



EFFECT OF TEMPERATURE,
PEROXIDASE LEVEL, AND RANCIDITY
ON USED OIL AFTER HEATING AND
FROM FAST FOOD SHOPS



INTRODUCTION

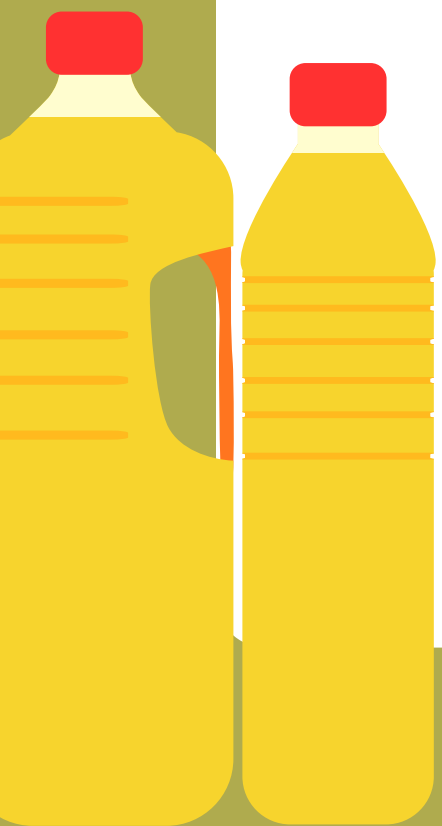
Edible oils are an essential part of our daily diet, used for cooking, frying, and flavouring food. However, oils are not stable forever – when exposed to air, light, and heat, they undergo a chemical change called rancidity. Rancid oils lose their pleasant taste and smell, and more importantly, they may form harmful compounds that can affect human health. One of the main factors that influences how quickly oils turn rancid is the temperature at which they are stored.





Understanding the effect of storage temperature on oil rancidity is important both at home and in the food industry. If oil is stored in warm places like near stoves or in direct sunlight, it may spoil quickly, while oil kept in cooler, dark conditions remains fresh for a longer time.

This project aims to study how different storage temperatures affect the rate of rancidity in edible oils, using both chemical tests and sensory observations.



STATEMENT OF PROBLEM

Cooking oils often spoil faster in warm kitchens or when exposed to heat and sunlight. People may unknowingly consume rancid oil, which is harmful to health. This project addresses the question: “Does storing edible oil at higher temperatures increase the rate of rancidity compared to storing it at lower temperatures?”



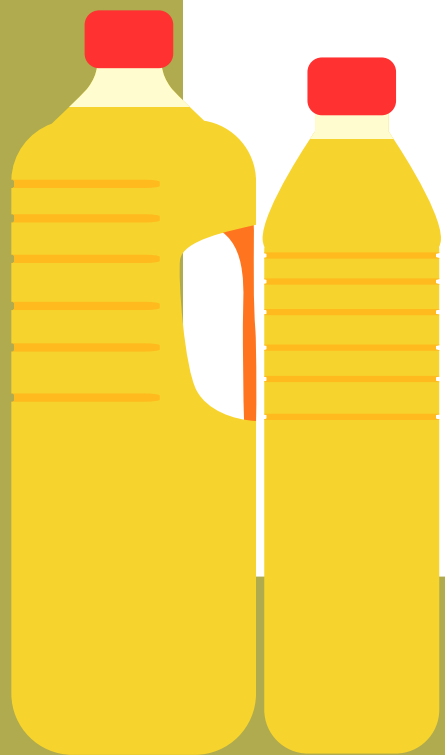
HYPOTHESIS

Do Oil stored at higher temperatures will show a faster increase in rancidity (higher peroxide value and stronger rancid smell) compared to oil stored at cooler temperatures?



