Science Fair Project Planning Packet

Name: Kanwarpreet Singh Sangha

	Due Dates	Things To Do
	18 November, 2025	Choose topic and write project question.
	18 November, 2025	Get approval from your teacher.
	1 December, 2025	Research your topic and write key words and paragraph.
	1 December, 2025	Write a hypothesis.
	15 January, 2026	Design an experiment; list variables and write procedure.
	15 January, 2026	List and gather your materials (bring after winter break).
	15 January, 2026	Conduct experiment and record data and observations.
	15 January, 2026	Create a table, chart, or graph of the data.
	15 January, 2026	Draw conclusions.
	15 January, 2026	Make the project display / Google Slides
	15 January, 2026	Write and Print Abstract
	15 January, 2026	Turn in Planning Packet to teacher / With Google Slides
	3 February, 2026	Present your project at the science fair.

→ This package is to be used as your log book.

→ The Science fair projects need to be submitted on Google slides on Google classroom.

Seen

18 Nov, 2025

1. Think of a Question - Your question will drive your entire project. Use the list of topics provided by your teacher. Make sure that your question is something that can be measured and answered by following the scientific process. Your question will also be the title of your project.

Project Question

Which fruit juice will make the best shape during spherification?

2. Research Your Topic - spend some time with your group learning more about your topic. Use reliable Internet sources, books from the library, your science book, or other resources. Do not forget to write these sources down to include in the bibliography. Not only do you want to be an expert on your topic, but you want to teach others about your topic.
    1. *Key Words* - locate 3 or more key science words related to your topic. Make sure that the words you choose are directly related to your topic. Provide a definition of each key word IN YOUR OWN WORDS.
    2. *A paragraph describing the science behind your project* - after you have completed your research give us (your audience) some background information on your topic in a complete and well-written paragraph (5-7 sentences). Give us specific, rather than general information. Use the space provided to write a draft. You will edit a final copy to place on your display board.

Key Words

Key word	Definition
Popping boba	Popping bobas are gelantanious spheres with a liquid center. They are used in bubble teas and frozen yogurt.

pH value	pH scales measure how acidic or alkaline a substance is. pH of 7 is neautral. pH less than 7 is acidic.
Spherification	Technique used to make gel like spheres from food or juices.
Gelling agent	A substance that reacts with calcium to form gelled film around the liquid.
Direct spherification	In this, we mix the liquid with sodium alginate and drops it into a calcium bath.
Molecular Gastronomy	An area of food science which explores how molecules in our food change when we prepare and cook it.
	This is part of spherification of juices is a part of molecular gastronomy.

Research Description (Final copy to be put on display board)

Spherification of juices is a food science project to convert drinks into semi-solid balls called popping bobas that pop in your mouth. It is based on a chemical reaction between sodium alginate and calcium chloride. Sodium alginate is an extract from brown algea and is a gelling agent. Sodium alginate has negatively charged alginate molecules and positively charged sodium ions. Sodium alginate creates a liquid solution when dissolved as sodium ions dissociate from alginate molecules. When sodium alginate is dropped in calcium chloride solution, calcium alginate is formed. The alginate molecules bind to the calcium ions. Doublely charged calcium ions can bind two different alginate molecules simultaniously. The solution got thicker and gelantanious substances are formed.

30 NOV, 2025

3. State Your Hypothesis - In your group decide what you think the outcome of the project will be and make a good guess as to what you think the answer to your question will be. **Also explain WHY you think that will be the outcome.** Remember, it is ok if you don't have the right answer; that is how scientists make discoveries. Make sure that your hypothesis is written in a complete sentence.

Hypothesis

If we use three different juices; Mango, Lychee and Apple. Mango juice will make perfect spheres due to its high pH value as compared to the other juices.

30 Dec, 2025

4. Design Your Experiment - Clearly write out the procedure you are going to follow. Remember that your experiment needs to follow the scientific process and that you need to have one variable that you are going to change.
   1. *Materials:* List all the materials that will be used in the experiment, including the quantity for each material.
   2. *Variables* - List the variables that you are going to keep the same and the one variable that you are going to change. You need to have at least one control (normal) variable and at least two to three other variables.
   3. *Write your procedure* - Think through each step very carefully and list them in numbered order.

