DETERMINATION OF SUGAR (SUCROSE) BY SOMOGYI'S METHOD

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INTRODUCTION

Sugar is widely used in the manufacturing of food as taste and flavour enhancer. It is also capable of inhibiting, retarding or arresting the process of fermentation, acidification or any other decomposition of food. Thus sugar is also used as a preservative.

The sugar extracted from the sample is converted into glucose with diluted HCl. The glucose content is determined by Somogyi's method. The content of sugar is then back calculated from glucose content. The recovery of sugar was found to be 91% and the reproducibility was satisfactory.

I   PREPARATION OF SAMPLE

Take a representative sample of the product, pass it through the mincer, transfer into a labelled polyethylene bag and keep it chill.

II REAGENTS

a)   Somogyi solution A

Anhydrous Na_2CO_3 25 g

———— KNa – tartarate.$4H_2O$ 25 g

———— 500 ml H_2O

$CuSO_45H_2O$ 7.5 g

———— 200 ml H_2O

———— add drop by drop while stirring

———— $NaHCO_3$ 20 g

———— KI   5 g

———— KIO_3 (1M = 6N)   0.892 g

Make up to 1 litre with distilled H_2O.

b)   Somogyi solution B

KI   25g

———— $K_2C_2O_4.H_2O$ (potassium oxalate)   28 g

Make up to 1 litre with distilled H_2O.

c) 0.1N HCl

Dilute 10 ml 1N HCl in 100 ml volumetric flask.

d) 0.1N NaOH

Weigh 1 g NaOH, dissolve in distilled water and make up to 250 ml volumetric flask.

e) 2N H_2SO_4

Conc. H_2SO_4 60 ml dilute to 1 litre.

f) Starch indicator

Weigh 1 g soluble starch and 0.1 g salicylic acid, dissolve both in 99 ml distilled water. Boil to dissolve the starch.

g) Dried KIO_3

Weigh about 2 g of KIO_3, dried in the oven at 120°C for 1 hr.

h) 2.5% KI

Weigh 2.5 g KI, dissolve in 97.5 ml of distilled water.

i) 0.05N $Na_2S_2O_3$ solution

Sodium thiosulphate $Na_2S_2O_3.5H_2O$, 13 g.

$$\left|\rule{0pt}{20pt}\right.\!\!\!\!\!\!\!\!-\!\!\!\!\!-\!\!\!\!\!-\!\!\!\!\!-\text{Na}_2\text{CO}_3 \quad 0.2\text{ g}$$

Make up to 1 litre with decarbonated H_2O

j) 0.005N $Na_2S_2O_3$

Dilute 100 ml of 0.05N $Na_2S_2O_3$ to 1 litre.

