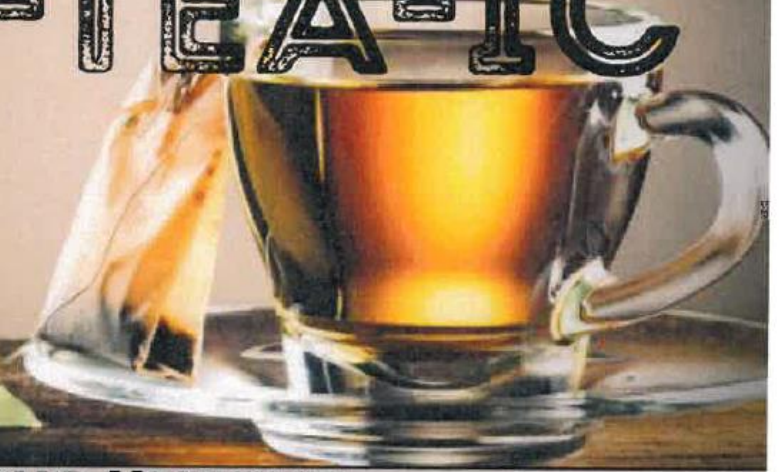
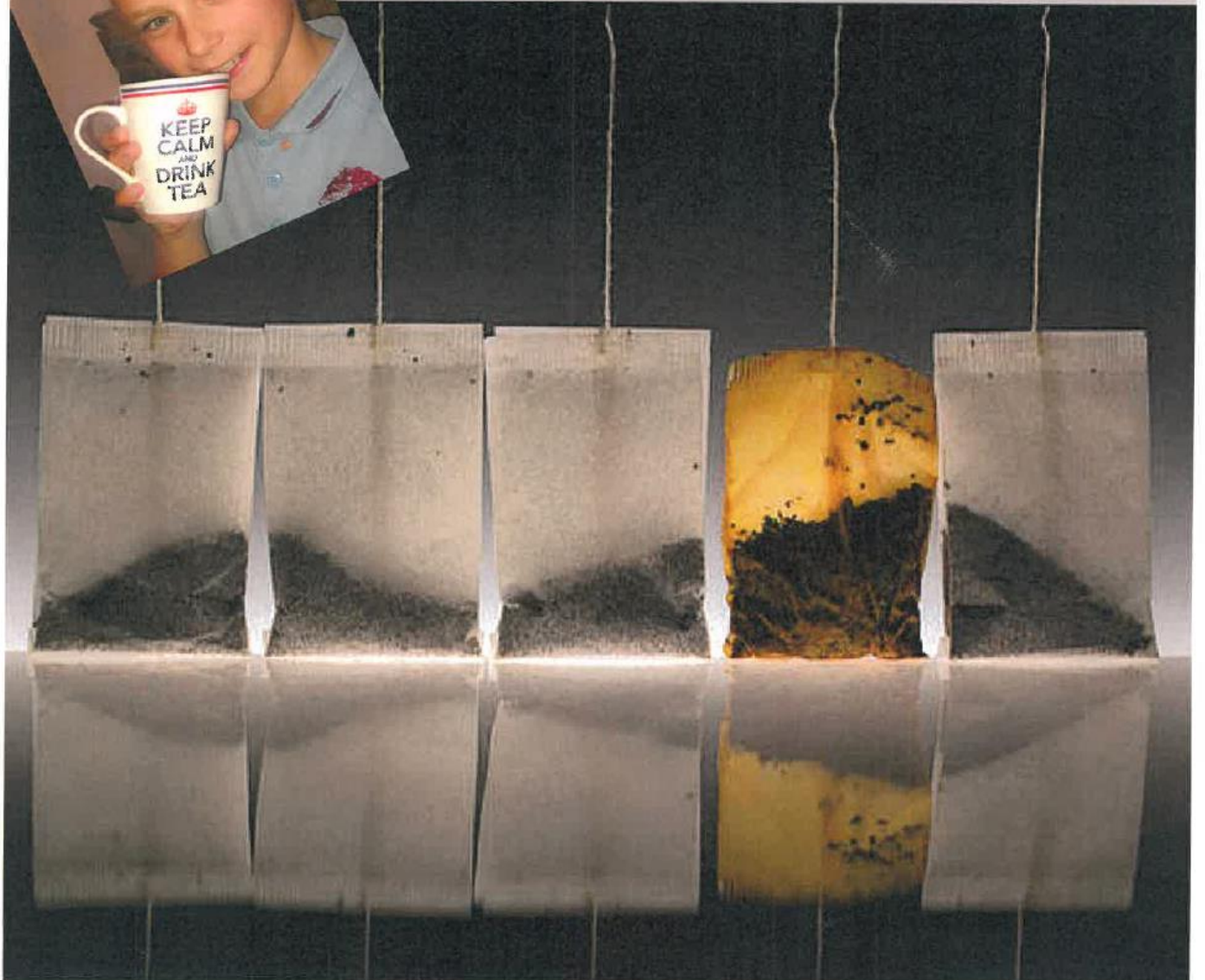


# PLAS-TEA-IC



BY ANGUS KNIGHT



## **Scientific Question:**

Are There Different Amounts of Plastic in Tea Bags?

