DETERMINATION OF MONOSODIUM L-GLUTAMATE (MSG) CONTENT IN FISH JELLY PRODUCTS

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INTRODUCTION

Monosodium L-glutamate is usually used as a taste enhancer in the production of fish jelly products.

The presence of MSG present in fish jelly products can be determined by enzymatic reaction. In the presence of the enzyme, glutamate dehydrogenase (GIDH), the L-glutamic acid present is deaminated oxidatively by nicotinamide-adenine dinucleotide (NAD^+) to α-ketoglutarate (see reaction 1). In the reaction catalyzed by diaphorase, the NADH formed converts iodonitro tetrazolium chloride (INT) to a formazan which is measured in the visible range at 492 nm (see reaction 2).

(1) L-Glutamate + NAD^+ + H_2O $\xrightarrow{\text{GIDH}}$ α-ketoglutarate + NADH + NH_4^+

(2) NADH + INT + H^+ $\xrightarrow{\text{diaphorase,}}$ NAD^+ + formazan

The equilibrium of reaction (1) lies far on the side of glutamate. By trapping the NADH formed with INT (2), the equilibrium is displaced in favour of α-ketoglutarate.

I SAMPLE PREPARATION

Collect fish jelly products sample (≤ 100 g) and pass 2-3 times through food mincer, or chop very finely and mix thoroughly.

II REAGENTS

a) Preparation of standard L-glutamic acid solution

1. Dissolve 100 mg L-glutamic acid with 25 ml distilled water.
2. Adjust to pH 7.0 with 2N KOH.
3. Make up to 100 ml with distilled water.
4. Pipette 10 ml solution into a volumetric flask.
5. Make up to 250 ml with distilled water.

This is the standard solution which contains 40 mg L-glutamic acid/litre.

b) Dilution of standard L-glutamic acid (40 mg/litre)

0.2 ml of the above solution was pipetted into 1.8 ml of distilled water. This contains 8.0 ug L-glutamic acid.

c) 1 M perchloric acid, $HClO_4$

Dissolve 143.51 g perchloric acid in 1 litre distilled water.

d) 2N KOH

Dissolve 11.2 g KOH in distilled water and make up to 100 ml in a volumetric flask.