MATERIALS

- Fresh cooking oil (control sample)
- Used oil sample (after heating / collected from fast food shop)
- Test tubes and droppers
- Water bath
- Test reagents for peroxide value determination
- Indicator: starch solution
- Spectrophotometer or colorimeter (optional)
- Thermometer



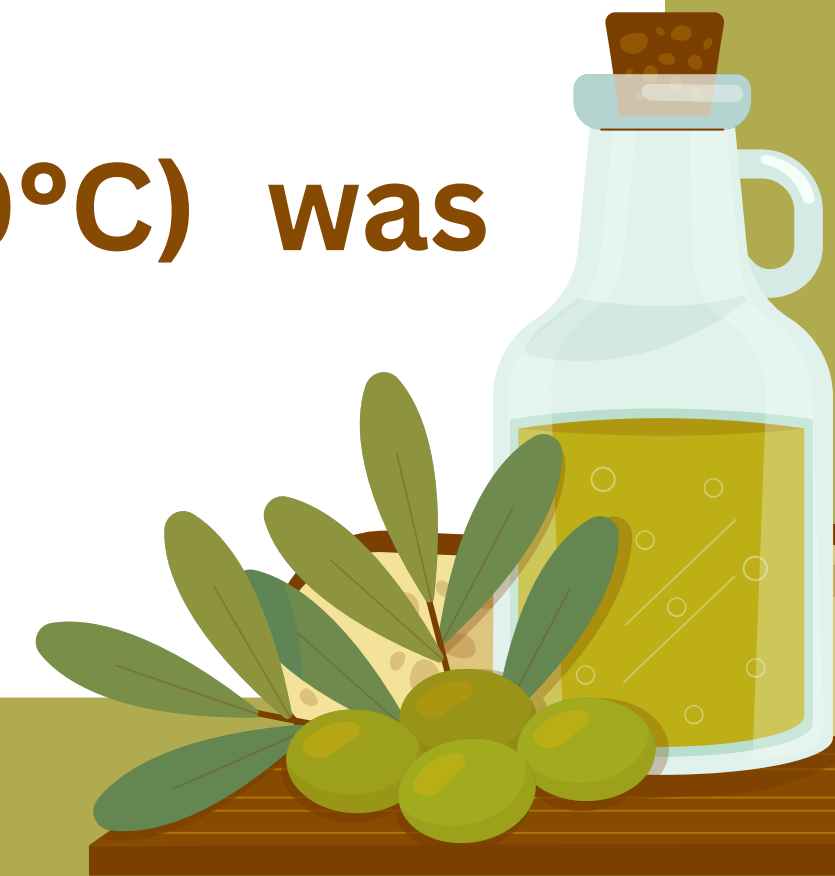
PROCEDURE

- **Sample Collection:**

Two oil samples were collected – one fresh and one used (after repeated frying).

- **Temperature Observation:**

The frying temperature (around 160–200°C) was recorded.





- **Peroxidase Test:**

Each oil sample (5 ml) was mixed with hydrogen peroxide and guaiacol, then heated in a water bath at 60°C for 10 minutes. Fresh oil showed a brown color (active enzyme), while used oil showed little or no color (enzyme destroyed).





- **Peroxide Value Determination:**

About 5 g of oil was mixed with acetic acid and chloroform, followed by KI solution. After 5 minutes in the dark, the mixture was titrated with sodium thiosulphate using starch as an indicator to find the peroxide value.



