Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# Sweet Talk

**Purpose**

The purpose of this exercise is to illustrate the difference between granulated sugar and powdered sugar.[[1]](#endnote-1)

**Procedure:**

 **Materials**

1. Iced tea (enough for the entire class, or one cup to use as a demonstration)
2. Cups (enough for the entire class, or one cup to use as a demonstration)
3. Plastic spoons
4. Granulated sugar (enough for the entire class, or a teaspoon to use as a demonstration)
5. Powdered sugar (enough for the entire class, or a teaspoon to use as a demonstration)

**![C:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmf]()Sequence of Steps**

1. Read background information.

2. Receive a glass/cup of iced tea.

3. Half of class put 1 tsp of granulated sugar in their tea

![C:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmf]()4. Other half of the class put 1 tsp of powdered sugar in their tea

5. Record observations and respond to questions.

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**Background information**

Our *SENSES* include touch, hearing, sight, smell, and taste. The two senses that are chemical in nature are smell and taste. Those two senses smell (olfactory) and taste (gustatory) can detect actual chemical molecules. The sense of smell can detect only GASEOUS molecules floating around in the air and contributes to about 80% of the flavor of food. (Remember the mouth and nose are connected)! The sense of TASTE can detect only molecules dissolved in water. (Using the food’s own liquid or from the saliva in the mouth).

There are five tastes we distinguish. They are sweet, sour, salty, bitter, and umami (glutamate, an amino acid, has its own distinct flavor). Studies have shown that our favorite taste is sweetness.

**What is sugar?** Sugar is a carbohydrate made up of carbon, hydrogen, and oxygen atoms. All carbohydrate molecules contain glucose (blood sugar). Our bodies metabolize (breakdown) carbohydrates into glucose or a monosaccharide. An example of a monosaccharide that exists in nature is fructose and is found in honey and many fruits. In comparison, a disaccharide is two monosaccharide molecules bonded together. Examples: (SUCROSE from plants like sugar cane and sugar beets, nectar in flowers; MALTOSE from malt sugar; LACTOSE from milk sugar.)

Furthermore a Polysaccharide is a complex carbohydrate made up of many simple sugars – basically starches and fiber – found in foods such as peas, beans, grains, and potatoes.

**History -** Prior to 3,000 years ago HONEY was the sweetener of choice. It wasn’t until 700 A.D. that sugar was used as a sweetener. Today each American eats about 40 pounds of sugar per year!

**There are differences in sugars.** Raw sugar comes directly from the sugar cane. Brown sugar still has the syrupy liquid, molasses, as part of the sugar. Brown sugar is also called ‘raw sugar.’Demerara sugar, made in India, is a dark brown sugar. Jaggery sugar, used in Europe, also is a brown sugar.Refined white sugar is raw sugar with molasses removed.Baker’s sugar is super fine granulated refined sugar.Powdered sugar is refined sugar with corn starch added.

Refined white sugar and super-refined (Baker’s sugar) are granulated, meaning the sugars consist of individual grains of a single crystal of pure sucrose. By pulverizing the granulated sugar into a fine powder, the sugar picks up moisture in the air. In other words sugar is **hygroscopic** (a substance that has the ability to take up or retain moisture). To prevent powdered sugar from taking up moisture, about 3% of cornstarch is added.

**Review Questions**

1. What are our senses?

 a. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 b. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 c. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 d. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 e. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. The two senses that are chemical in nature are:

 a. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ also called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 b. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ also called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. There are 5 tastes we can recognize, they are:
	1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Americans love the sweetness taste and prove it by consuming \_\_\_\_\_\_ pounds of sugar a year.
3. There are 7 kinds of sugar including:
	1. **Raw sugar** comes directly from the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
	2. **Brown sugar** still has the syrupy liquid, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, as part of the sugar. Brown sugar is also called ‘\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.’
	3. **Demerara** sugar, made in India, is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_sugar.
	4. **Jaggery** sugar, used in Europe, also is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ sugar.
	5. **Refined** white sugar is raw sugar with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ removed.
	6. **Baker’s** sugar is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ granulated refined sugar.
	7. **Powdered** sugar is refined sugar with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ added.
4. When a substance has the ability to take up or retain moisture it is referred to as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Observations**

1. What happened when you added your sugar to the tea? How does this compare with your classmates who used a different type of sugar?

2. Why is cornstarch added to sugar to make powdered sugar?

3. How does this processing technique of a raw agricultural commodity help the food science industry?

**Teacher’s Notes**

**Procedure:**

Opening question to the class: “Has anyone ever run out of granulated sugar and used powdered sugar as a substitute? If ‘yes’ is a response, asked “what happened”; if ‘no’ is the response use the following procedure so that every member of the class can see the difference between granulated sugar and powdered sugar.

* Separate the class in to two halves.
* Each student receives a glass (plastic cup at school) of iced tea (or at least cold tea).
* Half the class will put a teaspoon of granulated sugar in the tea; the other half will use powdered sugar.
* Results: The powdered sugar will clump instead of dissolving.

Variations of the procedure: You might want to have three groups and also use super-refined (Baker’s) sugar. That group should find no granules of sugar at the bottom of the glass, the granulated group may find grains of sugar suspended in the tea or settled at the bottom of the glass.

**Student answer sheet**:

1. What are our senses?

a) touch

b) hearing

c) sight

d) smell

e) taste

2. The two senses that are chemical in nature are:

a) smell also called olfactory

b) taste also called gustatory

1. There are 5 tastes we can recognize, they are:
	1. sweet
	2. sour
	3. salty
	4. bitter
	5. umami
2. Americans love the sweetness taste and prove it by consuming 40 pounds of sugar a year.
3. There are 7 kinds of sugar including:
	1. **Raw sugar** comes directly from the sugar cane.
	2. **Brown sugar** still has the syrupy liquid, molasses, as part of the sugar. Brown sugar is also called ‘raw sugar.’
	3. **Demerara** sugar, made in India, is a dark brown sugar.
	4. **Jaggery** sugar, used in Europe, also is a brown sugar.
	5. **Refined** white sugar is raw sugar with molasses removed.
	6. **Baker’s** sugar is super refined granulated refined sugar.
	7. **Powdered** sugar is refined sugar with cornstarch added.
4. When a substance has the ability to take up or retain moisture it is referred to as hygroscopic.
1. Dickson, Chris (2008). Sweet Talk, Lab. *North High School, Bakersfield Agriculture Department*. [↑](#endnote-ref-1)