

Current and Future Markets of Dissolving Pulp in China and Other Countries

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As a purified form of cellulosic fiber, dissolving pulp is an important starting material for many value-added cellulose products. Dissolving pulp is mainly produced by either the pre-hydrolysis kraft (PHK) process or the acid sulfite (AS) process. The dissolving pulp market has been booming in many developing countries in recent years. As one of the biggest producers of dissolving pulp in the world, China is also importing a large amount of dissolving pulp from other countries. It is expected that the production capacity of dissolving pulp in China will increase significantly in the near future.

Keywords: Dissolving pulp; Production technology; Capacity

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Dissolving pulp can be defined as purified chemical pulp with high alpha-cellulose content (Jahan 2009). High brightness and a narrow distribution of polymerization degree are also required. The consumption of dissolving pulp is mainly for viscose fiber production. Dissolving pulp can also be used as the feedstock for high value-added cellulose products, such as cellophane, cellulose acetate, nitrocellulose, carboxymethyl cellulose, and cellulose ether (Jahan 2009).

The Global Market of Dissolving Pulp

The production capacity of dissolving pulp is distributed all over the world except for Australia. As listed in Table 1, the production capacity in the developing countries was 33% of the total global capacity in 2017, which is an increase of 555 kilotons from 2016. The change is reflective of prospective growth of the dissolving pulp industry in the developing countries.

Table 1. Capacity Distribution of Dissolving Pulp from Wood in 2016-2017

Region	Country	Capacity (kiloton)	
		2016	2017
America	The United States	2000	2000
	Canada	910	910
	Brazil	785	785
Asian	China	1096	1301
	Japan and Thailand	400	400
	Indonesia and India	340	690
Europe	Sweden, France, Austria and Norway et. al.	1300	1300
Africa	South Africa	1050	1050
Total		7881	8436

* Data derived from www.ccfci.com

The price of dissolving pulp has been erratic and frequently affected by the price of chemical pulp. The price of dissolving pulp from soft wood was in the range 850 to 1100 USD in 2016 to 2017, which was 150 to 300 USD higher than bleached chemical pulp from soft wood. Considering the environmental protection and the development of downstream industries, it can be inferred that the price of dissolving pulp will exhibit a sustainable growth trend in a long run. However, the price fluctuation of dissolving pulp is inevitable in a short term.

Technologies for Dissolving Pulp Production

Dissolving pulp from wood or bamboo is mainly produced *via* the pre-hydrolysis kraft (PHK) process or acid sulfite (AS) process (Zhou *et al.* 2018). The amount of dissolving pulp produced by these two methods accounts for 85% to 88% of the total dissolving pulp production all over the world.

In the AS process, hemicelluloses and lignin are removed simultaneously. The pulp yield, brightness, and bleachability of the obtained pulp are higher than those of the pulp obtained by the PHK process (Chen *et al.* 2016). Besides, due to the breakdown of the primary wall of cellulose fibers, the accessibility and reactivity of dissolving pulp obtained via the AS process are higher than the pulp obtained via the PHK process. However, due to the acidic conditions of the AS process, the pulp obtained via AS process exhibits a wider distribution of polymerization degree than that via the PHK process (Chen *et al.* 2015). Besides, owing to the high requirement for raw materials of the AS process, the PHK process, which has a wide range of feedstock from which to select, is usually adopted for newly-built production lines of dissolving pulp, even though the pulp obtained via the PHK process exhibits lower pulp yield and lower reactivity.

Upgrading chemical pulps to dissolving grades is also an attractive technology for dissolving pulp producers. The basic principle of upgrading chemical pulp to dissolving pulp is to remove the hemicellulose impurities selectively in the pulp via post-treatment, and improve the reactivity of pulp (Fan *et al.* 2017).

Dissolving Pulp Industry in China

Various kinds of fiber raw materials, including wood, cotton, chemical pulp, and bamboo, are used to produce dissolving pulp in China. It is estimated that 40% or more of the dissolving pulp produced in China is from cotton, bamboo, and chemical pulps.

Table 2. China's Annual Domestic Production and Import Amount of Dissolving Pulp in 2012-2017

Year	China's domestic amount (kiloton)			Import (kiloton)	Total (kiloton)	Import ratio (%)
	from wood	from cotton	from bamboo and chemical pulp			
2012	620	440	120	1570	2750	57
2013	800	750	60	1800	3410	53
2014	600	670	80	2090	3440	61
2015	550	580	90	2250	3470	65
2016	980	460	550	2250	4240	53
2017	1050	350	400	2610	4410	59

* The data derived from www.ccfci.com

At present, China is the biggest consumer of dissolving pulp all over the world. Nonetheless, more than 50% of the consumption of dissolving pulp relies on imports. As shown in the data of Table 2, the demand and the import amounts of dissolving pulp in China both increased year by year. However, due to the high price of chemical pulps and cotton linters, the productions of dissolving pulp from cotton and chemical pulps has decreased significantly since 2013.

Besides, due to the limited wood resources in China, the supply of wood cannot meet the demand of the dissolving pulp industry. So most of wood raw materials used for dissolving pulp production are imported. The high transportation cost of the import wood chips is diminishing the profit of these dissolving pulp producers.

Although many problems exist, the dissolving pulp industry in China is growing vigorously. It is estimated that the capacity of dissolving pulp in China will increase by 700,000 to 1000,000 tons/year in the next few years. Synchronously, Chinese dissolving pulp companies are also investing in new dissolving production lines built outside of China to reduce the production cost.

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