SASTA OLIPHANT SCIENCE AWARDS

Prize Winner

Scientific Inquiry

Year 7-8

Benita Wu
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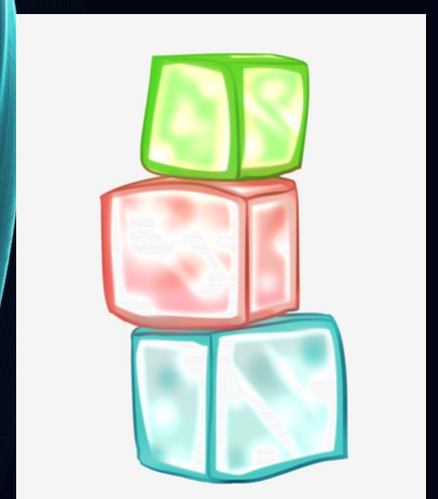
Seymour College

OLIPHANT

SCIENTIFIC INQUIRY

HOW WAVELENGHTS AFFECT THE ACCELERATION OF ICE CUBES MELTING



BY KYRA HUANG AND BENITA WU

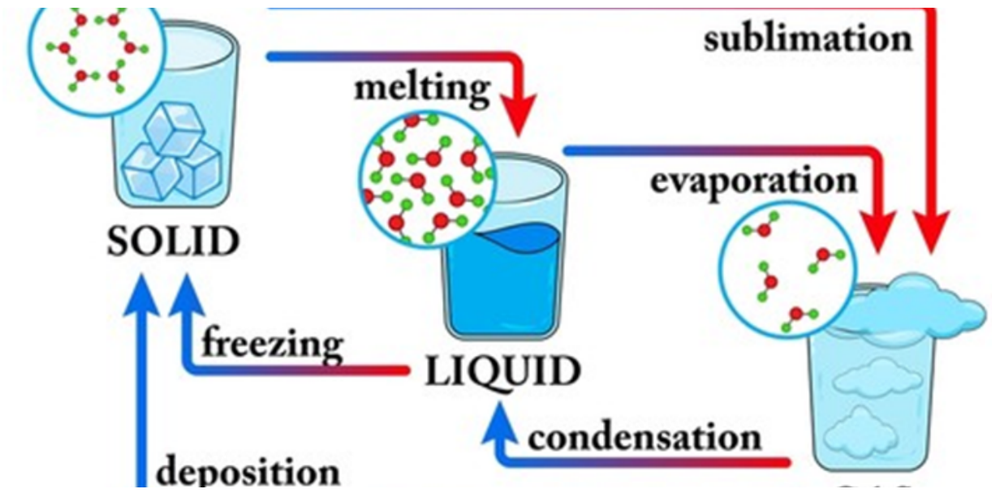
Oliphant Scientific Inquiry

QUESTIONING AND PREDICTING

BY KYRA HUANG AND BENITA WU

INTRODUCTION

Water is an integral part of our everyday lives. It is essential for human survival and is interacted with every day. Today, about one-tenth of Earth's land is covered by glacial ice, which is the solid form of water. The state of water could change easily depending on the surrounding temperature, which makes it interesting to explore how different factors (wavelengths) can affect the acceleration of ice cubes melting. This experiment investigated how different wavelengths affect the melting speed of ice cubes, using acrylic paint to make different coloured ice cubes. The different coloured ice cubes all had different wavelengths, which helped to determine the effect wavelengths have on the melting speed of ice cubes.



Water - States of Change
https://www.dreamstime.com/water-states-matter-phase-change-state-diagram-changing-solid-liquid-gas-due-to-temperature-image250066727

AIM

The aim of this experiment was to determine the effect of colour and its darkness on the melting speed of ice cubes.

HYPOTHESIS

If the wavelength of the ice cube is longer, then more heat will be absorbed, making the ice cube melt slower.

BACKGROUND INFORMATION

The two states of water explored in this experiment, water and ice share the same chemical formula of two hydrogen ions and one oxygen ion (H2O). Ice cubes are formed by freezing liquid water at below 0 ◦ C, and during the process, thermal energy is lost, releasing heat energy and slowing the water molecules' movements. Eventually, the particles will form connections, changing into a solid state. When the water was not completely pure, the water molecules could not connect as easily to start a solid due to the other particles getting in the way. When ice melts, the water molecules do the opposite.

Paints are made of three main components: pigment, solvent, and binder. The pigment provides the colour, the solvent makes paint applyable to surfaces, and the binder holds all ingredients together. When the paint gets added to water, the paint particles will spread out evenly around the water molecules, breaking the binder down, forming coloured water through diffusion.

