

Western Engineering Outreach

Gummy Gummy Bear Grade Sk-2

Meet Today's ENG HERO!



Elizabeth Gillies - Professor with Western Engineering

Elizabeth Gillies is a Professor in Chemical and Biochemical Engineering at Western University. Dr. Gillies leads a research program in smart materials and biomaterials spanning from fundamental discoveries to applications with a focus on polymer chemistry and the design synthesis of materials with new properties and functions. She is also exploring applications of her materials in drug delivery, regenerative medication and agriculture. To learn more about Dr. Gillies, please visit:

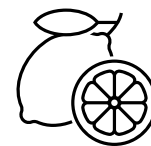
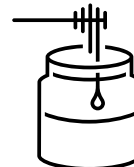
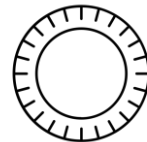
https://www.eng.uwo.ca/chemical/faculty/gillies_e/index.html

Learning Goals:

- Explore chemical engineering and how some foods are made/designed
- Grade 1: 3.3 identify food as a source of energy for themselves and other living things
- Grade 2: 3.5 describe some ways in which solids and liquids can be combined to make useful substances (e.g., flour and water make paste; milk and chocolate powder make chocolate milk)

Materials:

- 1 Cup Fruit Juice
- 1/3 Cup Gelatin (substitute agar powder for vegan)
- Syringe (or straw/funnel)
- Petri Dish (or small plate/cup)
- 2 Tbsp Lemon Juice
- 1/2 cup Honey
- Clean Mixing bowl
- Paper plate
- White glue
- Markers



Engineering and Science Connections:

Background:

The gummy bear originated in Germany, where it is popular under the name *Gummibär* (gum or gummy bear), or in the endearing form *Gummibärchen* (little gum or gummy bear). Gum arabic was the original base ingredient used to produce the gummy bears, hence the name *gum* or *gummy*. Hans Riegel, Sr., a confectioner from Bonn, started the Haribo company in 1920. In 1922, inspired by the trained bears seen at street festivities and markets in Europe through to the 19th century, he invented the Dancing Bear (*Tanzbär*), a small, affordable, fruit-flavored gum candy treat for children and adults alike, which was much larger in form than its later successor, the Gold-Bear (*Goldbär*). Even during Weimar Germany's hyperinflation period that wreaked havoc on the country, Haribo's fruit-gum Dancing Bear treats remained affordably priced for a mere 1 Pfennig, in pairs, at kiosks. The success of the Dancing Bear's successor would later become Haribo's world-famous Gold-Bears candy product in 1967.



Variations and Flavors

The success of gummy bears has spawned the production of many other gummy candies that look like animals and other objects: rings, worms, frogs, snakes, hamburgers, cherries, sharks, penguins, hippos, lobsters, octopuses, apples, peaches, oranges, and even *Ampelmännchen*, Smurfs, and spiders. Manufacturers offer sizes from the standard candy size, and smaller, to bears that weigh several kilograms.

In the United States, Haribo gummy bears are sold in five flavors: raspberry (red); orange (orange); strawberry (green); pineapple (colorless); and lemon (yellow). Trolli's bears are similarly most often sold in five flavors in the United States, and in the same colors; however, Trolli's red bear is strawberry-flavored, while the green is lime and the colorless is grape. Many companies emulate either Haribo or Trolli flavor-color combinations. Health-oriented brands, which often use all-natural flavors, sometimes opt for more and different flavors. For example, the boxed bulk gummies sold by Sunflower/Newflower Markets include grape, pineapple-coconut, and peach, among others.

Gummy Gummy Bear

Some of Trolli's Gummy Bear flavours and packaging:



Ingredients and Production

The traditional gummy bear is made from a mixture of sugar, glucose syrup, starch, flavoring, food coloring, citric acid, and gelatin. However, recipes vary, such as organic candy, those suitable for vegetarians, or those following religious dietary laws.

Production uses a specialized machine called a starch mogul. The image of the gummy bear is stamped into a tray filled with powdered starch. The hot, liquid mixture is poured into the indentations in the starch and allowed to cool overnight. Once the mixture has set, the candies can be removed from the mold and packaged. The molds are open on top, so only the bear's front is formed while the back remains flat. The original design for each type of candy is carved into plaster by an artist, then duplicated by a machine and used to create the starch molds for the production line.

Gummy bears made with bovine, porcine or piscine gelatin are not suitable for vegetarians and vegans. In its factory in Turkey, Haribo produces halal bears and other sweets which are made with bovine gelatin. Also, some gummy bears are made with pectin or starch instead of gelatin, making them suitable for vegetarians.

Large sour gummy bears are larger and flatter than regular ones, have a softer texture, and include fumaric acid or other acid ingredients to produce a sour flavor. Some manufacturers produce sour bears with a different texture, based on starch instead of gelatin. Typically, starch produces a shorter (cleaner bite, less chewy) texture than gelatin.

Health Issues

Gummy bears ordinarily contain mostly empty calories, but recently gummy bears containing vitamin C, produced by manufacturers such as Sconza or Bear Essentials, are being marketed to parents of young children. Multivitamins have also been produced in the form of gummy bears to motivate consumption by young, picky eaters.

Gummy bears, and other gummy candy, stick to teeth and may cause tooth decay. However, gummy bears containing the cavity-fighting additive xylitol (wood sugar) are now being tested. Trolli has developed a line of gummy candy which is claimed to help the immune system and teeth: the acti-line.

Activity:

Intro:

Do you like to eat gummy candies? If so which ones and why do you like them so much?

Watch this "How it's Made" video: <https://www.youtube.com/watch?v=3A9o84pOVPE>

Now let's make our very own gummy bears!

Activity:

1. Put your 1 cup cold juice into a sauce pan (any microwavable container).
2. Add your 1/3 cup of gelatin.
3. Let it sit for a minute or two so the gelatin can "bloom". (This will help prevent a clumpy or gritty finished product!)
4. Place in Microwave for a series of 30 second bursts so that it warms up slowly. Continue until all the gelatin dissolves.
5. Turn off heat and let sit for a few minutes to cool down.
6. Add your lemon juice and raw honey. Stir well.
7. Use a syringe and suck up your juice concoction and push out into your gummy bear mold (petri dish).
8. Let sit for 5 minutes so it sets and then put in fridge for one hour. Remove bears and enjoy!
9. Once it has solidified, you can take a popsicle stick and carve out the gummy shape you want.
10. While the gummy bears are cooling down cut out a circle from the paper plate the size of your petri dish.
11. You need to create their own candy company - what shape will be your candy be and what is your company name.
12. You can make a logo for your petri dish so that you can stick it on top of your product.

Now you have your very own homemade gummy treats from your own gummy company! Enjoy!

What Did You Learn?



- How gummy bears are made using chemical engineering.
- What type of ingredients are used in that process and all the different flavours and types of gummy bears there are.
- How to make your own gummy bears and your own gummy bear company.

Future Learning



- What are some other foods that might be made by humans?
- What are some of the other things that chemical engineers might make using the same process?

Share your creations!

We would love to see what you made. Email as at discover@uwo.ca or tag us on social media.

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Thanks for discovering with us!