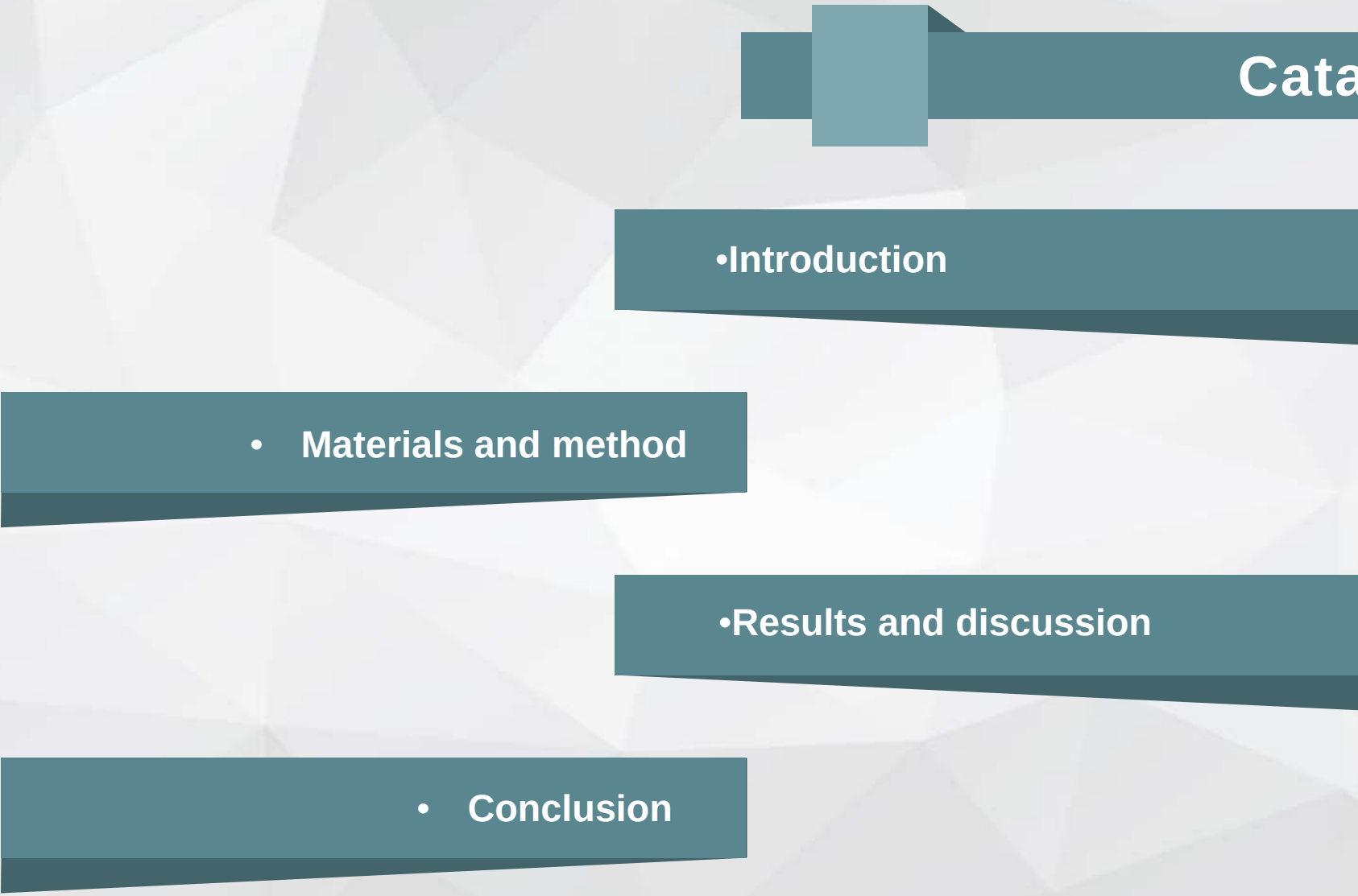


Determination of the components of peanut oil, soybean oil, corn oil heating products and simply cooking products by GC-MS

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Catalogue

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•Results and discussion

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Introduction · Background

Huge Amount

The amount of waste cooking oil in China can be no less than 1,000,000t/year. And the amount is increasing, according to The Government Gazette in Shanghai as example.

Harm

- Air pollution and eutrophication
- Do harm to health if taken back to meals or fed to animals

1

Introduction · Aims



This experiment is part of the whole research, which will followed with quantitative experiments, experiments of heating time and estimation of oxidation degree according to *Food Chemistry*.