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QUESTIONING AND PREDICTING

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BACKGROUND INFORMATION (CONTINUED)

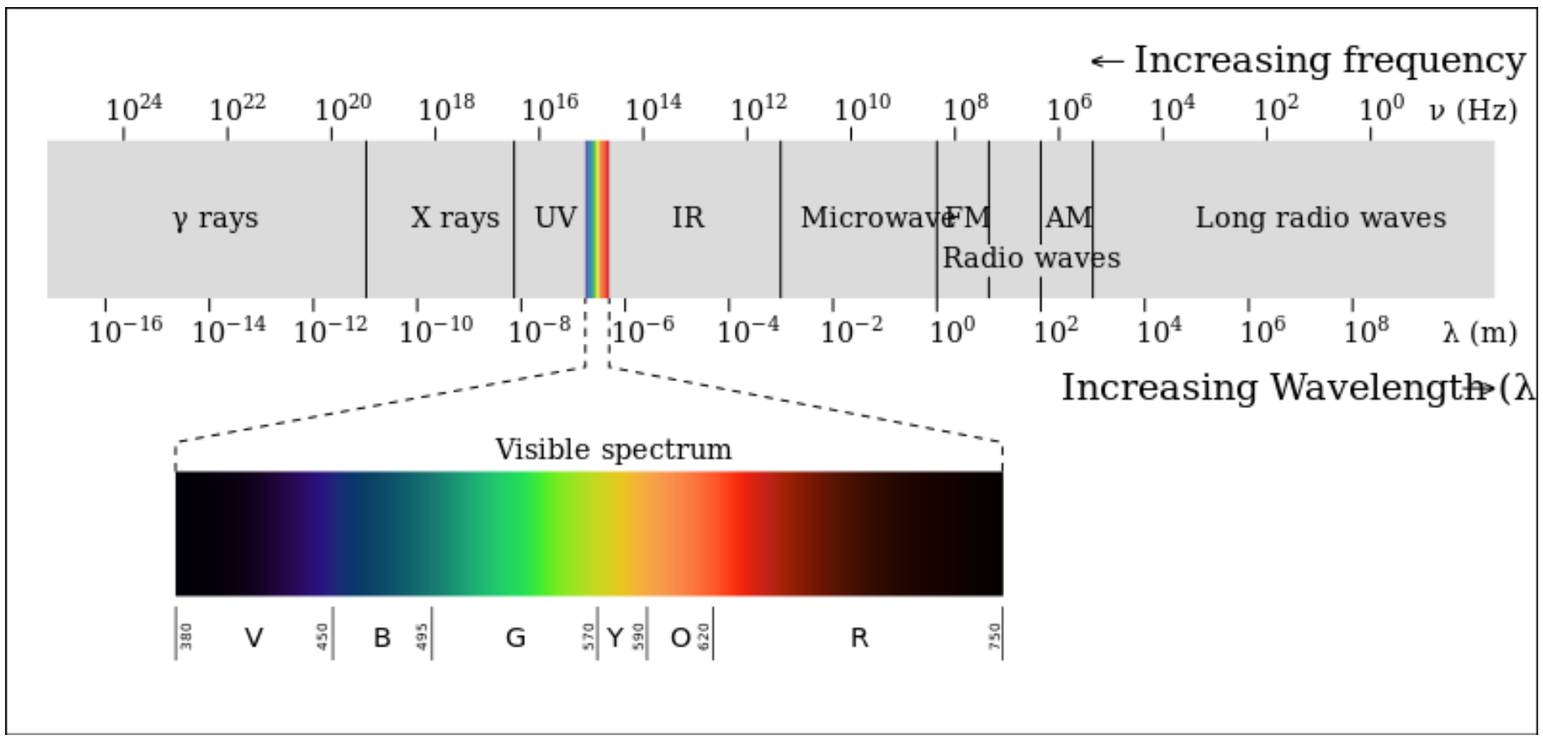
Heat is caused by the amount of energy and movement within the particles. The heat absorbance and reflection of different wavelengths of colour was the main factor affecting the melting speed of the ice cubes. Black absorbs all wavelengths of light, whilst white reflects them. This experiment compared the main colours from the colour spectrum, having both dark coloured, light coloured, and transparent ice cubes made using acrylic paint.

The visible light spectrum, also known as visible light, is a part of the electromagnetic spectrum that the human eye can see. Usually, humans can only detect wavelengths between 380 to 700 nanometers. In physics, colour is visible light with a specific wavelength. Human eyes see the differences in wavelength and energy as differences in colour. Different colours have different wavelengths and energy. Objects appear as different colours because they absorb some wavelengths, then reflect or transmit other colours. When a certain substance reflects more wavelengths, then more heat energy will be reflected more, making it cooler and melt slower.

WAVELENGTHS OF COLOUR USED (APPROX.)