DETERMINATION OF FACTOR (F) OF 0.05N $Na_2S_2O_3$
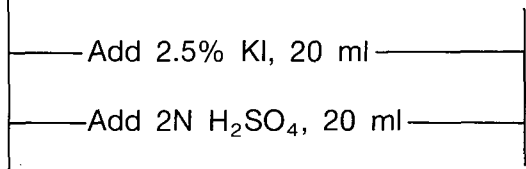
Weigh about 1.5 g dried KIO_3 accurately
|
Make up to 500 ml with H_2O in volumetric flask
|
Pipette 10 solution   Blank
| Pipette H_2O, 10 ml
|
|———Add 2.5% KI, 20 ml ———————————|
|
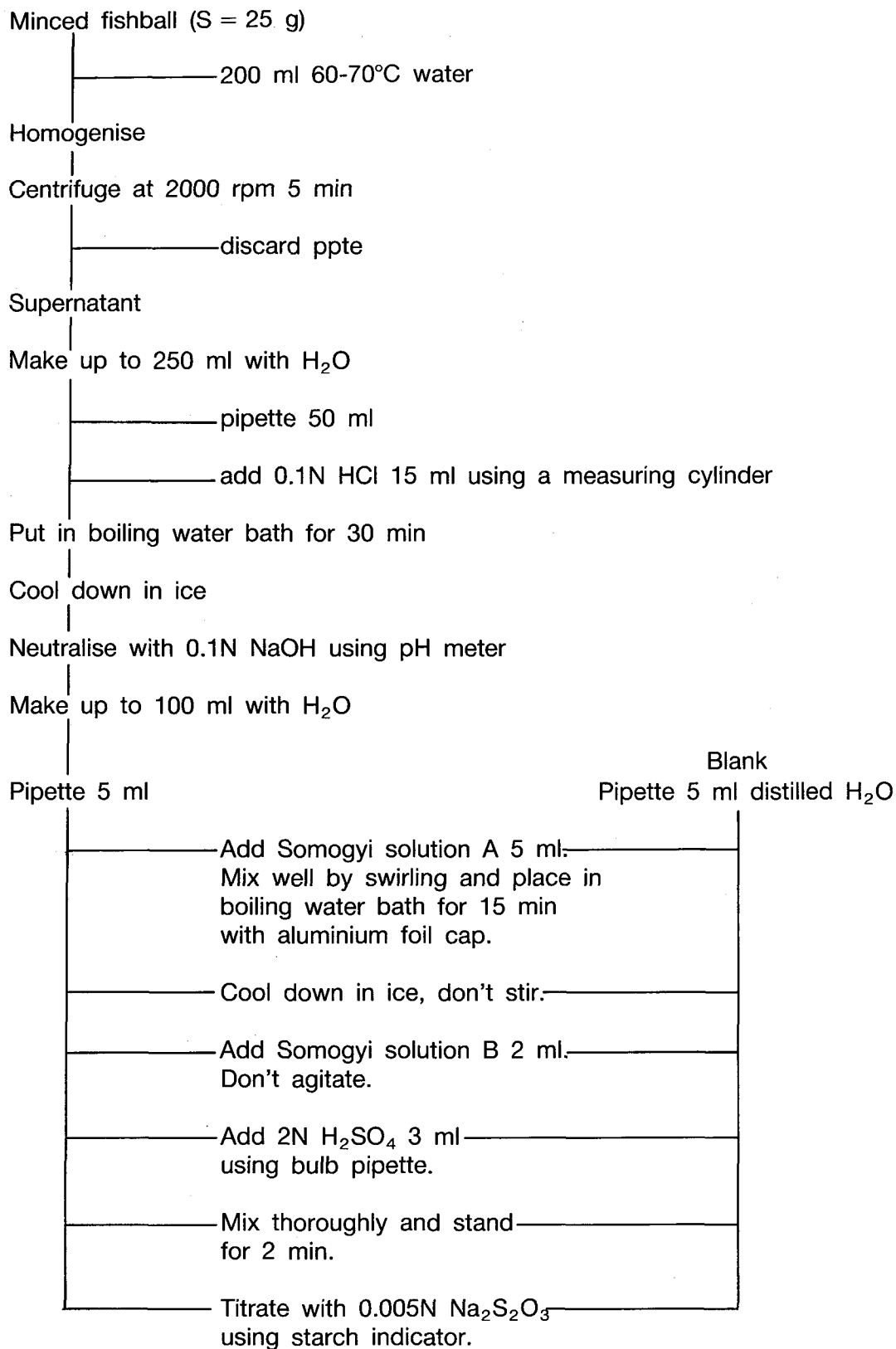|———Add 2N H_2SO_4, 20 ml ———————|
|
Titrate with 0.05N $Na_2S_2O_3$ with starch indicator

$$\text{Factor, F} = \text{wt. of KIO}_3 \times \frac{10}{500} \times \frac{1}{0.0017835} \times \frac{1}{(B - A)}$$

0.0017835: conversion factor of 1 ml 0.05N $Na_2S_2O_3$ to KIO_3 (g)

A: titration volume of KIO_3 solution (ml)

B: titration volume of blank (ml)

III PROCEDURE

Minced fishball (S = 25 g)

├──────────200 ml 60-70°C water

Homogenise

Centrifuge at 2000 rpm 5 min

├──────────discard ppte

Supernatant

Make up to 250 ml with H_2O

├──────────pipette 50 ml

├──────────add 0.1N HCl 15 ml using a measuring cylinder

Put in boiling water bath for 30 min

Cool down in ice

Neutralise with 0.1N NaOH using pH meter

Make up to 100 ml with H_2O

Pipette 5 ml   Blank
                                          Pipette 5 ml distilled H_2O

├──────────Add Somogyi solution A 5 ml.──────────┤
           Mix well by swirling and place in
           boiling water bath for 15 min
           with aluminium foil cap.

├──────────Cool down in ice, don't stir.──────────┤

├──────────Add Somogyi solution B 2 ml.──────────┤
           Don't agitate.

├──────────Add 2N H_2SO_4 3 ml──────────┤
           using bulb pipette.

├──────────Mix thoroughly and stand──────────┤
           for 2 min.

└──────────Titrate with 0.005N $Na_2S_2O_3$──────────┘
           using starch indicator.

IV CALCULATION

$$\text{Sucrose (\%)} = 0.0001449 \ (B - A) \ F \times \frac{100}{5} \times \frac{250}{50} \times 0.95 \times \frac{1}{S} \times 100$$

$$= 13.7655 \ (B - A) \ F \times \frac{1}{S}$$

where 0.0001449 : 1 ml 0.005N $Na_2S_2O_3$ = 0.0001449 g glucose

A : Sample titration volume (ml)

B : Blank titration volume (ml)

F : Correction factor of $Na_2S_2O_3$

S : Sample weight

0.95 : Conversion factor of glucose to sucrose

REFERENCES

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         515, 31.052, 31.053