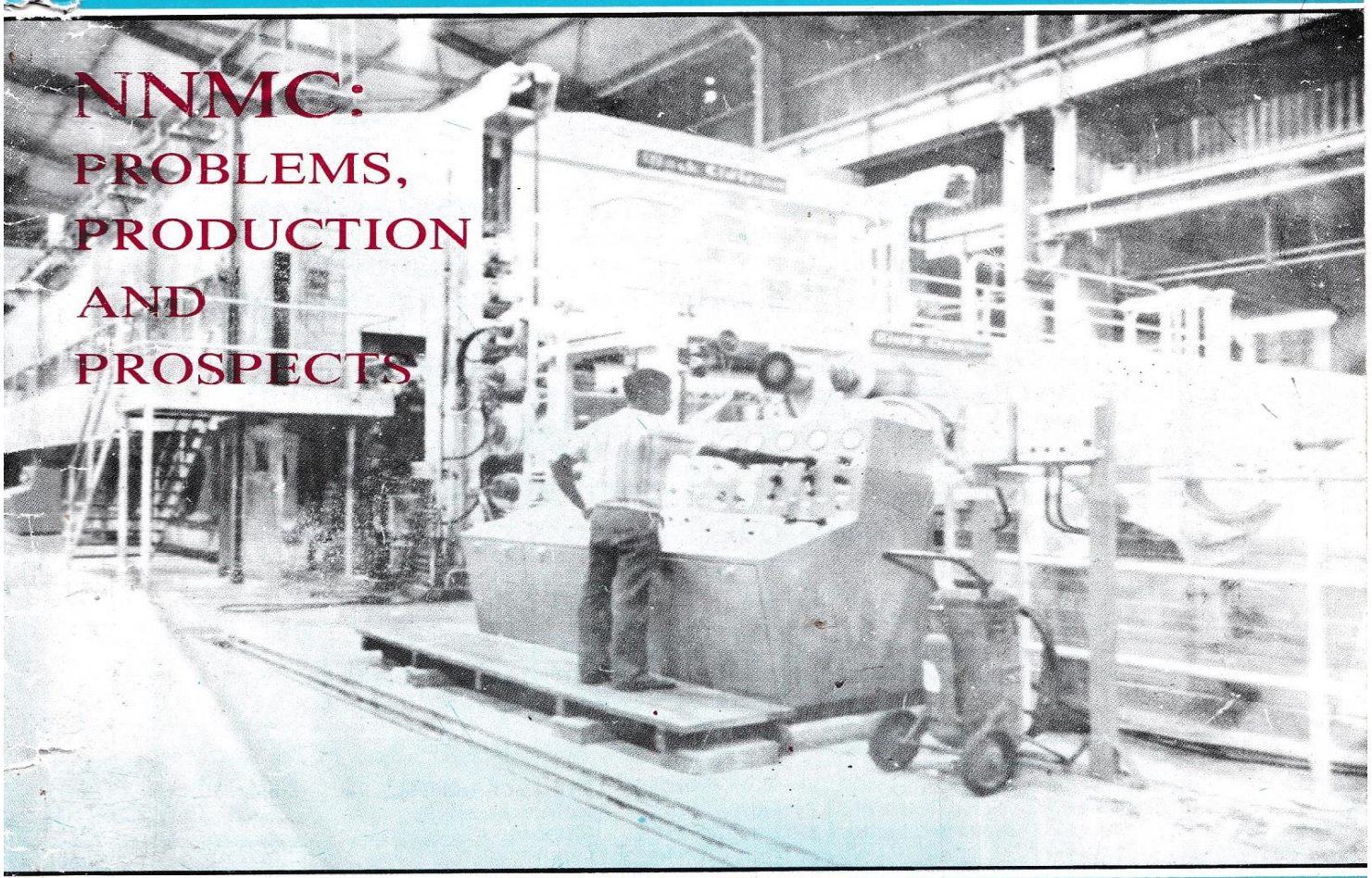
CHEMICAL & INDUSTRIAL
news
VOL. 1 NO. 1 OCTOBER, 1986



NNMC: PROBLEMS, PRODUCTION AND PROSPECTS

DETERGENTS IN ENVIRONMENTAL SANITATION AND HEALTH CARE

INTERVIEW WITH CHIEF CYRIL U. NYONG

Some Locally Available Paper Making Raw Materials

by Ukana Akpabio

The papermarking raw materials fall into two broad groups – the fibrous and the non-fibrous, with the former consituting over 90% by weight, of the paper. The fibrous raw materials are mainly the cellulosic fibres of plant origin, and some synthetic fibres, e.g. glass fibres used in making some specially papers; the non-fibrous materials are the chemical additives added in course of papermaking to modify the structure of the paper for particular end use requirements.