Red: 665 nm
Orange: 630 nm
Yellow: 600 nm
Dark green: 530 nm
Light green: 510 nm
Dark blue: 470 nm
Light Blue: 450 nm
Purple: 400 nm

Black and white are not considered colours in physics, as they do not have specific wavelengths, and are results of our eyes mixing wavelengths of light together. This makes it interesting to explore whether that will affect the melting speed of ice.



The Whole Spectrum of Wavelengths of Light
https://www.lumitex.com/blog/visible-light-spectrum?hs_amp=true

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WHY IS THIS A FAIR TEST?

To ensure a fair test, there must be one variable that is changed (independent variable), one that is measured (dependent variable), and all the other variables kept the same (controlled variable). This would allow this experiment to determine the effect of the independent variable on the dependent variable. The controlled variables are useful to determine if the independent variable caused of the changes on the dependent variables. This experiment was also repeated twice to increase the accuracy and reliability of the practical.

The independent variable was the colour of the ice cube, while the dependent variable was the time taken for the ice cubes to melt. The type of water used for the ice cubes and freezing temperature was kept the same as the controlled variable to clearly show that the different melting speed was due to the change in the darkness if the ice cubes. All variables are shown in table 1. To maintain the credibility of this experiment, potential biases (systematic & random errors) were avoided.

CHIOCE OF METHOD:

This laboratory experiment gave a tighter control of the variables, is easily repeatable, and makes it easier to examine the cause of independent variable on the dependent variable.

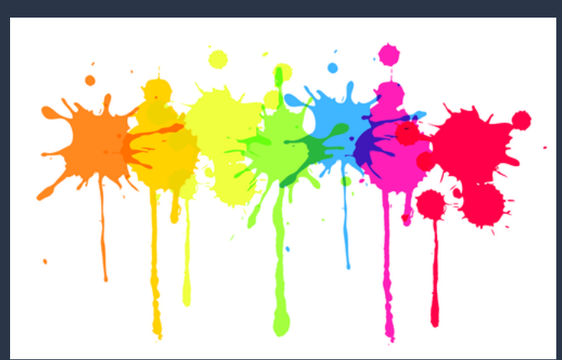

Table 1: Variables

Independent Variable	Wavelength of ice cube
Dependent Variable	Time taken for ice cubes to melt
Controlled Variables	Type of water
	Temperature of water
	Freezing temperature
	Freezing time and length

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PLANNING AND PREDICTING

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METHOD

1. Twelve plastic cups were filled with tap water up to 20mL.
2. Two teaspoons of acrylic paint of each different colour (red, orange, yellow, light green, dark green, dark blue, light blue, purple, pink, black, and white) were added to each cup.
3. The twelfth cup was left transparent.
4. The mixtures were stirred thoroughly.
5. The coloured water was poured into the ice mold, making two ice cubes of each colour.
6. The ice molds were put into the freezer for 1 day.
7. The ice cubes were taken out of the freezer.
8. A phone was set up on a stand to record the ice cubes melting.
9. Three heat lamps were set up next to the ice tray.
10. The stopwatch was used to time the time it takes for the ice cubes to melt.
11. The time it took for the ice cubes to melt was recorded.
12. The experiment was repeated with the same colours and water, into a different ice mold tray.

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EQUIPMENT AND MATERIALS

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EQUPMENT & MATERIALS

Materials:

- *Tap water x480 mL*
- *Ice mold tray x2*
- *Plastic cup x24*
- *Freezer*
- *Acrylic paint x11 colours*
- *Heat lamp x3*
- *Stand x1*
- *Teaspoon*
- *Stopwatch*
- *Phone/Camera x1*

POSSIBLE RISKS

Table 2: Possible and Ways to Control Risks

Risks	Ways to control these risks
Bacteria may be alive in the ice cubes due to cold temperature.	Wash hands thoroughly before and after experiment.
Holding ice for too long may cause ice burns and damage skin tissue.	Avoid contacting the ice for too long.
Water spilling may cause tripping hazard.	Ensure spilled water are cleaned immediately.

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RESULTS

Table 3: Ice cubes melting speed results

	Trial 1		Trial 2	
Colour	**Melting Speed (Minutes)**	**Order**	**Melting Speed (Minutes)**	**Order**
Red	58.33	3	40.87	8
Orange	61.17	6	35.97	7
Yellow	59	4	32.5	5
Light green	64.33	7	33.78	6
Dark green	59.33	5	30.58	3
Light blue	70.63	8	25.48	1
Dark blue	76.62	10	49.28	11
Purple	57.78	2	46.32	9
Pink	86.45	12	27.23	2
White	84.3	11	48.15	10
Black	71.48	9	50.12	12
Transparent	44	1	31.1	4

