colour and haemoglobin released was the same as in freeze-thaw lysis. All the observations above have also been obtained for perazine which has an *N*-methylpiperazine side-chain.

Chlorpromazine has been implicated in an immune haemolysis which does not appear to be related to the presence of haemin (Beutler 1969). Spontaneous release of haem and haemin from denatured haemoglobin has been associated with some haemolytic anaemias and the production of Heinz bodies (Jacob & Winterhalter 1970). We have tested chlorpromazine for its antimalarial activity on in-vitro cultures of the blood stages of *Plasmodium falciparum*, a human malaria. At chlorpromazine concentration of 5×10^{-5} M and above the inhibition of growth was 100% and at 1×10^{-5} M growth was inhibited by 40%. Haemin-mediated mechanism may be one of the mechanisms involved (Jearnpipatkul & Panijpan 1980; Chou & Fitch 1981; Orjih et al 1981). Phenothiazine neuroleptics also have been found to have protozoacidal effects on *Leishmania donovani*, a human pathogen (Pearson et al 1982).

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Design and evaluation of a miniature air-suspension coating apparatus

S. K. Baveja†, K. V. Ranga Rao, Amarjit Singh*, *Department of Pharmaceutical Sciences, Panjab University, Chandigarh 160014, India*

The air-suspension coating technique has been preferred to conventional pan coating technique in developing a dosage form since Wurster's disclosures (1953, 1957) because of its simplicity, rapidity and uniformity of the final product. Several papers have been published regarding the design and utility of laboratory air-suspension coating devices (Wilhelm & Valentine 1951; Wurster 1959; Singiser & Lowenthal 1961; Caldwell & Rosen 1964). All of them require a minimum of nearly a kilogram of material for optimum efficiency of their working although Wolkoff et al (1968) have designed an assembly requiring gram quantities of material. During our work on the formulation of sustained release tablet dosage forms of new drugs, synthesized material was often in short supply and a much simpler and smaller coating model was badly needed. This communication deals with the design and evaluation of such a unit developed in our laboratory.

A schematic diagram of the miniature air-suspension coating apparatus is shown in Fig. 1. The body of the apparatus was a glass tube of 2·6 cm internal diam. and length of 11·0 cm the lower end of which was fitted through a B_{24} standard joint to a glass tube of 2·1 cm internal diam. The lower end of the latter was tapered to allow the entry of hot air into the column. In between the cone and the socket of the joint, a stretched muslin cloth screen provided the base of the column, on which the tablets were fluidized with minimal attrition. The tip of the column was also covered with muslin cloth. Coating solution present in a burette was sprayed from the top so that the spray tip was 4·5 cm above the muslin screen. A coating solution was not sprayed from bottom as in Wurster apparatus since the coating materials were blocking the muslin screen and obstructing the entry of hot air. The air supply provided by an air compressor (K. G. Khosla & Co. Pvt. Ltd, New Delhi) was heated by passing it through a heat exchanger controlled by a dimmerstat. The output of the compressor was adjusted in such a way that it was just sufficient to fluidize the tablets between the muslin base and the spray tip.

Tablets of equal weight were prepared using a single

* Present address: Warner Hindustan Ltd., Uppal, Hyderabad 500039.
† Correspondence.

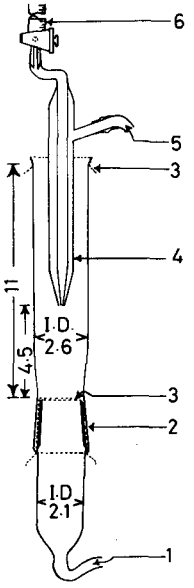

FIG. 1. Miniature air-suspension coating apparatus fabricated in the laboratory 1. Compressed hot air at 42°C. 2. B_{24} Quick fit joint. 3. Muslin cloth. 4. Spray tip. 5. Compressed cold air. 6. Reservoir containing coating solution (1% w/v). All dimensions are in cm.

punch hand operated machine by manually filling the die with accurately weighed amount of granules. Two or more tablets were placed in the column and fluidized. Acetonic solutions of the resins Eudragit RS and RL (Rohm Hass GmbH, West Germany) were taken in the burette and connected to the spray gun through a polyethylene tube. The apparatus worked optimally when the coating solution employed had 1% w/v resin content, the spray tip was 4·5 cm above the muslin base and compressed air at 42 °C was employed to produce the desired fluidization of the tablet bed. The flow of coating solution was controlled carefully so that the tablets did not stick to each other. The hot air left the muslin roof of the column at room temperature.

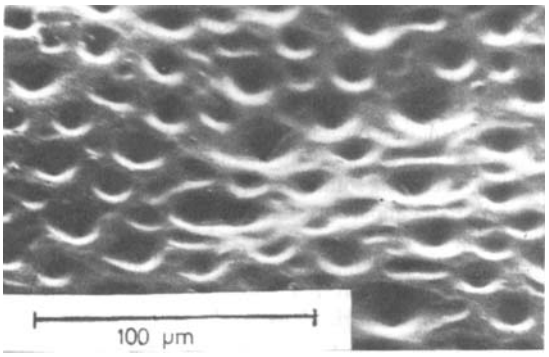

FIG. 2. Scanning electron micrograph of a film coated tablet showing the homogenity and completeness of the coating (× 150).

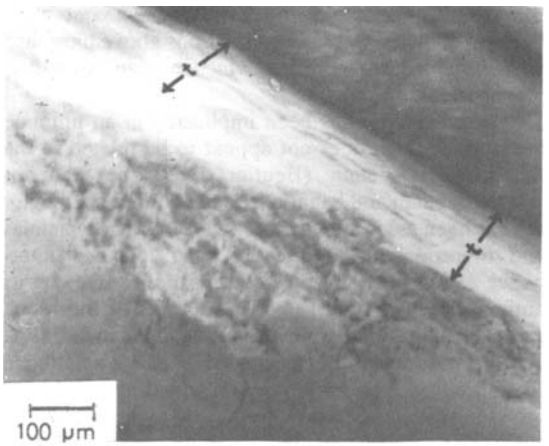

FIG. 3. Scanning electron micrograph of a grounded plane of film coated tablet showing the uniformity of the coating (× 100). t = thickness of the coat.

The film coated tablets were studied for homogeneity, completeness and evenness of the coat using scanning electron microscope (Jeol Scanning microscope, Model JSM 25S) having resolution 6 nm, magnification 45 to 1 lakh and probe current 10^{-12} to 10^{-9}A. For studying the homogeneity and completeness of the coat, the film-coated tablet was mounted on the specimen stub using dotite silver paint and sputtered with gold-palladium alloy. The evenness of the coat was studied by grinding the edges of the film coated tablets using 800 mesh carborundum powder in the presence of light petroleum (b.p. 60–80 °C) on a glass plate so that the thickness of the coat was exposed. The ground tablet was then mounted on the specimen stub and sputtered as above. Micrographs taken at different magnifications and 5 KV accelerating voltage showed that the coating is homogeneous, complete and even (Figs 2, 3). Hence it can be seen that the film coating of tablets using this mini-model was simple, homogeneous, complete, uniform, rapid, reproducible and could be of potential value in formulating sustained release tablet dosage form at the laboratory scale.

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