## **Abstract:**

The reason I chose to do this experiment was because when my Mum told me that she had seen an article on the microplastics being released from teabags. I want to see if this was true. I was trying to find out how much plastic was in the tea bags to see how bad it is for you and how much you could possibly drink in a day. What I did to figure it out is I boiled tea bags and baked tea bags to see if I could see any plastic. The results of the experiment were that the pyramid melted into plastic in 17 secs when placed in the oven. The other teabags were in the oven for 21 mins and still didn't catch on fire because I believe there is only a minimal amount of the plastic in them. In my other experiment where I boiled teabags on mass, I found an oily residue on the top of the water and also found what looked like plastic stuck to the side of the pot. My solution to this is to use tea leaves in a tea strainer with a tea pot and drink tea that way and it tastes fresher.

## **Background Research**

While most of us take a hot cuppa for granted, some people believe tea bags are not so hot for our health and the environment.

A new study has found that a single plastic tea bag can shed billions of particles of microplastics – significantly higher than the estimated amount of microplastics particles consumed by a person in an entire year.

The new study, conducted by researchers at McGill University in Montreal, found a single plastic-based tea bag releases approximately, 11.6 billion microplastic particles and 3.1 billion nanoplastics (even smaller particles) into your mug.

## **Hypothesis:**

I think that the Nerada Tea Bags will have the most plastic as they admit to using plastic.

## **Materials**

- Tea Bags.
- Oven Tray.
- Toaster Oven.
- Baking Paper/Foil.
- Coffee Filter
- Saucepan
- Water

## **Method:**

**Experiment 1 – Boil 100 teabags to see if there is any evidence of microplastics in the water.**

1. Buy 6 different boxes of 100 teabags
2. Place the 100 teabags in the saucepan and cover with cold water.
3. Bring to the boil for 10 minutes. Let the tea mixture sit until it's cooled right down.
4. When the mixture has cooled down strain the liquid through a coffee filter to catch any micro plastics there may be.
5. Carefully dry the filter paper to see if you can spot any of the plastic fibres.

**Variables:**

**Control variables:**

- Amount of teabags
- Temperature of the water.
- Time in the water
- Same size pot

**Independent Variable:**

- The type of teabag used

**Dependent Variable:**

- The amount of plastic observed in the water and on the filter

**Experiment 2 – Place one of the different types of teabags in the over to see if they melt.**

1. Cut open the teabags and remove the tea.

2. Line an oven tray with foil.
3. Write the names of the teabags on the foil and place the teabag next to its name.
4. Preheat the oven to 180°C
5. Place the tray into the oven
6. Observe what happens to the teabags.

**Variables:**

- Temperature of the oven
- Amount of time in the oven

**Independent Variable:**

- **The type of teabag used**

**Dependent Variable:**

- Observe the teabag materials after it has been heated at a high temperature

**Results:**

**Boiling Test Results**

**Boil 1**  
Pyramid  
Teabags



- plastic sitting on the top of the water in the pot.
- plastic set on the sides of the pot.
- steadily filtered through, took about 5 mins.

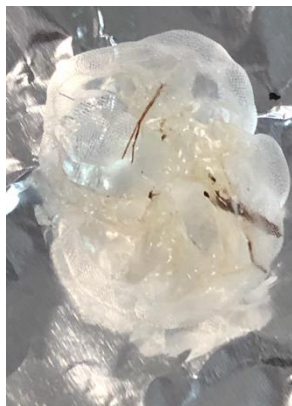
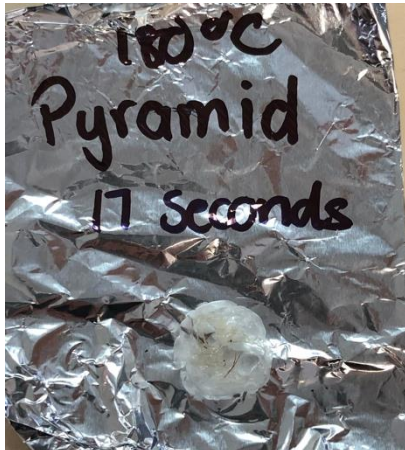
**Boil 2**  
Coles  
Teabags



- Didn't really notice plastic on top.
- It didn't filter as easy as the pyramid tea.