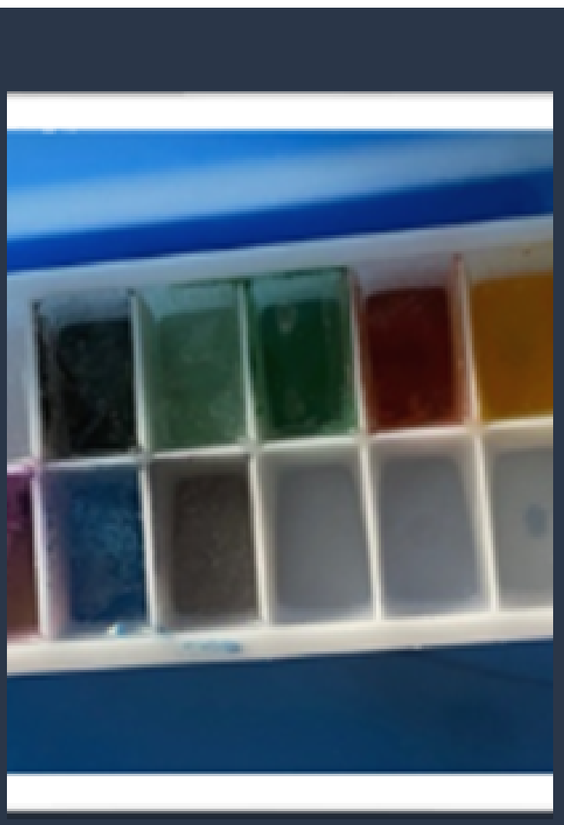

Table 4: Ice cubes melting speed average

Colour	Average Melting Speed (minutes)	Order
Red	49.6	7
Orange	48.57	5
Yellow	45.75	3
Light green	49.06	6
Dark green	44.96	2
Light blue	48.06	4
Dark blue	62.95	11
Purple	51.55	8
Pink	56.84	9
White	66.23	12
Black	60.8	10
Transparent	37.55	1

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PROCESSING AND ANALYSING DATA AND INFORMATION

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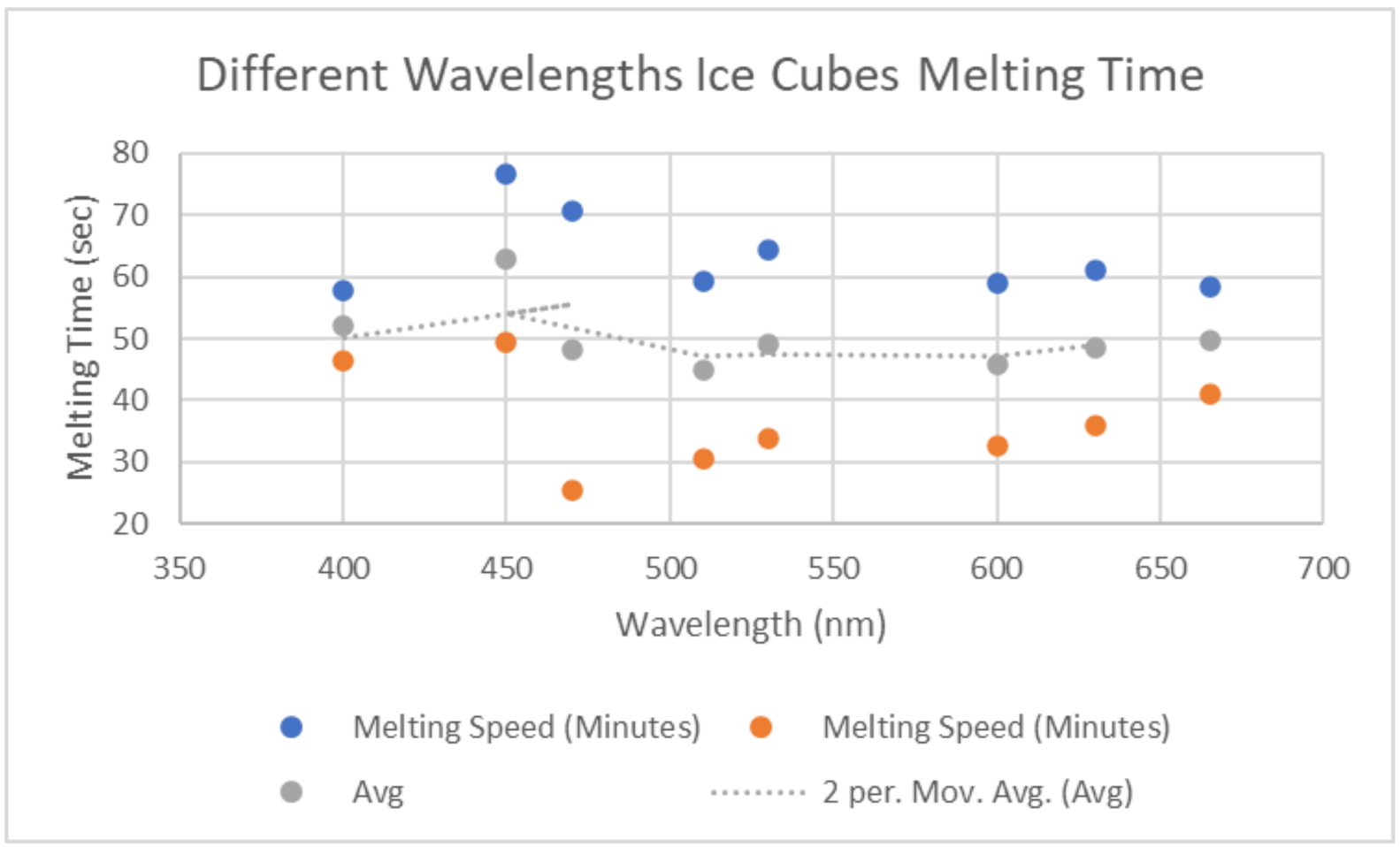
GRAPHS

