Chapter Eleven

UTILIZATION OF CHEMICALS FROM WOOD: RETROSPECT AND PROSPECT*

FRANKLIN W. HERRICK

Olympic Research Division, ITT Rayonier Incorporated, Shelton, Washington 98584

HERBERT L. HERGERT

ITT Rayonier Incorporated, 605 Third Avenue, New York, New York 10016

INTRODUCTION

Extensive research on the chemical structure and utilization of wood constituents has been conducted by the forest products industry but has remained largely unnoticed among the chemical fraternity during recent years. This is a result of the predominant position held by petroleum as a raw material in the chemical industry. The recent upsurge in crude oil prices, coupled with a growing public awareness that petroleum is a finite resource, has prompted serious review of the prospect for sustaining our economy on

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alternative chemical and energy resources. Among these are the forest since it is capable of sustained yield if properly managed.

The concept of a forest-based chemical industry has been the dream of wood chemists for several generations and, indeed, was a reality in Sweden until the late 1940's. In spite of a significant research and development (R&D) investment by some segments of the forest products industry, the manufacture of chemicals from wood (and bark) represents only an insignificant fraction of the total chemical production of the developed countries. One of the reasons for this situation is that the research objective has almost invariably been byproduct utilization. The principal products of the industry are lumber, poles, railway ties, plywood, particleboard, pulp, and paper. Although conversion of the tree to the finished product has vastly improved over the years, substantial quantities of byproducts remain to serve as fuel or are disposed of as an environmental nuisance. These include bark, sawdust, shavings, branches, roots, and pulping or bleaching effluents. Research, therefore, has been raw-material-oriented rather than being based on market demand. Furthermore, the raw material is a solid, frequently intractable material with an almost hopelessly complex chemistry.

Because of space limitations, it is not possible to review all the types of chemicals that have been or could be made from wood. Recent symposia and reviews have already dealt with the subject broadly. Rather, our purpose here will be to review selectively several categories of chemical compounds which have a production history or have been sufficiently investigated to the point where the installation of production facilities has been seriously contemplated. Emphasis will be placed on North American practice.

Secondly, our aim is to reach some conclusions as to the direction that wood chemistry research should take in the future if it is to be ultimately put to commercial use. Modern management expects the R&D department of a business to show a payout in the same way as any other function of the operation. If future R&D projects, to produce chemicals from wood, are to be funded either at the university or by industry and are to be successful in the sense of resulting in a profitable wood chemical venture, it is