Nigeria is naturally endowed with many fibrous raw materials for papermaking. The fibrous materials come mostly from the tropical hardwood trees, and some of these are presently used in making paper pulps, for example, the gmelina trees grown in the Cross River State are used in producing pulp for newsprint manufacture at Oku-Iboku, and mixed Nigerian hardwoods are pulped at the Nigerian Paper Mill Limited at Jebba for making Kraft papers and boards. However, the hardwoods contain only short fibres, which, though useful for good paper formation, do not offer much strength properties to the paper. Strong industrial papers are usually made from softwood fibres e.g. fibres from pines which are longer than those of the hardwood.

Unfortunately for Nigeria, the popu-

Contd. on Page 9

Contd. from Page 8

lar papermaking sottwood trees are not indegenous as are found in the temperate zone. However, recent investigations in the search for alternative long fibre plants in Nigeria suggest that there are certain indegenous plants which may contain long fibres suitable for papermaking; these plants include raffia palms, bamboo (nyanyaha), various plants containing best fibres and seed hairs, e.g.; cotton from cotton trees and cottonwood (ukim) trees, to name but a few. This is an area in which both the chemists and the papermakers should participate actively in research works. Papermaking operations involve initially the production of pulp from these plant sources. Pulping can be done mechanically or chemically, the later method gives rise to cleaner pulps usually bleached and used for making, high quality papers. In respect of this there is need to know the chemical components of these plants and the chemicals which can effectively defibre the wood or any other plant source. Although it is well known that plant stems consist of high polymeric substances namely, the polysaccharides (cellulose and hemicelluloses), lignin and other extraneous materials, the knowledge of the exact distribution of these components in a particular plant is necessary in order to know the amount of pulping chemicals which would adequately fiberize the plant stem. Chemical pulping processes include the alkaline processes – the soda and sulphate processes in which the active chemical is the caustic soda – the acid (sulphite) process with sulphorous acid as the active chemical, and recently, the solvent process in which organic solvents, e.g. .alcohols, are used in presence of catalysts to defiber the plant tissue. In all these processes the aim is to release the fibres from the cementing element, the lignin. To achieve this, the pulping liquors, reduce the polymetric lignin into smaller units which then dissolve in the liquor, and are thus removed, leaving the cellulosic fibres mildly attacked by the pulping chemicals. Papers are then made by bonding these fibres into webform with or without other chemical additives. Recent studies by the author and other have proved that plantain stem can be easily pulped chemically, bleached, and good papers made from the resultant pulp. However, although microscopic examination indicated that plantain stem fibres are longer than thoseof the tropical hardwood, the strength properties of the resultant paper were found to be inferior to those of the hardwood pulp papers, which normally should have low strength properties compared with paper made from the long softwood fibres.

Main Features

It is suggested that the inferior strength properties of plantain pulp paper might be due to the structure of the fibres which appeared finer, softer and more flexible, and have thinner cellwalls than those of the hardwood fibres. However, these poor strength characteristics of plantain pulp papers to not rule out the use of plantain pulp for papermaking, for it can be blended with other fibres to produce paper of any desired characteristics. Secondly, since the stems from harvested plantain are presently not utilized for any industrial application but are left to rot away at the plantations, it is expected that it would be cheap to acquire these agricultural wastes for papermaking. Besides, plantain has a short rotational period of 6–7 months as against the eight years for the gmelina trees, in this way adequate supply and continuity of plantain pulp can be ensured for the pulp and paper mills. It is also invisaged that the pulp could be suitable for producing dissolving pulps for the textile and plastic industries. If the plantain/banana stems are used for industrial purposes it is hoped that the cleanliness of the environment around the homes, especially in the villages, where these plants are grown would improve as they would be sold to the pulp and paper mills for conversion into pulp. Thus, besides producing fruits for food; plantain/banana plants would serve as the raw materials source for the pulp and paper mills in Nigeria. It is hoped that other local agricultural wastes and grasses, if investigated, may also yield good paper pulps.

The non-fibrous raw materials for papermaking also exist abundantly in Nigeria. The most common ones at the fillers (loadings); these include limestone, china clay and pigments like iron oxide which can be mined in the Cross River State. These materials, after going ghrough initial purification processes, can be reduced to particle size suitable for paper loading. Recently, the author has proved that shells of some crustacean organisms like the clam and periwinkle can be used as paper fillers. Besides filling the sheet, studies indicate that clam shell filler imparts mild sizing effect to control water penetration in the sheet. On the other hand, rosin size can be obtained locally from the exotic pines growing in the country while wax obtained from petroleum products is another sizing agent.

With the abundant forests containing numerous trees and other plants to supply the pulp and paper industries with papermaking pulps, and some locally available paper additives, it is hoped that, if the raw materials are well exploited, Nigeria can become the leading pulp and paper producing country in Africa.

These pulp and paper products can then be used for home consumption and for export.

Dr. Akpabio is Paper Chemist at
Department of wood and paper Technology
The Polytechnic
Calabar.