2

Materials

Fatty acid	Peanut oil	Soybean oil	Corn oil
C14:0	-	0.07	-
C15:0	18.06	23.59	50.67
C15:1	-	0.03	0.11
C18:0	5.92	9.55	4.92
C18:1	52.4	23.68	29.53
C18:2	22.33	43.46	12.57
C18:3	-	0.53	-
C20:0	1.27	0.54	0.93
C20:1	-	0.07	0.17

Come-from: Peanut, soybean and corn oils were obtained from a local Carrefour supermarket in Shanghai, China, while the Chinese cabbage was bought in another market.

Dosage:

Oil:15ml for each sample

Chinese cabbage: 30g for each sample

Samples:

Cooking samples

Heating samples: To imitate the quick cooking situation of waterless food

2

Method

- 15ml of the oils were added in 100ml beakers.
- Heated the samples to 80% the smoke points of oils
- 30g of the Chinese cabbage were put into the beakers and started timing until the temperature reached the selected value

To get the samples

The process above were repeated to get the heating samples just without the cabbage

2

Method

To
prepare
the samples
for GC-MS

Add 4mL isooctane to dissolve the sample

Add 0.2ml of potassium hydroxide and methanol solution

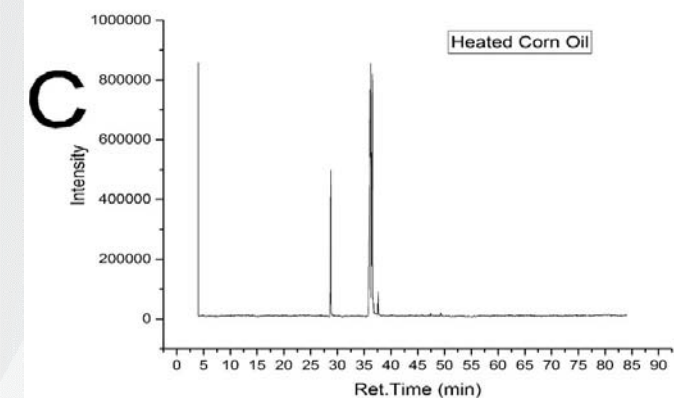
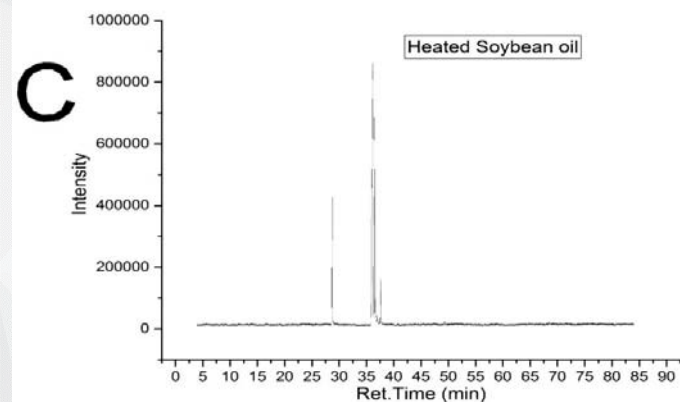
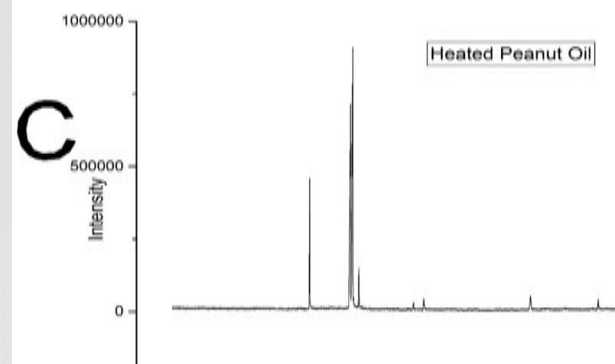
Shake it vigorously and settle it until it is clear

Add about 1g sodium bisulfate, shake it vigorously

move the upper solution to the machine bottle to be measured

The reason to choose this method: the free fatty acid won't be changed in this way, which makes it easier to get the difference between heating and cooking reaction.