## Experiment 2:



I am baking 4 tea bags:

### Bake 1.

2:14 the pyramid melted into a ball of plastic

### Bake 2

Coles, bushells & Nerada 3min 15 secs started to smell plastic burning. 180 degrees. Leaving in oven for 10 minutes.

### Bake 3

Pyramid only 17 seconds til melting point

### Bake 4

Coles, bushells & Nerada on highest temp (250 degrees) at 3mins 12 secs they smelled like burning plastic.

5 min 40 starting to burn

6min 33 secs moving closer to heat rods

20mins55 secs they are still not burned so I removed them from oven.

Paper bake:

It takes 4:00 to go brown.

## **Conclusion:**

My aim was to discover the amount of plastic used in teabags. My hypothesis was that Nerada tea bags would have more plastic in them than others as they admit on their website that they use plastic in their bags. However, because I didn't have access to the correct scientific equipment to test the amount of plastic I could test for the actual amount. My experiment changed because of this to just seeing if I could prove that there was plastic in tea bags in general. I did this by boiling a full pot of 100 pyramid teabags which showed melted plastic sitting on the top of the liquid and after it had cooled completely the plastic set on the side of the pot. When I boiled a different brand of tea bag, the tea would not filter through the filter, it was clogged up. The tea bags when I completed the baking part of experiment would not burn. The pyramid tea bag took 17 seconds to melt to a ball of plastic. However, the other brands "paper" tea bags took 21 minutes and 17 seconds before they went black but would not burn or crumble like paper does. Based on my experiment I can see there are Microplastics in our teabags. While I couldn't discover exactly how much I could see that there was plastic present. From my experiment I would recommend that people use the paper tea bags when making a cup of tea or even better would be to use a tea strainer instead.

## **Acknowledgements:**

### **Thanks To.....**

Mr Holloway (my teacher) for the space time and toaster oven.

Mum for buying all the tea bags and making yourself look like a tea-aholic.

## References:

For admitting that they use plastic in their tea bags.

<https://www.neradatea.com.au/products/what-are-our-tea-bags-made-from> -

For the background research.

<https://www.smh.com.au/lifestyle/health-and-wellness/do-you-take-your-tea-with-plastic-20160926-gromoq.html>

<https://metro.co.uk/2019/09/27/tea-bags-plastic-10817296/> -

Article on the Micro plastics in tea

<https://www.discovermagazine.com/health/plastic-tea-bags-release-billions-of-microplastics-into-every-cup>





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## SCIENCE AND ENGINEERING INVESTIGATION AWARDS RISK ASSESSMENT

This form is required for all Science and Engineering Investigation Awards Projects. **This form should be completed before you start your investigation.**

<b>Student's Name/s:</b>	<b>Angus Knight</b>
<b>Year Level:</b>	<b>5</b>
<b>Teacher/Mentor:</b>	<b>Mr. Craig Holloway</b>
<b>Title of Project:</b>	<b>Plas-Tea-Ic</b>

You will need to answer Questions 1 and 4 for all investigations. You will only need to answer Questions 2 and 3 if you are using hazardous materials, equipment or potentially hazardous biological agents.

You must include a copy of this form with your investigation report.

### Investigation risks

a. List the risks involved in your investigation. <ul style="list-style-type: none"><li>• Hot water</li><li>• oven tray</li><li>• pots and pans</li></ul>
b. Describe the safety precautions and procedures that you will use to reduce these risks. <ul style="list-style-type: none"><li>• Oven mitts</li><li>• adult supervision</li></ul>





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**Specific hazards (if applicable)**

a. List all hazardous chemicals, activities, and/or equipment that you will use.

b. List any potentially hazardous biological agents that you will use.

c. Describe the safety precautions and procedures that you will use to reduce the risks associated with hazardous chemicals, activities, equipment, and/or any potentially hazardous biological agents as listed above.

**Disposal of hazardous materials (if applicable)**

Describe the disposal procedures of any hazardous chemicals or potentially hazardous biological agents that you will use.



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## References

List the source(s) of safety information you used, including websites, books or laboratory safety guidelines.

Neruda tea website.

- ✓ I/We have talked with my/our teacher/mentor about the **risks** associated with this investigation and how I/we will manage these.
- ✓ I/We have discussed with my/our teacher/mentor about any **specific hazards** associated with this investigation and how I/we will manage these, including the safe disposal of any hazardous materials.

Signed:

Date 25/9/20