Fat experiments

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The Determination of the Acid Value of a Fat

Aim:

To determine:

- The age of the fat.
- The quality of the fat.

The factors that change the fat :

- the atmospheric oxygen that react with the double bound to form peroxide.
- The microorganisms that hydrolyze the fat with libration of free fatty acids and glycerol.

The result of this change:

The fat and oil become rancid (bad or sour)

Hint :

The more free fatty acids the more the acidity and age of the oil

can you suggest methods to determine the age of a given oil?

Important to Remember:

The amount of free fatty acids present gives an indication of the age and quality of the fat.

The usual method:

Titration with a base.

the most common base is KOH.

The result of the titration is the acid value.

The acid value:

the number of milligrams of KOH required to neutralize the free fatty acid present in 1 g of fat.

The procedure:

1-Weigh about 5 ml of fat in a flask.

2-Add 25 ml of fat solvent to the flask.

3-Add 1 ml of phenolphthaleine solution, mix well.

4-Titrate with 0.01N KOH. End point is when the faint pink color persist for 30 seconds.

5-Note the volume (V) for KOH required. Calculate the acid value

Calculation:

- Molecular weight of KOH is 56
- 1 liter N KOH contains 56 g.
- 1 ml of N KOH contains 56 mg.
- 1 ml of 0.01N KOH contanis 0.56 mg
- Acid value = (V X 0.56) / weight of fat used

The Iodine Number of a Fat

Introduction:

Double bonds in unsaturated fatty acid are capable to be broken down and bind halogens (iodine, bromine and chloride).

The number of grams of iodine absorbed by 100 g of fat, called the "iodine number"

The aim:

is a measure of the degree of unsaturation.

The methods:

1) The Wijs method, which uses iodine chloride (ICL).

2) The Hanus method, which uses iodine bromide (IBr).

N.B.:

The Hanus reagent is more stable .

the Wijs method gives results 2 to 5 percent higher and the iodine numbers are closer to the theoretical values.

The principle:

$I_2 + Br_2 \longrightarrow 2\ IBr$ (Iodine Bromide)

Fat + Excess IBr $\longrightarrow$ Halogenated Fat + unreacted Ibr

$KI + IBr \longrightarrow I_2 + KBr$

$I_2 + 2\ Na_2S_2O_3 \longrightarrow 2\ NaI + Na_2S_4O_6$

Procedure:

Each student will analyse two fat samples dissolved in chloroform. Note the concentration of each sample.

1-Pipette 10 ml of each fat sample provided in separate flasks. Label each flask.

2-Add exactly 25 ml of Hanus iodine solution from a burette to each flask.

3-Set up a blank (separate flask) by adding 10 ml of chloroform to 25 ml of Hanus iodine solution. Only one blank flask is enough for all the students.

4-Close the flasks with glass stoppers, mix well by swiriling and allow to stand at room temperature for 30 mins. In a dark cabinet with occasional swirling.

5-Add 10 ml of 15% potassium iodide solution to each flask and mix.

Procedure:

6-Add about 50 ml of water, washing down any iodine solution that may be found on the wall of the flask and the stopper.

7-Titrate the iodine with 0.1N sodium thiosulphate from 50 ml burette until the color of the solution is pale yellow.

8-Add 2 ml of 1% starch solution as indicator. The solution in the flask turns blue.

9-Continue the titration until the blue color disappears, mixing well during the final stages of titration.

10-To ensure complete removal of the iodine, stopper the flask and shake vigorously. If the blue color returns, continue the titration.

11-Record the volume used for your sample and blank.

Calculations:

Iodine Number $= \frac{(b-a) \times 0.01269 \times 100}{\text{Weight of fat in g}}$

- Where b is the volume of titer (sodium thiosulphate) with the blank.
- And a is the volume of titer (sodium thiosulphate) with the sample.

Atomic mass of iodine =126.90447


obrigado
Dank U
Merci
mahalo
Köszi
спасибо
Grazie
Thank you
mauruuru
Takk
Gracias
Dziękuję
Děkuju
danke
Kiitos