Graph 1: Melting Speed of Coloured Ice Cubes (order from darkest colour to lightest colour, from left to right)



Note: Pink, black, white, and transparent were tested as controls, as they do not have a specific wavelength.

DISCUSSION

The data from both trials had many fluctuations, especially near the ice cubes with wavelengths of 450 to 530 nanometres. The data from trial 1 had a relatively flat trend, with most ice cubes taking around 60 seconds to melt. The plots for trial two was more fluctuated than trial one. Both trials peaked at 450 nanometres, for the wavelength of light blue. With both trials, the melting time dropped after 450 nanometres, then the plots became more similar level with each other, but still noticeably different. 400 nanometres had the quickest melting time in trial 1, while 470 nanometres were the quickest in trial 2. Comparing the trial 1 and 2 results with the transparent ice cube, it melted relatively quickly, as it did not have a long wavelength.

Overall, comparing the results from trial 1 and trial 2, the precision of the data was fairly high. Both trials had similar patterns and trends, with trial 1's ice cubes taking distinctly longer time than trial 2's. However, the difference between the trial 1 and trial 2 results stayed similar across the graph, showing the precision of the results. The results with 400 nanometres were the most precise, as there was minimal difference between the two trials. The data with 470 nanometres had the least valid results, as there was a big difference between the two trials.

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DISCUSSION (CONTINUED)

The trend of graph 1 was a moving average that peaks at 450 nanometres for the wavelength of light blue, which took 62.95 seconds to melt, the maximum time taken to melt. Light blue was the peak in both trials, increasing the precision of the light blue results. The lowest point was 510 nanometres for the wavelength of light green. It took 44.96 seconds to melt, the minimum time taken to melt. Other than the peak, all other data were relatively similar, generally taking around 50 seconds to melt.

COLORS	WAVELENGTH (nm)
RED	~ 652 - 740
ORANGE	~ 590 - 625
YELLOW	~ 565 - 590
GREEN	~ 520 - 565
BLUE	~ 445 - 520
INDIGO	~ 425 - 445
VIOLET	~ 380 - 425

Wavelength of difference colours
https://homework.study.com/explanation/list-the-order-of-colors-in-the-color-spectrum.html

Graph 1 had many fluctuations, but the trendline was still slightly tilting down, showing a negative relation between the wavelength and the melting time. The trend is a plateau with a slight decrease, melting time from 52.05 to 49.6 seconds for wavelengths from 400 to 665 nanometers. This showed how as the wavelength increased, the melting time generally decreased. This result supported the hypothesis that if the ice cube's wavelength is longer, more heat will be absorbed, making the ice cube melt slower, as the ice cubes generally melted slower when the wavelength was longer.

Comparing the melting speed of coloured ice cubes with transparent ice cubes, the transparent ice cubes melted the quickest on average. This could be because transparent ice cubes do not reflect heat and instead absorb them, making the ice cube melt quicker.

Graph 1 showed that, generally, as the wavelength increased, the melting time decreased. However, the trendline was only very slightly tilted, and the difference between the melting time for the highest wavelength and the lowest wavelength was small. This showed that the different wavelengths of different colours did not have a big effect on the melting speed of the ice cubes, and there could be other factor affecting the acceleration of the ice cubes melting. The acrylic paint probably did not have much effect on the water used for the ice cubes, which caused the trendline to stay relatively flat on the graph.

Overall, the wavelength of the colours did affect the melting rate. From this experiment, the theory that when a substance reflects more wavelengths, it will reflect more heat too, making the ice cube melt slower was supported. However, there are certain wavelengths that could make the ice cubes melt quicker than others, that do not necessarily reflect less wavelengths, around 450 nanometres, as shown from graph 1, on average.

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EVALUATION

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IMPROVEMENTS

A main improvement for this experiment was to repeat it at least 3 times. The results varied significantly between trial 1 and trial 2, which highlighted the importance of doing a third trial, to increase the accuracy and precision of this experiment.

