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AGRICULTURAL COLLEGE

COMMERCIAL PROCESSES OF PULPING WOODS FOR PAPER

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There are four commercial processes of making paper pulp from wood. They are known as the groundwood, the sulphite, the sulphate, and the soda processes. Each is especially adapted to the manufacture of certain grades of paper or to the pulping of certain woods.

News, cheap magazine, and cheap catalog papers are made mostly of groundwood, that is, of uncooked wood mechanically ground into a pulp. The groundwood process is the cheapest of all the pulping processes, and the pulp yield is by far the greatest. The quality of the pulp, however, is so low that even in cheap papers it is not strong enough to use alone, and considerable quantities of longer and stronger fibered pulp must be added. The woods used for mechanical pulp are few in number. The favored species are the long-fibered, light colored, non-resinous balsam and spruces. Other long-fibered woods of more resinous nature and of darker color, such as some of the pines and the hemlocks, are used to a limited extent. The hardwoods yield a short-fibered groundwood that limits their use by this process to cheap book and tissue papers. The number of species of hardwoods that may be thus used is also limited by the color of the wood which carries over to the paper. Pitch, knots, and decay all cause considerable discoloration and lower the quality of pulp.

The stronger and better grade papers are made of pulp manufactured by one of three chemical processes - sulphite, sulphate, or soda. In each process a large portion of the wood known as lignin is removed, leaving fibers of almost pure cellulose. This is accomplished by cooking wood chips with a chemical under steam pressure in a specially designed digester.

Some classes of book, wrapping, bond, and tissue papers are made largely from sulphite pulp, and considerable sulphite is used in groundwood papers. Because of wood costs the sulphite process is a little more expensive than the other processes, and the pulp yield is only about half as large as in the groundwood process; but the pulp is very strong and can be bleached to a high degree of whiteness. The woods used with the sulphite process are the long-fibered, non-resinous softwoods, such as spruce, balsam, and hemlock. The chemical used is bisulphite of lime formed by the action of sulphur dioxide gas upon lime.

Kraft or wrapping paper and high-test fiber board are made from sulphate pulp. The sulphate process is a little less expensive than the sulphite process; the yield of pulp is about the same. The chemical used is a mixture of sodium hydroxide or caustic soda and sodium sulphide. Any long-fibered wood can be used for sulphate pulp, for the process is alkaline and quite suitable for the reduction of woods which contain resins, waxes, fats, and other alkaline-soluble materials. Sulphate pulp is usually used unbleached, but in paper-making experiments at the Forest Products Laboratory it has been found that it can readily be bleached by the two-stage method. This development extends the use of the sulphate process and of such woods as the southern pines to the manufacture of high-grade book, magazine, and writing papers.

Book, lithograph, and envelope papers are very often made from a mixture of sulphite pulp and pulp made by the soda process. This mixture gives an opaque, well-felted, and well-formed sheet of paper which is highly esteemed by the printer. The soda process can be applied to coniferous woods without difficulty, but it is used almost entirely for the reduction of soft, short-fibered, deciduous woods, such as aspen, cottonwood, basswood, beech, birch, and gum. Soda pulp is sometimes used alone in the manufacture of some of the cheaper, bulkier book papers which have very low strength requirements. The chemical used in the process is caustic soda.