Development on Non-Fluoro Greaseproof Paper

王怡琇、彭元興

E-mail: 9608198@mail.dyu.edu.tw

ABSTRACT

Demands on quality and safety of paper products come in contact with foodstuff become ever more stringent along with advance in time. In recent years, the US Food and Drug Administration (FDA) has aired concern that fluorinated greaseproofing agent might cause cancers in the users of such products. Hence, how to develop a fluorine-free greaseproofing paper becomes a urgent task. The study was carried out in 3 stages. The first stage used polyvinyl alcohol (PVOH), starch, emulsified wax, carboxymethyl cellulose (CMC), and chitosan to coat on base sheets of copying paper and observe their greaseproofing performances. In the 2nd stage, we chose the more effective additives (PVOH, CMC, starch and emulsified wax) to undergo blending tests, pairs of chemicals were mixed in proportions of 25/75, 50/50, and 75/25 and also coated on the base sheets; or 2 chosen chemicals were separately coated on the base sheets to observe their greaseproofing and waterproofing efficacies. In the 3rd stage, the specimens of the effective greaseproofing formulations were tested for their contact angles. The greaseproofing performance was evaluated with the oil kit test and the waterproofing performance tested using the Stockigt value. Results of the 1st stage experiments indicate that the DF-L-407 PVOH, when coated at a weight of 0.31 g/m2 gave the best greaseproofing performance; with a kit no. of 7. Other PVOH products have performance ranking of DF-L-470, C-325, BF-24, C-1130, C-523, AW-401, 203-S, F-245=BF-17, and F-17. The first 5 chemicals were selected for the 2nd stage tests to blend with other chemicals. For water- proofing efficacies, C-325 PVOH had superior performance and possessed a Stockigt value of 37.8 s. The 2nd stage results indicate that blending PVOH with CMC (Finnfix 30) provided the best greaseproofing efficacy, particularly when C-523 and the CMC was blended at a 75/25 ratio and a coat weight of 1.09 g/m2 to give a kit value of 8. Other PVOHs had performance ranking with CMC of C-325, C-524, BF-24, C-1130, and DF-L-407. For waterproofness, PVOH C-1130 blended with emulsified wax A235 at a 75/25 ratio gave the best result, with a Stockigt value of 42.1 s. Sequential double coating results suggest that this approach was inferior to the blending approach. The 3rd stage results indicate that the spreading coefficients, Ss, were less than 1, suggesting that oil and water would bead on the coated paper without spreading, and they would not wet the paper surface accordingly.

Keywords : greaseproofing paper ; surface tension ; contact angle ; polyvinyl alcohol ; carboxymethyl cellulose ; starch ; emulsified wax

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