MATERIALS: Bulleted list of materials used, including specific sizes, colors, amounts, etc. Be sure to use metric units. *(Example: two Celsius thermometers, 5cm of tape)*

- Sodium Alginate (50 mg)
- Calcium chloride (50 mg)
- Apple Juice, Orange Juice, Strawberry, Peach and Watermelon Juice
- Weighing Scale (measuring in mg)
- Blender
- Plastic Wrap
- Measuring cups (1 cup / half cup)
- bowl
- Spoons
- Timer
- 2mm graph paper
- Syringe
- Strainer
- pH strips/meter
- Distilled water

Constant Variable What stays the same (Controlled) (Example: location, time out in the sun, thermometers)	Independant Test Variable 1-ONE thing that is changed/different (Example: Aluminum can painted black, aluminum can painted white)
- Quantity of juice - Quantity of Sodium alginate - Quantity of calcium chloride - Time to blend juices - Time to keep in a fridge - Time to keep the balls in the bath for	- PH value of juices

PROCEDURES: Numbered list. Must begin with a *verb!* Be specific and include quantities/amounts):

Example #1: *Peel* Label off and several aluminum cans.
#2: *Place* the heat lamp 10 cm from the cans.

1:	*Gather* all materials.
2:	Measure 2 mg of calcium chloride and make a ba~~with distilled water~~
3:	Measure 2 mg of sodium alginate
4:	Add one cup of fruit juice and the sodium algina
5:	Blend for thirty seconds
6:	Refridgerate for two hours
7:	Remove the solution and test the pH
8:	Suck some solution with a syringe
9:	wipe the syringe to remove excess liquids
10:	Release the solution one drop at a time in the bath
11:	Let the solution sit in the bath for one minute.
12:	Remove the juice balls from the bath with a strainer
13:	measure the lenght and width of the balls on the graph paper.
14:	write down your recordings
15:	Repeat experiment ~~two~~ four more times for accuracy.

5. Conduct experiment – when you do your experiment you need to collect data and make observations. You need to complete 3 or more trials. You will complete these in your Experiment Log. After you have completed the experiment use your log to write down the data and observations below. In your log you will need to:
    1. *Collect Data* - you will need to collect numerical data; that means you need to take measurements during the experiment. It can be temperature, distance, height, etc. You will analyze the data later to determine the results of your experiment.
    2. *Make Observations* - as you conduct your experiment you will use your senses (sight, smell, touch, etc.) and write down any observations you make during the process.

1 Jan, 2026

Ph 5.07

watermelon trial 1

	d	h
1	6	6
2	6	5
3	6	6
4	5	5
5	6	5
Ave.	5.8	5.4

Ratio 1.074

Jan 10, 2026 (thin solution)

watermelon trial 2

	D	H
1	6	5
2	6	5
3	5	5
4	6	5
5	7	5
Avg.	6.	5.2

Ratio- 1.1538

Jan 11, 2026

Watermelon Trial 3

	d	H
1	7	5
2	6	6
3	6	4
4	6	6
5	6	6
Avg.	6.4	5.4

Ratio- 1.1851

Jan 12, 2026

watermelon trial 4

	D	H
1.	7	5
2	6	6
3.	6	6
4.	6	6
5	7	5
Avg.	6.4	5.6

Ratio- 1.1428

Jan 13, 2026

watermelon trial 5

	D	H
1.	7	6
2.	6	5
3.	7	5
4.	6	6
5.	6	6
	6.4	5.6

Ratio- 1.142

Apple Juice

(Thick solution)

PH - 4.16

Jan 6, 2026
Apple trial 1

	D	H
1	7	5
2	8	5
3	6	4
4	8	5
5	6	5
	7	4.8

ratio - 1.4583

Jan 10, 2026
Apple trial 2

	D	H
1	5	4
2	7	5
3	6	4
4	8	4
5	7	4
	6.6	4.2

ratio - 1.5714

Jan 11, 2026
Apple trial 3

	D	H
1	7	4
2	6	4
3	7	5
4	7	4
5	6	4
	6.6	4.2

ratio - 1.5714

Jan 12, 2026
Apple trial 4

	D	H
1	7	5
2	7	6
3	8	5
4	8	5
5	8	5
	7.6	5.2

ratio - 1.4615

Jan 14, 2026
Apple trial 5

	D	H
1	6	4
2	8	5
3	6	4
4	7	4
5	7	5

ratio - 1.5454

Orange Juice (very thick Solution)

