THE USE OF GAMMA RAY TO UTILIZE SOME DAIRY INDUSTRY WASTES

BY

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B.Sc. Agric. Sci. (Food Sci. & Tech.), Ain Shams University, 1984

M. Sc. Agric. Sci. (Dairy Sci. & Tech.), Ain Shams University, 1992

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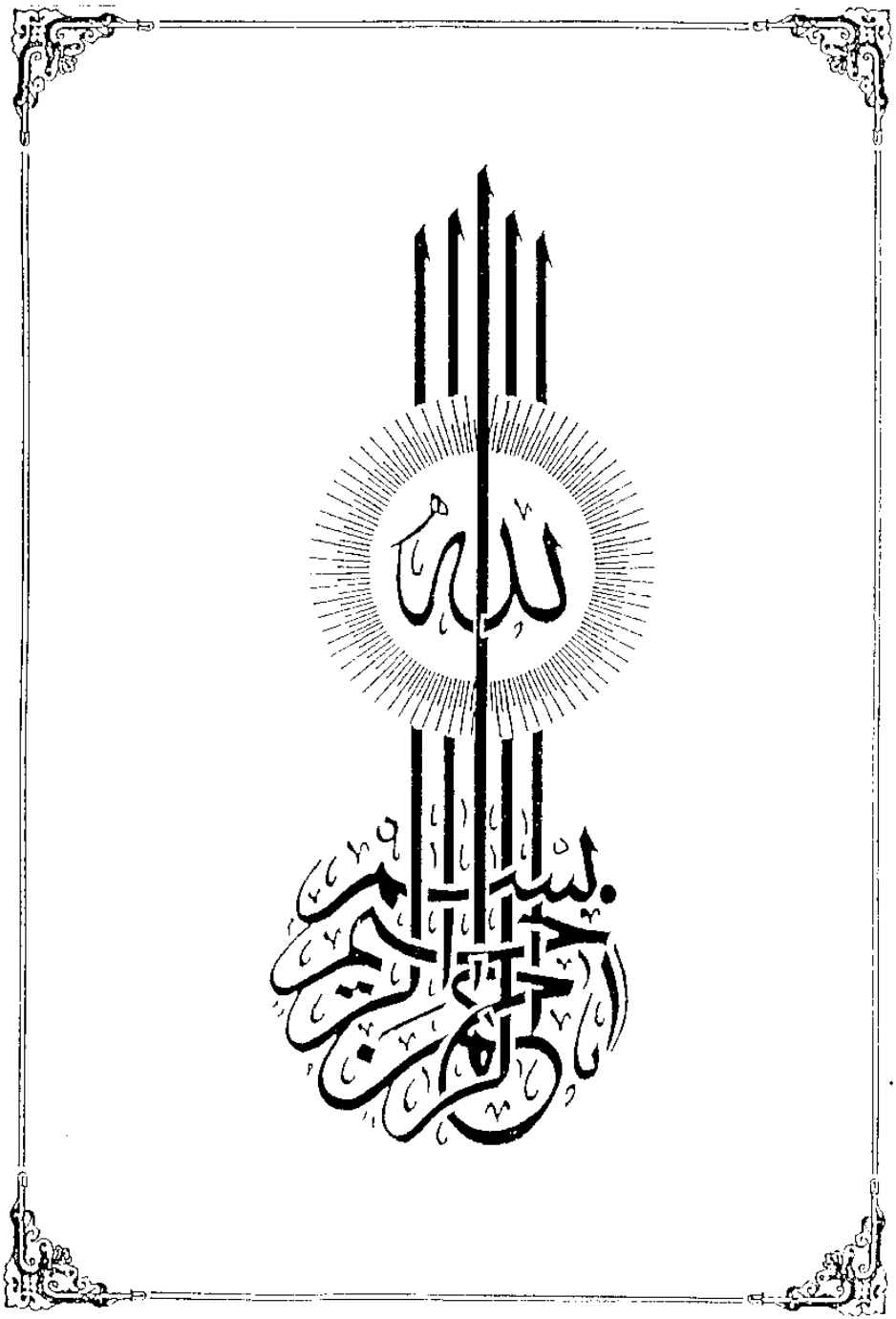

Approval sheet

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Abstract

Samir Ahmed Meligy. The use of gamma ray to utilize some dairy industry wastes. Unpublished Ph.D.thesis. Food Science Department, Faculty of Agriculture, Ain Shams University, 1999.

Waste disposal of dairy industry has many economic and environmental burdens. Therefore, the workplan was undertaken to gain optimum fermentation condition for gellan gum production by *Sphingomonas paucimobilis* EMCC 2011 growing in milk permeate. This was implemented through four main parts.

The first part was performed to achieve an ample fermentation protocol. The highest production of gellan gum (11.2 g/L) with high viscosity in milk permeate by EMCC 2011 strain was achieved with initial pH of 7.0, inoculum level of 15%, agitation rate of 150 rpm and incubation at 30°C for 60 hr. Supplementation of milk permeate with 0.5 g/L $MgSO_4$, 3.0g/L KH_2PO_4 and 3.0 g/L yeast extract, increased the production of gellan gum to 13.5 g/L. With gamma irradiated (0.25 kGy) strain EMCC 2011, gellan gum production was increased to 14.75 g/L. Presence of 0.5 g/L triton x-100 in the fermentation medium increased gellan gum production, being 15.94 g/L. Scale-up the achieved fermentation protocol using immobilized irradiated cells, in a 5 liter fermentor, obviously increased the total yield of gellan gum. The overall rheological parameters reveal the similarity of both the standard gellan and the produced one. This study indicates that gellan gum could be locally produced at economical costs. Besides, the use of milk permeate as a bacterial growth medium markedly reduced the BOD_5 of milk permeate before drainage. High quality yoghurt and ice cream with preferable texture and consistency, were produced with adding gellan as a stabilizing agent to the milk used for making yoghurt and to the ice cream mix by the rates of 0.05% and 0.1%, respectively.

Key words: gellan gum - milk permeate- *Sphingomonas paucimobilis*- growth promoters- gamma irradiation - surfactants- sponge immobilization.

Contents