Another was to use a thermometer to measure how the temperature changes with the different coloured ice cubes during their melting stage. This could give more insight into how the temperature differs with ice cubes with different wavelengths. Using thermometers could also ensure that the ice cubes were the same temperature before going into the freezer, which will increase the reliability and credibility of this test.

POTENTIAL ERRORS

Table 4: Systematic Errors

Systematic Error	Effect on Results	Improvements
Paint despositing at the bottom of the tray	Most of the paint substancess settled at the bottom of the tray after a while. This was shown at the end, when the melted icecubes only had a tinge of colour and most of the pigments were at the bottom	Use a beater to mix the pigments into the water. The saturation point of the paint can also be found to fully dissolve the paint pigments.
Heat lamp not positioned at the same angle.	The three heat lamps were positioned around the tray of ice cubes. However, some were slightly closer to the lamps compared to others. This would have affected the time taken for the ice cubes to melt.	Position the heat lamps around the ice cube tray so each has an equal amount of light and heat.

Table 5: Random Errors

Random error	Effect on results	Improvements
Slight colour inconsistencies. The purple and the light green were made by mixing some of the paints together.	This might have affected reliability as the paint made would vary from store-bought paint.	Use colours from the same brand.
Human error – The time taken for the ice cubes to melt relied on eyesight.	This affects the accuracy of the experiment as this means the times taken were not extremely precise.	Place the phone closer or on top of the tray to provide better view.

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EVALUATION

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FURTHER INVESTIGATION

Further investigations on this subject and topic of ice's melting rate, would be to try to test how different kinds of water affect the melting speed. When the acrylic paint was added to the water, the properties of the water stayed mostly the same. By using different kinds of water such as saltwater, sugar water, or distilled water, the molecules in the water would be different, most likely somehow disrupted, having a more significant impact on the melting rate of ice cubes made from these water. By observing these trends, new information can be gathered and used to determine the change of melting speed of ice cubes depending on the water used.

Salt and Sugar on a table along with cup of water and a spoon
Https://flexbooks.ck12.org/cbook/ck-12-middle-school-physical-science-flexbook-2.0/section/7.5/primary/lesson/solubility-ms-ps/

CONCLUSION

The aim of this experiment was to find out how different wavelengths could affect the melting rate of ice cubes. The hypothesis that if the wavelength of the ice cube is longer, then the ice cube will melt slower was supported. It was proved by the results, that as the wavelength increased, the melting speed decreased. However, the colours did not have a lot of effect on the melting speed, as the trend of the result were only slightly titled, so many improvements could be made to increase the validity and accuracy of this experiment.

ACKNOWLEDGEMENTS

Ms Salvi (our teacher) helped us understand the theories behind our graph more thoroughly and the Seymour lab assistants guided and helped us when we conducted the experiment.

WORD COUNT

1908 words (headings, titles, tables, figure captions, references, and log book not included)

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BIBLIOGRAPHY

BY KYRA HUANG AND BENITA WU

Auglis, M. A. (2020) Racing molecules: Hot and Cold Water fun, Spectrum News Kentucky. Available at: https://spectrumnews1.com/ky/louisville/weather/2020/06/03/the-difference-between-hot-and-cold-air (Accessed: June 20, 2023).

Artists Network (2016) 2 ways to thin acrylic paint, Artists Network. Available at: https://www.artistsnetwork.com/art-mediums/acrylic/how-to-thin-acrylic-paint-painting-with-acrylics-for-beginners/ (Accessed: June 20, 2023).

Baes, F. (no date) hps.org, Health Physics Society. Available at: https://hps.org/publicinformation/ate/q12178.html (Accessed: June 20, 2023).

Changing state—melting (no date) Middleschoolchemistry.com. Available at: https://www.middleschoolchemistry.com/lessonplans/chapter2/lesson5 (Accessed: June 20, 2023).

Colours of light (no date) Science Learning Hub. Available at: https://www.sciencelearn.org.nz/resources/47-colours-of-light (Accessed: June 30, 2023).

Critical thinking activity: The water cycle (no date) Noaa.gov. Available at: https://gml.noaa.gov/education/info_activities/pdfs/CTA_the_water_cycle.pdf (Accessed: June 20, 2023).

Grainger Engineering Office of Marketing and Communications (no date) Melting colored ice, Illinois.edu. Available at: https://van.physics.illinois.edu/ask/listing/1659 (Accessed: June 20, 2023).

How long will it take for my ice cubes to freeze? Answers to all your ice-making questions (no date) Newair. Available at: https://www.newair.com/blogs/learn/how-long-for-ice-cubes-to-freeze (Accessed: June 20, 2023).