pH - 3.82

Jan 6, 2026

Orange trial 1

	D	H
1.	8	4
2.	8	3
3.	7	4
4.	8	5
5.	8	4
Avg.	7.8	4

Ratio- 1.95

Jan 10, 2026

orange trial 2

	D	H
1.	8	4
2.	9	3
3.	8	4
4.	8	4
5.	7	4
Avg.	8	4.4

Ratio- 1.8181

Jan 11, 2026

Orange trial 3

	D	H
1.	8	4
2.	8	4
3.	8	4
4.	9	3
5.	7	4
Avg.	7.6	3.8

Ratio- 2.00

Jan 12, 2026

Orange trial 4

	D	H
1.	8	4
2	8	3
3	8	3
4	8	3
5	8	3
	7.6	3.2

Ratio- 2.38

Jan 13, 2026

Orange juice trials

	D	H
1	8	4
2	8	3
3	9	3
4	9	3
5	8	4
	8.4	3.4

Ratio- 2.470

Strawberry Juice (moderate solution)

pH - 4.02

Jan 6, 2026

Trial 1

	D	H
1	7	4
2	6	4
3	7	4
4	6	4
5	6	4
Avg.	6.4	4

ratio- 1.6

Jan 10, 2026

Trial 2

	D	H
1	6	4
2	6	4
3	7	3
4	6	4
5	7	3
Avg.	6.4	3.6

ratio- 1.7777

Jan 11, 2026

Trial 3

	D	H
1	7	5
2	6	4
3	6	5
4	6	4
5	7	4
Avg.	6.4	4.4

ratio- 1.4545

Jan 12, 2026

Trial 4

	D	H
1	6	4
2	6	4
3	7	4
4	8	5
5	8	4
Avg.	7	4.2

ratio - 1.6666

Jan 13, 2026

Trial 5

	D	H
1	7	5
2	6	4
3	6	4
4	6	4
5	7	5
Avg.	6.4	4.4

ratio - 1.4545

peach Juice (thin solution)

PH-4,30

Jan 6, 2026
trial 1

	D	H
1	5	4
2	7	4
3	7	4
4	5	4
5	6	4
Avg.	5,6	4,2

ratio-
1.3333

Jan 10, 2026
trial 2

	D	H
1	6	4
2	5	4
3	5	4
4	5	4
5	4	4
Avg.	5	4

ratio- 1.25

Jan 11, 2026
Trial 3

	D	H
1	5	4
2	6	4
3	5	4
4	5	4
5	5	4
Avg.	5,2	4

ratio-
1,2926

Jan 12, 2026
Trial 4

	D	H
	5	4
1	6	4
2	5	5
3	4	4
4	5	6
5		
Avg.	5	4,4

ratio-
43636

Jan 13, 2026
Trial 5

	D	H
1	5	4
2	5	3
3	6	4
4	6	4
5	6	4
Avg.	5.6	3,8

ratio-
1.4736

Diameter to height ratio of fruit juices

	Trial 1 (d/h) ratio	Trial 2	Trial 3	Trial 4	Trial 5	Average
Apple	1.46	1.57	1.57	1.46	1.54	1.5
Peach	1.33	1.25	1.29	1.13	1.47	1.3
Watermelon	1.07	1.16	1.19	1.14	1.14	1.1
Orange	1.95	1.81	2.00	2.38	2.47	2.1
Strawberry	1.60	1.78	1.45	1.67	1.45	1.6

Data:

Title:

Label:	Label:			
	Trial 1	Trial 2	Trial 3	Average

Results: Your data written in paragraph form. You may discuss patterns and comparisons found in your data.

Sentence 1: One sentence summarizing what you were testing.
Sentence 2: Briefly explain what the data was for the **first trial**.
Sentence 3: Briefly explain what the data was for the **second trial**.
Sentence 4: Briefly explain what the data was for the **third trial**.
Sentence 5: Briefly explain the **average** of the data collected. Here is where you would make a **statement comparing the data**, identifying the most and least quantities observed.

