

of wood substance. Cellulose, which forms about 50 p.c. of wood substance, is the ideal paper-making material. It is a singularly inert substance, largely unaffected by ordinary chemical agents, atmospheric conditions, bacteria and fungi. High grade paper, being almost pure cellulose, will remain in perfect condition for centuries. Not only do the chemicals used separate out the cellulose, but they remove the fats and resins so troublesome in paper making, and break down the substance which holds the cellulose fibres together, so that they can be later felted together into a strong sheet of paper.

The sulphite process, which is the most important in use in Canada, depends on the action of a bisulphite liquor (a comparatively weak acid solution of calcium and magnesium bisulphite) on the non-cellulose wood components. This liquor is prepared by burning sulphur or pyrites and absorbing the resulting sulphur dioxide gas in a milk-of-lime solution or in water, in the presence of limestone.

The woods used in this process in Canada are all coniferous. Spruce forms 65 p.c., balsam 24 p.c., hemlock 10 p.c., together with small quantities of other conifers. The previously barked and cleaned pulpwood is chipped in a machine which reduces the wood to particles about an inch long and a quarter of an inch thick, or smaller. These chips are screened, crushed and fed into digesters—large steel tanks lined with acid-resisting brick—where they are cooked by steam in the presence of the bisulphite liquor referred to. The cooked chips are then “blown” into pits below the digesters and washed in preparation for screening. Sulphur and lime are the most important chemicals used in this process, and their recovery, or the economic utilization of waste sulphite liquor, is still largely an unsolved problem.

Sulphite fibre is used in the manufacture of newsprint paper, in which it forms about 20 p.c. of the pulp used, adding strength to the remaining 80 p.c. of ground-wood pulp. It is used for the better classes of white paper and boards, either pure or in mixture with the other fibres.

The soda process is the oldest chemical process, and depends on the action of an alkaline solvent, caustic soda, on the non-fibrous components. This caustic soda is prepared from soda ash dissolved in water and boiled with lime or is produced electrolytically from brine. Most of the chemicals used in this process are recoverable. The wood of the softer so-called “hardwoods” or broad-leaved trees, such as poplar, basswood, willow, etc., is used almost exclusively in this process. The wood is prepared as in the other chemical processes, and the chips are cooked in unlined metal digesters. The resultant fibre is used in the manufacture of the best class of book, magazine and writing papers, as a filler mixed with stronger pulp. The result is a paper which lacks strength but can be readily finished to a good surface.

The manufacture of sulphate or kraft pulp is a comparatively recent modification of the soda process. It was first used in America by the Brompton Pulp and Paper Company at East Angus, Quebec, in 1907, and was treated as soda pulp in statistical reports up to 1912. The process was first introduced with the intention of reducing the manufacturing cost of soda pulp by substituting salt cake (sodium sulphate) for the more expensive soda ash (sodium carbonate). Subsequent developments showed that by an adaptation of this process the superior strength of coniferous wood fibre could be taken advantage of, and at the present time the woods used are almost exclusively coniferous. Spruce heads the list with about 65 p.c. of the total, followed by jack pine with about 20 p.c., hemlock with about 10 p.c., and other conifers in smaller proportions. The chipped wood is treated with the caustic solution in unlined steel digesters. The cooking process is carried on just long