Determination of Peroxide Value (PV) of lipid

Requirements

1. Lipid (cooking oil can be used)
2. Acetic acid
3. Chloroform
4. Potassium iodide
5. Sodium thiosulfate
6. Starch

Rancidity is brought about by the action of air (oxidative rancidity) or by microorganism (ketonic rancidity) in oil. In the oxidative rancidity oxygen is taken up by the fat with the formation of peroxide. The degree of peroxide formation and the time taken for the development of rancidity differ among oil.

PV is an important quality control tool and measures the amount of hydroperoxides that are formed in the oil during lipid oxidation. Lipid oxidation occurs adjacent to double bound in unsaturated lipids, creating hydroperoxides. These peroxides, however, are very reactive and may actually decrease during the storage of the lipid (or food containing lipids). Therefore, a very high or very low PV provides little information about the quality of the lipid unless the storage history of the sample is known or if the samples are tested periodically over time (i.e. Once a week for 6 months). The peroxide value is determined by measuring the amount of iodine liberated from a saturated solution of potassium iodide solution by a lipid dissolved in a solution of acetic acid and chloroform.

- Weight a known amount of lipid into an Erlenmeyer flask (5 g, record exact amount). Conduct in duplicate.
- In the hood, dissolve the lipid in 30 mLs of a solution of acetic acid and chloroform (3 parts acetic acid and 2 parts chloroform, this will be pre-prepared for you).
- Mix to dissolve lipid, add 0.5 mL of saturated KI (potassium iodide), and return to the lab for the titration. Allow mixture to stand for 1 minute, and mix occasionally.
- Add 30 mL of water to the solution and gently mix.
- Slowly titrate the liberated iodine with a standard solution of sodium thiosulfate (commercial stock solution will be provided) while stirring until the pale yellow color is nearly gone.
- When the pale yellow color begins to disappear, add 0.5 mL of starch solution (1%) to help free any residual iodine from solution. This will turn the water a blue color. Titrate (slowly) until the blue color is gone.
- Record volume of sodium thiosulfate.

$$\%PV = \frac{S \times N \times 1000}{\text{Weight of lipid}}$$

Where, S = mL of sodium thiosulfate and N = normality of the sodium thiosulfate.

Note: A bank should also be set at the same time.