This experiment is to test the effect of pH while making popping bobas from juices. Diameter to height ratio is calculates to check which juice will make the best spheres. For trial one, diameter to height ratio of apple juice is 1.46, peach juice is 1.33, orange juice is 1.95, watermelon juice is 1.07, and strawberry juice is 1.78. For trial two the average for apple juice is 1.57, peach juice is 1.25, orange juice is 1.81, watermelon juice is 1.16, strawberry is 1.78. For trial 3, apple juice is 1.57, peach juice is 1.29, orange juice was 2.00 & 1.19 for watermelon juice and strawberry was 1.45. For trial four, apple juice was 1.96, peach was 1.36, orange was 2.38, watermelon was 1.14, strawberry was 1.66. For trial five, apple juice was 1.54, peach was 1.47, orange was 2.47,

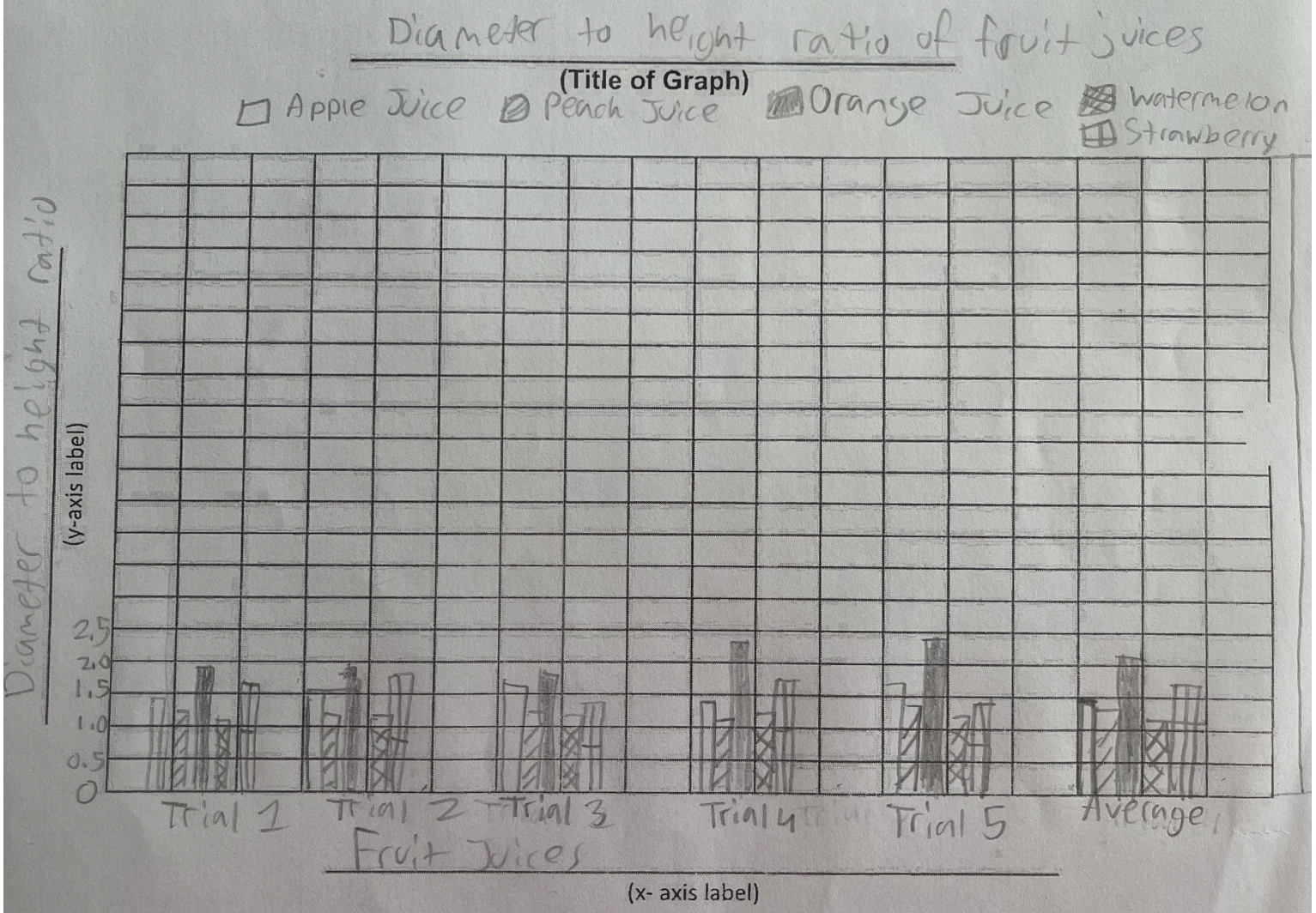
1.14 for watermelon and 1.6 for strawberry, watermelon juice with the highest pH made the best spheres. More the pH, the better the spheres the juices made during direct spherification.

