THREE-WALLED MICROCAPSULES

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The resultant membrane formed at the interface between two polymer solutions, one aqueous the other non-aqueous,has enhanced elasticity as summarised in Fig. 1.

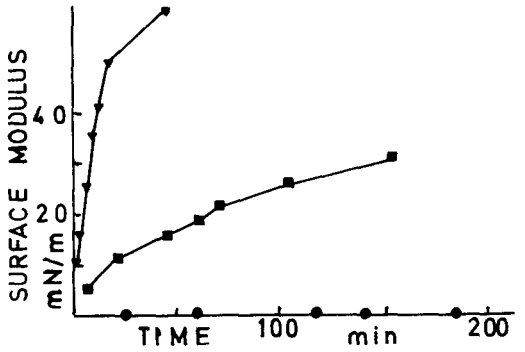

Fig.1. The elasticity of membrane formed from the following solutions of polymers (oscillating ring rheometer)

- ■ 1% w/v acacia solution (air/water interface)
- ● 1% w/v polychloroprene solution(air/Xylene interface)
- ▼ Both of the above solutions (liquid/liquid interface)

Warburton (1978)reported the manufacture of 3-walled microcapsules. An aqueous polymer solution is emulsified in a non-aqueous one to form an o/w emulsion which is then reemulsified in the aqueous solution. Capture of a high proportion of aqueous cores was then found to occur,to give a multiple emulsion.If a volatile,non-aqueous solvent is used, this can be removed by evaporation. These processes result in a concentrated suspension of 3-walled microcapsules,modal diameter 2-6um,depending on the ionic strength of the initial aqueous phase.Diagrammatic representations,not to scale,of the polymer structures involved, are shown in Figs. 2 - 4.

Key: Water soluble polymer; Oil soluble polymer; Solvent

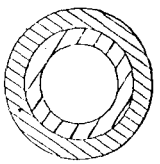

Fig.2. Water droplet present in the w/o emulsion

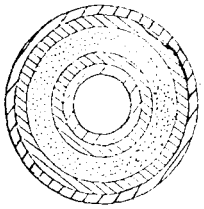

Fig.3.Multiple emulsion droplet

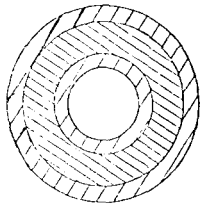

Fig.4.Microcapsule formed from the multiple emulsion droplet when the solvent layer has been removed.

Microcapsules have been made using 5% w/v acacia and 4% w/v polychloroprene solutions. When first made, xylene in which the polychloroprene is dissolved, is trapped within the wall of the microcapsule causing instability. Xylene can be encouraged to diffuse out of the microcapsules by bubbling air through the multiple emulsion. Both the parent multiple emulsions and the aerated microcapsules have bimodal weight distributions.

Warburton (1978) U.K. Patent Application GB 2 009 698 A

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