, marshmallows
234-240 °F 112-115 °C	**Soft Ball** — the syrup can be formed, but will lose its shape again	Fondant (a soft, creamy sugar base for icing)
230-233 °F 110-111 °C	**Thread** — the syrup runs in strings from the spoon	Candied fruits

Safety Note: Caution! Very high temperatures. There is a risk of burns.

Cold Water Test

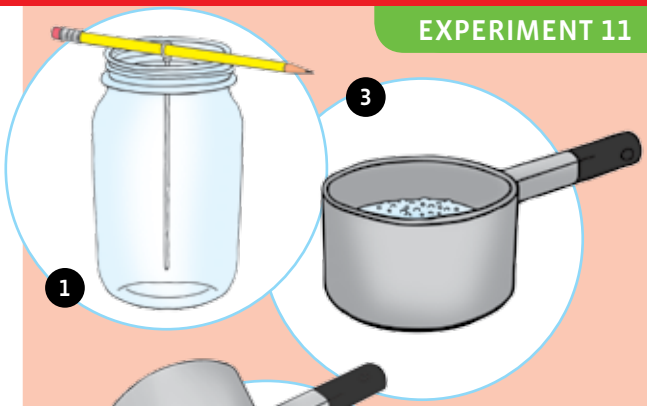
To test hot sugar syrup, place a tiny amount in a bowl of cold water. Remove it with your fingers and test it according to the descriptions above.

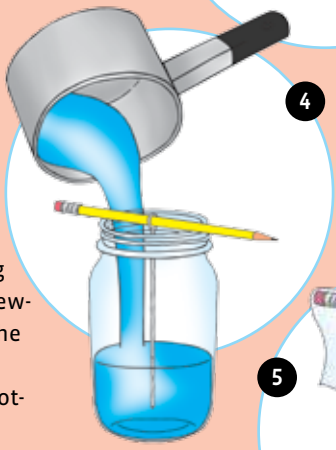
EXPERIMENT 11

Rock candy

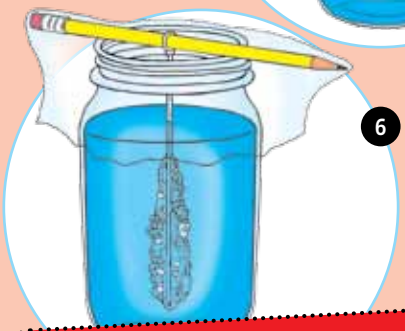
YOU WILL NEED

- → *cooking pot*
- → *metal spoon*
- → *large glass canning jar*
- → *pencil or wooden skewer*
- → *kitchen string*
- → *plastic wrap*
- → *2 cups of water*
- → *4 cups of granulated sugar*
- → *food coloring*





Safety Note: Caution! High temperatures. There is a risk of burns.



HERE'S HOW

1. Prepare the jar setup by tying a string around the middle of the pencil or skewer. When the pencil is placed across the top of the jar, the string should hang down into the jar but not touch the bottom of the jar.

2. Wet the string and roll it in some of the granulated sugar. Let it dry. The string should be coated with sugar crystals.

3. Put 2 cups of water and 4 cups of sugar into the pot. Bring this solution to a boil.

4. When all of the sugar has dissolved into the water, remove it from the heat and pour it into the jar.

5. Gently place the string in the solution. Cover the jar with plastic wrap.

6. Leave the jar in a spot where it will not be disturbed. After a day, you should see some small crystals on the string. For large crystals, wait a week or longer.

→ WHAT'S HAPPENING?

You made a supersaturated solution of sugar and water. Over time, the sugar crystallized out of the solution, adhering to the small starter crystals on the string and forming into larger crystals.

EXPERIMENT 15

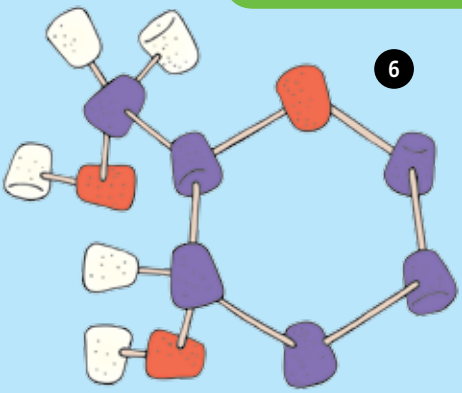
Sugar molecules

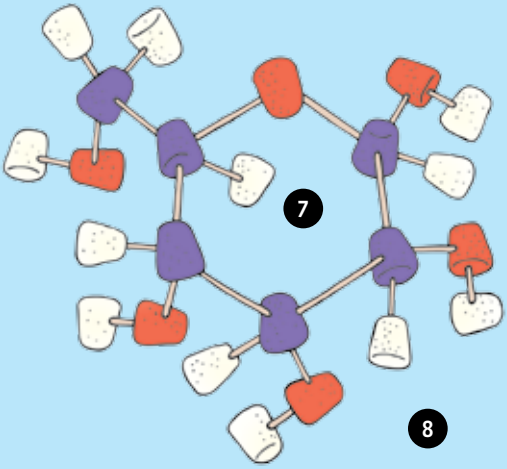
HERE'S HOW IT CONTINUES

6. Attach one hydrogen and one oxygen to all of the other carbon atoms in the ring.

7. To the carbon atom in the ring that has the sixth carbon atom sticking off of it, attach one more hydrogen.

8. This is how the finished molecule looks. Note that the red oxygen atom in the ring has nothing else attached to it, except the two carbons holding it in the ring.





→ WHAT'S HAPPENING?

This model represents one glucose molecule, only much, much bigger than it is in reality. Glucose is a simple sugar. A single glucose molecule has six carbon atoms, six oxygen atoms, and 12 hydrogen atoms. It is considered an organic compound, and is used by cells to produce energy. This particular molecular configuration is one way that glucose can be oriented.

EXPERIMENT 16

Fatty acid molecules

Try to recreate this fat molecule (called a fatty acid) on your own. It uses the same atoms as glucose: carbon, hydrogen, and oxygen.