Jan 14, 2026

Graph: Record **AVERAGE** data from chart into a bar graph.

- Bars must be equal widths and with equal spacing
- First bar cannot touch "0" line on the y-axis
- Select appropriate scale for y-axis (by 1's, by 2's, by 5's, or by 10's depending on your data)

Helpful website to create a graph: http://nces.ed.gov/nceskids/createagraph/



14 Jan, 2026

7. Determine the Results - Now it is time to review your data and observations to find out what happened. Think about the best way to show your data: bar graph, line graph, chart, etc. and then create a table or a graph using your data. Write out the results of each test in the experiment in paragraph form using complete sentences. Make sure that you include the numerical data (measurements) as well as any other important observations that you made.

8. Draw Conclusions - After you have determined the results it is time to decide the answer to your original question. Write your answer in a complete sentence using the question to begin your answer. You also need to tell whether your hypothesis was correct or incorrect. If it was incorrect explain why you think so. End this paragraph by saying how you could change or improve your experiment in the future.

Conclusions

Answer to your original question: The purpose of this experiment was to test which fruit juice will make the best spheres while making popping babas. Apple, peach, orange, watermelon and strawberry juices are tested and watermelon juice with the highest pH made the best spheres.

You're your hypothesis correct or incorrect? If incorrect, why?

My hypothesis proved to be correct because the juice with the highest pH has got diameter to height ratio 1.1 which is closest to one. Higher the pH value, better the shape of the spheres.

If you were to complete this experiment again, what changes would you make? How would you improve this experiment?

When we put drops of fruit juice and alginate solution in the calcium chloride bath, some drops stay a little longer than others which affect the size. Next time I will put one drop at a time and measure it first instead of doing it altogether

9. Display board - Now that you have completed your experiment you will begin setting up your display board to communicate the results of your experiment to others. Remember, the board is graded on the information not how colorful or pretty it looks. Your display board must have ALL of the following components located in the same places. Other board guidelines:

- Font should be easy to read and at least a size of 16pt or greater.
- Photos should not include faces of students
- Information on the board can be typed or written neatly by hand.

Abstract:
Less than 250 words: include
1 sentence purpose,
1-2 sentences about procedure
1 sentence about results
1 sentence conclusion

Purpose: Give the Reason for your study. What made you decide to pick this particular experiment? Why should people want to know about this experiment?

Background Information:
Bullet points to help reader understand the reason for your study and your procedure choices

Procedure Diagram or Flowchart to show the steps of your experiment. You should include a photograph of you actually performing the experiment.

Title:
You can use a creative title, but make sure it hints at what type of experiment you did.

Experimental Question:
Hypothesis:
Reasoning for Hypothesis:
Give a logical reason for your hypothesis

Define all constants, positive and negative control groups (if possible), and experimental groups.

Data Tables:
Must all have titles and units in each column/row. All data tables must be computer generated. Include a short sentence below each data table that explains to the reader what your data table means.

Graphs:
Must all have titles, proper scales, units (all in metric system), and printed in color. The graphs must be computer generated.
Include a short sentence below each data table that explains to the reader what your data table means.

All Graphs and Data Tables should be understood by a reader without spoken explanation.

Sources of Error or
Things you wish had happened differently during your experiment

Conclusion:
Summarize findings of your study in bullet form
Why are they important?
How do your findings help other scientists?

Further Investigations/Plans:
Include at least 2 ideas for future studies that could be done to further your research

Bibliography:
Proper formal format with at least 5 sources.

Make sure you show a source for every image and every bit of background information on your poster!

Other Requirements: All text, diagrams, graphs, tables should be computer generated. No handwritten text
Creating full size powerpoint slides and printing them works really well!
All paper must be cut using a paper cutter. No ragged edges. All cuts must be straight.
All headings must be BIG, around 40 font size. All other type should be large enough to read 4 feet away.
All units must be in metric and scientific names italicized and written properly. The genus name is capitalized and the species name is not.