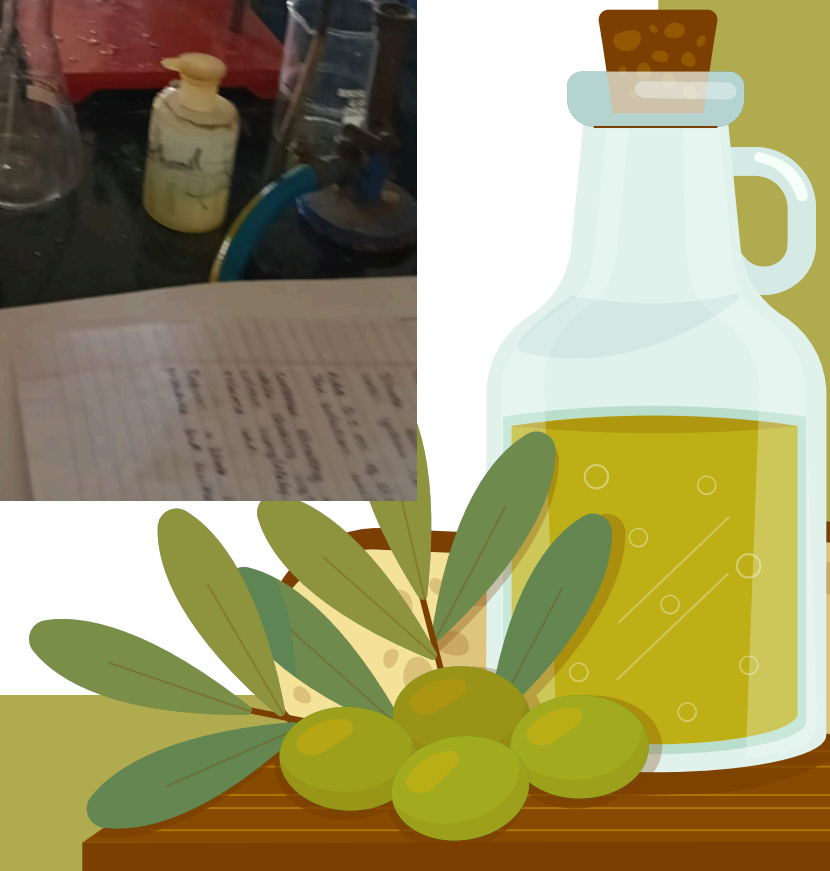


- **Rancidity Observation:**

Physical changes such as color, smell, and foaming were noted. Additional rancidity tests (acid value or blue color reduction) were done if required.



PHOTOS



PHOTOS



OBSERVATIONS & INFERENCES

PARAMETER	EFFECT OF HEATING / REUSE	HEALTH / QUALITY IMPACT
TEMPERATURE	Breaks down fatty acids, increases viscosity, darkens oil	Loss of nutrients, formation of toxins
PEROXIDASE LEVEL / PEROXIDE VALUE	Increases initially, then decreases with prolonged heating	Indicator of oxidation; high PV = poor quality
RANCIDITY	Rapidly increases with reuse	Bad odor/taste, harmful compounds



RESULT

- Heating at high temperature destroys peroxidase enzyme.
- Peroxide value increases with repeated use, indicating oxidation.
- Used oil shows signs of rancidity – dark color, foul smell, and sticky texture.



CONCLUSION

The study clearly shows that repeated heating of edible oils, especially in fast food shops, causes loss of peroxidase enzyme activity, increase in peroxide value, and development of rancidity. These changes indicate oxidation and chemical degradation of the oil. Used and reheated oils become dark, viscous, and foulsmelling, showing poor quality and the presence of harmful oxidation products such as aldehydes and free fatty acids. Therefore, reused cooking oil is unsafe for consumption, as it can pose serious health risks and lower the nutritional quality of food



FUTURE ENHANCEMENT

This study can be further extended by testing different types of edible oils and using advanced analytical methods to detect oxidation and toxic compounds formed during heating. Future research can focus on developing antioxidant-rich oils with better heat stability and promoting public awareness about safe oil usage. The findings can also help frame guidelines and regulations to control the reuse of cooking oils in commercial food outlets, ensuring better food quality and health safety



ACKNOWLEDGEMENT

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BIBLIOGRAPHY

**Food Safety and Standards Authority of India (FSSAI) –
Guidelines on Reuse of Cooking Oils.**

**AOCS Official Method Cd 8-53: Peroxide Value of Oils
and Fats.**

**“Rancidity in Oils and Fats” – Journal of Food Science
and Technology.**

**School Chemistry Laboratory Manual – Titration
Methods.**

Everyday Science Textbook, Class IX (NCERT