Kittmer, L. (2018) What colors absorb more heat?, Sciencing. Leaf Group. Available at: https://sciencing.com/colors-absorb-heat-8456008.html (Accessed: June 30, 2023).

No title (no date) Study.com. Available at: https://homework.study.com/explanation/do-colored-ice-cubes-melt-faster-than-ice-cubes-with-no-added-colorings-explain-your-answer.html (Accessed: June 20, 2023).

Rainbow ice cubes (no date) Tablespoon.com. Available at: https://www.tablespoon.com/recipes/rainbow-ice-cubes/5d120876-9db2-4236-b52a-cb9e9747987d (Accessed: June 20, 2023).

Relationship between color, wavelength, and energy (no date) Webb. Available at: https://webbtelescope.org/contents/media/images/01F8GF6NH5PTXGBVNVHR2TSQRB (Accessed: June 30, 2023).

(No date) Amazon.com. Available at: https://alexaanswers.amazon.com/question/2YClZ22ILl9VTX33Dhjr91#:~:text=A%201%2Dinch%20ice%20cube,melt%20at%20the%20same%20temperature (Accessed: June 20, 2023).

(No date) Chemed.org. Available at: https://www.chemed.org/wp-content/uploads/Color-Clouds.pdf (Accessed: June 20, 2023).

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SCIENTIFIC INQUIRY

LOG

BOOK

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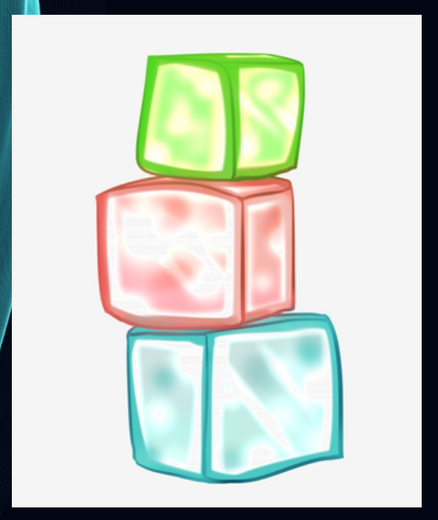

Ideas Brainstorm

Shadows

- How does the rotation of the earth (time of the day) affect the length of a shadow?
  - Sunset/sunrise
  - Noon

Does double glazing affect the temperature inside a space?

- materials that affect temperature
- One layer
- Two layers

Water and Ice

Do the properties of water affect how long it takes an ice cube to melt?

- Kind (type of water)
  - Salt water
  - Sugar water
  - Alkaline water
  - Tap water
- colour
  - Red
  - Green
  - Normal
- In water/out of water
- Shape
  - pyramid
  - Star
  - cube

Does the type of water accelerate the growth of a bean?

- Tap water
- spring water

Plants

OSA RISK ASSESSMENT FORM

for all entries in (✓) ☐ Models & Inventions and ☑ Scientific Inquiry

This must be included with your report, log book or entry. One form per entry.

STUDENT(S) NAME: Kyra Huang , Benita Wu ID: 0597-011

SCHOOL: Seymour College

Activity: Give a brief outline of what you are planning to do.

We are trying to determine how will the properties of water affect the melting speed of ice cubes. We are going make ice cubes with salt water, green (dyed) water, and plain tap water. The time it takes for the ice cubes will be collected and compared.

Are there possible risks? Consider the following:

- Chemical risks: Are you using chemicals? If so, check with your teacher that any chemicals to be used are on the approved list for schools. Check the safety requirements for their use, such as eye protection and eyewash facilities, availability of running water, use of gloves, a well-ventilated area or fume cupboard.
- Thermal risks: Are you heating things? Could you be burnt?
- Biological risks: Are you working with micro-organisms such as mould and bacteria?
- Sharps risks: Are you cutting things, and is there a risk of injury from sharp objects?
- Electrical risks: Are you using mains (240 volt) electricity? How will you make sure that this is safe? Could you use a battery instead?
- Radiation risks: Does your entry use potentially harmful radiation such as UV or lasers?
- Other hazards.

Also, if you are using other people as subjects in an investigation you must get them to sign a note consenting to be part of your experiment.

Risks	How I will control/manage the risk
Bacteria may be in the ice cubes.	Wash hands thoroughly before and after experiment
Holding ice for too long may cause ice burn and damage skin tissue	Avoid making contact with ice cubes for a long time.

(Attach another sheet if needed.)

Risk Assessment indicates that this activity can be safely carried out

RISK ASSESSMENT COMPLETED BY (student name(s)): Kyra Huang, Benita Wu

SIGNATURE(S): Kyra Benita

☑ By ticking this box, I/we state that my/our project adheres to the listed criteria for this Category.