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10. Abstract – The abstract is a short version of your science fair final report. It should be no more than 250 words. Most of the information you will put in your abstract is already written, you will just need to copy it over. You must have the following five components in your abstract:

- Introduction
- Project Question
- Procedures
- Results
- Conclusions

The only new thing you will need to write it the **Introduction**. This is where you describe the purpose for doing this experiment or project. Tell why people should care about the work you did. How does your experiment give us new science information? Can this information be used to improve our lives? If so, how? This is where you want to interest the reader in your project and motivate them to read the rest of it.

Abstract Introduction

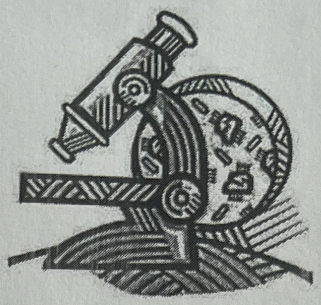
This science experiment is conducted to test the effect of pH while making popping bobas from fruit juices. Five different juices (apple, peach, orange, strawberry, watermelon) are tested to see which will make perfect spheres. This is a food science experiment and popping bobas are gaining popularity as it gives a sudden burst of flavors to drinks and deserts, while adding visual appeal to beverages. To conduct this experiment one cup of fruit juice was mixed with two milligrams of sodium alginate using a blender. The solution was refrigerated for two hours and then dropped in a calcium chloride bath with the help of a syringe. Diameter and height of spheres was measured after one minute and diameter to height ratio was calculated.

As a result of this experiment watermelon juice made the best spheres, followed by peach juice, followed by apple juice, followed by strawberry juice, and orange juice made the worst spheres. Watermelon juice with the highest pH had less hydrogen ions and made best spheres. In conclusion, pH value affects the shape of spheres while making popping bobas

Finally, you will type up the abstract, edit and revise it, and then print it. Make sure that your abstract is written in Times New Roman or Arial font at size 12pt.

Resource #1

You must have 3 Resources



Resource:

Type of Resource: webpage

Website: http:// www.sosa.cat/en/spherification/

Author: _____

Title: _____

Publishing Company: _____

Location of the Publishing Company: _____

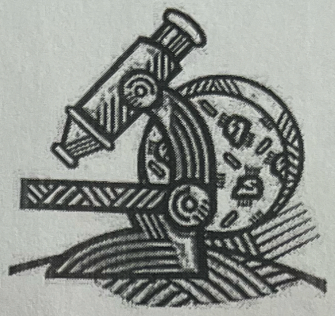
Date of Publication: _____

Information found in your own words:
(Must be at least one paragraph summary.)

Spherification is a technique that traps liquids in a thin gel. Calcium salt allows the reaction between it and the alginate to form a gel layer. Calcium gluconate allows liquids to be put into the gel layer without changing the taste. There is two types of spherification: Direct and inverse. In direct spherification the alginate directly mixes with the liquid. In a reverse spherification reverses the roles of alginate and ca baths.

Resource #2

You must have 3 Resources



Resource:

Type of Resource: Webpage ✓

Website: http:// www.epa.gov/goldking mine/what-ph#:~:text=T
20pH%20scale%20measures%20how,greater
than%207%20is%20basic

Author: _____

Title: _____

Publishing Company: _____

Location of the Publishing Company: _____

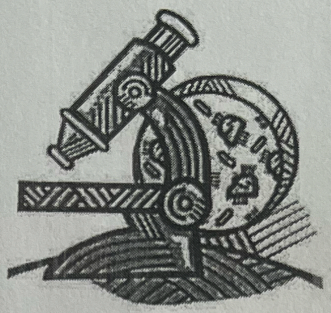
Date of Publication: _____

Information found in your own words:
(Must be at least one paragraph summary.)

A pH scale measures the acidity or alkaline of a substance and ranges from 0 to 14. 7 is neutral and less than 7 is acidic and greater than 7 is basic. Mixtures are always either acidic, basic or neu

Resource #3

You must have 3 Resources



Resource:

Type of Resource: webpage

Website: http:// www.sciencebuddies.org/science-fair-projects/Project-Ideas/FoodSci_p074/cooking-food-science/bo
Spherification

Author: _____

Title: _____

Publishing Company: _____

Location of the Publishing Company: _____

Date of Publication: _____

Information found in your own words:
(Must be at least one paragraph summary.)

Molecular gastronomy is an area in food science that is based on how to make popping bobas. The technique that is used to make these spher is called spherification. Sodium alginate reacts wit calcium to create gel-like spheres called popping bobas.