e) Treated sand

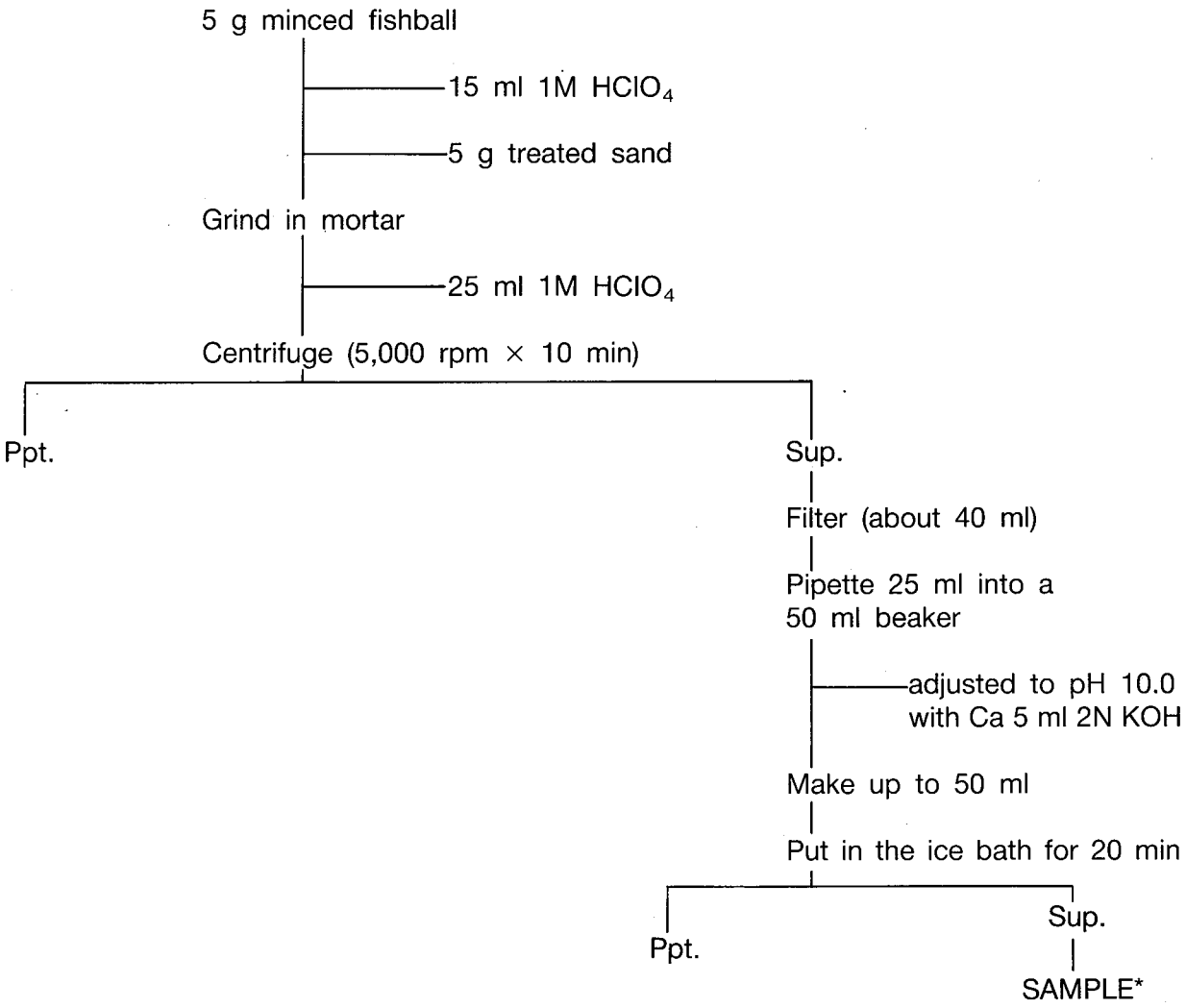
f) Enzyme solution (1 set contains 4 enzyme solutions named solution 1, 2, 3 and 4)

N.B. This enzyme solution can be purchased from:

Food Analysis
Boehringer
Mannheim GmbH
Manneheim, WEST GERMANY

III PROCEDURE

A. PREPARATION OF L-GLUTAMIC ACID SAMPLE SOLUTION



* Supernatant sample is to be diluted if too concentrated.

B. PREPARATION OF SUPERNATANT SAMPLE IN ENZYME SOLUTION

Pippette the enzyme soln and sample soln into test-tubes according to the following table (duplicate) and mix. Add soln 4 and mix again. Stand for 30 min at 25°C water bath. Read the optical densities of the soln at 492 nm.

	Blank (ml)	Standard (ml)	Sample (ml)
Enzyme Soln. 1	0.60	0.60	0.60
Enzyme Soln. 2	0.20	0.20	0.20
Enzyme Soln. 3	0.20	0.20	0.20
Distilled Water	2.00	—	—
Std. Soln.	—	2.00	—
Sample Soln.	—	—	2.00
Soln. 4	0.03	0.03	0.03

IV CALCULATION

To calculate the L-glutamic acid in fishball

$$O.D._{sample} = O.D._{sample} - O.D._{blank}$$

$$\text{L-glutamic acid (mg/100 g)} = \frac{O.D._{sample}}{O.D._{standard}} \times 8 \times 10^{-3} \times D \times \frac{50}{2} \times \frac{[40 + 5M]}{25} \times \frac{100}{W}$$

where $O.D._{sample}$ = optical density of sample

where $O.D._{standard}$ = optical density of standard

8×10^{-3} = standard solution used in mg L-glutamic acid

M = moisture of sample

D = Dilution ratio

W = Wt. of sample (5 g)

$\frac{50}{2}$ = $\frac{\text{Make-up volume}}{\text{Sample of volume of reaction}}$

[40 + 5 m] = Volume of perchloric acid solution used.

REFERENCE

Colormetric method for the determination of L-glutamic acid in foodstuffs. Cat. No. 139092. Available from Boehringer Mannheim, GMBH. West Germany.