TEACHER'S NAME: Mrs. Swati Salvi

SIGNATURE: DATE: 25/5/23

OSA RISK ASSESSMENT FORM

for all entries in (✓) ☐ Models & Inventions and ☑ Scientific Inquiry

This must be included with your report, log book or entry. One form per entry.

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- Radiation risks: Does your entry use potentially harmful radiation such as UV or lasers?
- Other hazards.

Also, if you are using other people as subjects in an investigation you must get them to sign a note consenting to be part of your experiment.

Risks	How I will control/manage the risk
When ice cubes made/ melt, water spilling causing tripping hazard.	Make sure spilled water gets cleaned immediately.

(Attach another sheet if needed.)

Risk Assessment indicates that this activity can be safely carried out

RISK ASSESSMENT COMPLETED BY (student name(s)): Kyra Huang, Benita Wu

SIGNATURE(S): Kyra Benita

☑ By ticking this box, I/we state that my/our project adheres to the listed criteria for this Category.

TEACHER'S NAME: Mrs Swati Salvi

SIGNATURE: Swati DATE: 25/5/23

cubes melting

(How wavelengths affect the acceleration of ice^

Finalised Inquiry Question: How does the colour of the water affect the melting speed of ice cubes?

CHANGED - wavelengths of colours - how they affect

Brainstorm

* Dyed (different colours) ice cubes compare with plain, transparent.
* Different colours absorbs heat differently => room for analysis.
  ↳ amount of heat absorbed indicating time possibly taken for ice cube to melt.

Research

* Water H_2O (2 Hydrogen, 1 Oxygen)
* Water exist as 3 states => water, ice, water vapour
  ↳ (liquid, solid, gas respectively
* Water turning into ice => heat energy lost
  ↳ less movements within particles
  ↳ lack of movement => bond forming between molecules
  ↳ stronger bond => less able to move around freely
  ↳ physical change => particles (properties) stay same
  ↳ particles bond together to solidify.
  ↳ not as pure water => molecules harder to form bonds
* Adding dye into water
  ↳ random movement of dye and water particles causes them to bump into each other and mix
  ↳ Hot water => food colour diffuses through water quickly due to high particle movement & heat.
  ↳ cold water => cold water molecules move slowly, tightly packed together => harder for food colouring to bounce around and move fast to fill up.
  ↳ coloured water => dye molecules spread out around water molecules.

Dye => low pigment level => less effect on water

↓

Acrylic paint => higher pigment concentration

Research

* paint made of pigment, solvent, binder
  - ↳ pigment provide colour
  - ↳ solvent make sure paint applyable to the surface
  - ↳ binder holds all ingredient together
* paint + water
  - ↳ particles same idea / concept with food dye adding to water
  - ↳ water breaks down binder in paint

9th June => trial

- red, orange, yellow, green, blue and purple, black, white, transparent
  - ↳ colours mixed together when carrying to freezer
    - ↳ diluted

Improvements -

- mix water and paint at the Art room before walking up
- use hard and fixed-shape ice cube mold so water doesn't spill
- add exact amounts of paint: water ratio

13th June => Made ice cubes tray!

* red, orange, yellow, (light green, dark green, blue, purple (~~[redacted]~~)

Observations -

- pigments did not completely dissolve - when melting, pigments floated to the bottom
  - ↳ might have affected results
- bits of pigment floated to the top

Materials Used (per experiment)

Materials	Quantity	
Tap water	240 mL	- solvent / water
Ice mold tray	1	- for the icecube
Plastic cup	12 (one / colour)	- for the water & paint to be mixed in
Freezer	1	
Acrylic paint	11 different colours	
Heat lamp	3	
Stand	4 - 3 for lamps, 1 for phone	- to hold up lamps / phone
Teaspoon	1	- to measure
Stopwatch	1	- to time
Phone/camera	1	- to video

Hypothesis partly supported - the melting speed slightly decreased with the higher nanometer of wavelength

Wavelengths of colours -
Red: 620-750nm
Orange: 590-620nm
Yellow: 570-590nm
Green: 495-570nm
Blue: 450-495nm
Violet: 380-450nm

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Black and white do not have specific wavelengths because they aren't considered colours and are results of our eyes mixing different wavelengths of light together.
Pink is created as an illusion by our brains where in reality, it is made by red and purple mixed together

RESULTS:

	Trial 1		Trial 2	
Colour	Melting Speed (min)	Order	Melting Speed (min)	Order
Red	58.33	3	40.87	8
Orange	61.17	6	35.97	7
Yellow	59	4	32.5	5
Light Green	64.33	7	33.78	6
Dark Green	59.33	5	30.58	3
Light Blue	70.63	8	25.48	1
Dark Blue	76.62	10	49.28	11
Purple	57.78	2	46.32	9
Pink	86.45	12	27.23	2
White	84.3	11	48.15	10
Black	71.48	9	50.12	12
Transparent	44	1	31.1	4