VISCOSITY OF FISH MEAT SOL

LIM P. Y.

INTRODUCTION

Viscosity is the measure of fluid friction. It may be considered as the internal friction resulting when a layer of fluid is made to move in relationship to another layer. A highly viscous material is one possessing a great deal of internal friction — it will not pour or spread as easily as a material of lesser viscosity.

This procedure can be used as a rapid method to assess the gel forming ability of the fish meat, fish mince, leached meat and surimi etc. Generally, fish flesh with meal sol of a minimum viscosity between 300-400 centipoises can be used to process good quality fish jelly products (e.g. fishballs or fishcakes).

Practically all fluids will become less viscous as their temperature increases, and thicker as they cool. The relationship between viscosity and temperature is exponential in nature; that is, a small temperature change can cause a large viscosity change. The temperature of the material **MUST** be stated along with its viscosity. Not to do so nullifies the meaning of the resulting viscosity value.

The relationship between viscosity and meat concentration is in the form of a power curve. As such, it is important that the meat concentration be constant for comparative studies.

There is a maximum speed at which layers of fluid can move with laminar flow; that is, with no transfer of matter between the layers. Turbulence results beyond this maximum speed, and to maintain this turbulent flow, a larger energy input is necessary. This is reflected by an apparently higher internal friction, and the indicated viscosity will be higher than it should be. The Tokyo Keiki Rotary Viscometer functions at a constant speed of 20 rpm.

I SAMPLING AND SAMPLE PREPARATION

Take a representative sample minimum of 70 g from the product. Place the sample in polyethylene bag and store in refrigerator or in ice so as to maintain sample integrity, in preparation for analysis.

Comminute the sample with a chopper or mechanical mincer until homogeneous and place the homogenate in a polyethylene bag. Store the sample in the refrigerator or in ice until required. Ensure that the prepared sample is still homogeneous prior to weighing.

II APPARATUS

Bottom-drive homogeniser (Nihon Seiki SN-03) or equivalent Rotary Viscometer Type C, CVR-20B, Tokyo Keiki, with 2 spindles (one with a factor of 5 for less viscous fluids and the other with a factor of 20 for viscous fluids)

Beaker, 1000 ml
Chopper or mechanical mincer
Spatula

III REAGENTS

a) Sodium chloride, extra pure.

b) Di-potassium hydrogen orthophosphate (KH_2PO_4), cryst. extra pure.

c) Potassium dihydrogen orthophosphate (KH_2PO_4), cryst. extra pure.

d) Extraction solution: Dissolve 189 g NaCl, 33.5 g K_2HPO_4 and 8.74 g KH_2PO_4 in 1000 ml distilled water. Transfer the solution in reagent bottle and store in refrigerator.

IV PROCEDURES

1. Weigh ca 70 g meat sample into the cylinder of SN type homogeniser.
2. Add 500 g chilled distilled water (ca 10°C) in the cylinder of homogeniser.
3. Completely remove the air bubble in the meat sample with slow speed of homogeniser.
4. Add 100 ml extraction solution and homogenise for 3 mins with speed dial at 3-4.
5. Transfer the meat sol to 1 litre beaker and keep in ice water (below 5°C) for 20 mins.
6. Measure viscosity of the sol with Type C viscometer with the guard, mesh and selected spindle (temperature of the meat sol should be about 7-10°C).
7. Read the viscometer when the pointer stabilised and note the temperature of the meat sol.

V CALCULATION

Multiply the viscometer reading by 5 if the large spindle is used or by 20 if the smaller spindle is used and express the viscosity of the meat sol in centipoises.