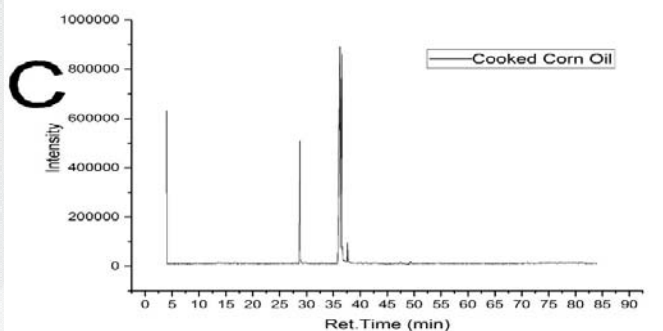
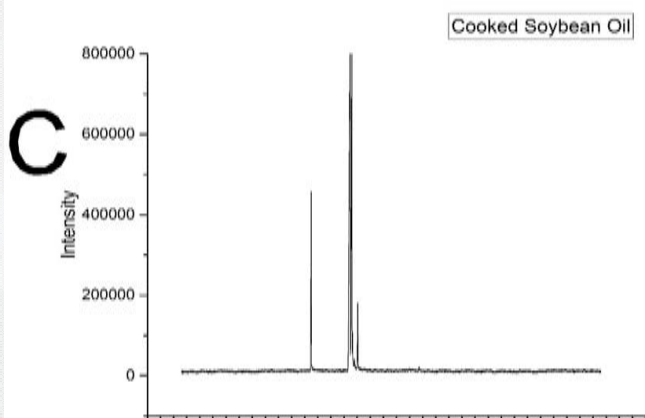
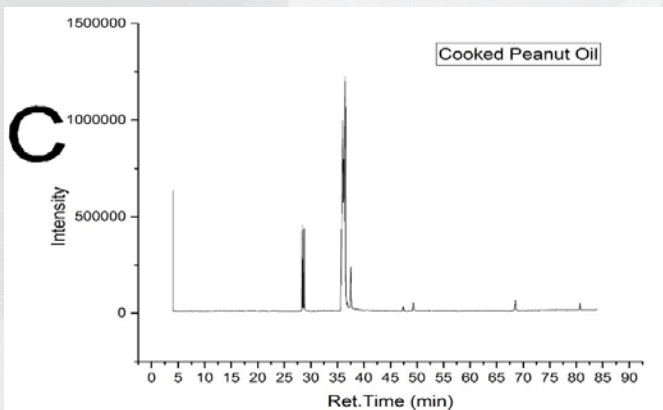
3 Results and discussion



Fatty acid	Peanut oil	Soybean oil	Corn oil
C15:0	24.79	22.24	45.05
C18:0	8.17	9.68	7.6
C18:1	36.36	22.88	19.01
C18:2	30.67	45.2	26.83

After heating, the content of oleic triglyceride and trilinolein in first two kinds of oil is close and over 60%, while in heated corn oil reached 45%, which is representative in all heated samples. Considering the proportion of oleic acid and linoleic acid is uncertain, trilinolein can be chosen as model for its higher content.

3 Results and discussion



Fatty acid	Peanut oil	Soybean oil	Corn oil
C14:0	-	-	-
C15:0	16.38	22.53	39.93
C15:1	-	-	0.1
C18:0	13.48	9.64	6.8
C18:1	23.97	22.47	42.55
C18:2	44.64	45.35	8.32
C18:3	-	-	0.11
C20:0	1.53	-	1.29
C20:1	-	-	0.21

After cooking, the content of oleic triglyceride and trilinolein in first two kinds of oil is close and over 65%, while in heated corn oil reached 50%, which is representative in all cooked samples. And the content of oleic triglyceride is over 20% in all samples, it can be a better model compounds.

a

Comparing the two kinds of samples, a big decline in fifteen alkyl triglyceride content of oleic acid, while linoleic acid triglyceride triglyceride content and is still relatively stable, further illustrate the mixture of triglycerides and oleic acid linoleic acid triglyceride is a right model compound.

Fast cooking can not fundamentally change the composition of raw oil; water content is high, the ingredients of cooking products and raw materials are more close, which can indicate that the difference between the oxidation reaction rate and the activation energy of the different components in the grease is larger.

b

4

Conclusion

Raw oil

Fast cooking can not fundamentally change the composition of raw oil

The effect of
moisture content

When water content is high, the ingredients of cooking products and raw materials are more close

Model
compounds

The mixture of oleic triglyceride and trilinolein can be suitable model compounds; while the proportion of oleic acid and linoleic acid is uncertain, oleic triglyceride can be a suitable model compounds for its content can meet 20% in all samples



THANK YOU