



# AN OVERVIEW OF WAX UTILIZATION IN CHINA

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The utilization of wax as a raw material has been reviewed. Adding wax feedstock into rubber products, leather, food, synthesis of castor oil phosphate, tail gas recovery and electrodes has also been discussed. The complete utilization most of the wax sources in China has also been evaluated.

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## Introduction

Wax during the oil refinery process is one of the important chemical products. It is a white to yellowish-white, gelatinous, crystalline water-insoluble substance. Its main content includes n-paraffin. Its carbon number, molecular weight, distillation range and density are 16-32, 300-540, 350 °C -500°C and 0.880-0.915, respectively.<sup>1</sup> Wax plays an important role in *Chinese* industries such as lighting, packaging, farming, chemicals, rubber, medicine and homecare products, etc. *China* owns a considerable amount of wax. *Shengbei*, *Daqing* and *Nanyang*'s oil have high wax contents. The production of wax in *China* reached 147.9 million tons which was about one third of the total production of wax in world during 2005.<sup>2</sup>

In the present paper, the output and import of *Chinese* wax, adding wax feedstock into rubber products, leather, food, synthesis of castor oil phosphate, tail gas recovery and electrodes has been reviewed, including a detailed comparison between output and import of *Chinese* wax also.

## Discussion

### Comparing between output and import of *Chinese* wax

Table 1 shows output and import of *Chinese* wax. There were more waxes distributed in Northeast of *China* such as *Yanshan*, *Dalian*, *Fushun*, *Jinxi* and *Daqing*. Their output were about half of the production of *Chinese* wax. The production of plants, which were near sea (*Gaojiao*, *Jinan* and *Maoming*), was about one fourth of *Chinese* total wax output. Food grade wax and completely refined wax were about 5% and 50% of *Chinese* total wax output, respectively.<sup>3</sup> Utilization of *Chinese* wax in the rubber industry<sup>4</sup>

Rubber during the storage and usage is easily cracked due to aging such as light, oxygen, ozone, heat and machinery. Wax derived from the oil refinery process is a solid compound having white to yellowish-white colour. It never reacts with rubber during the rubber production, however it freely swims in rubber.

It slowly moves on the surface of rubber because of low wax content on the surface of rubber. There is a layer of preventive film in the surface of rubber as time increases, rubber avoids making a direct contact with oxygen, so it decreases aging by the addition of wax into rubber. Different variety of waxes have different functions, therefore, people prefer it to take maximum benefits based on its properties.

### Utilization of *Chinese* wax in the leather industry<sup>5</sup>

In general, people usually have two requirements for leather. First one is increasing glossiness and second one is natural beauty as true leather. Manufactures use two methods to satisfy people's requirement, (1) its property is changed such as oxidation and esterification reaction; (2) as a main feedstock is blended to produce emulsified wax with other products such as resin, surfactant, aids and solvent. Its derivative is used at the top of leather, which increases glossiness and radiance of leather.

### Utilization of *Chinese* wax in the food industry<sup>6</sup>

Food products are packaged by using paper coated with wax or wax as adhesion agent in the food industry. Wax products can be coated to the surface of fruit also. It is dissolved into gasoline and then sprays to the surface of fruit, which not only avoids fruit to dry or spoil, but also prevents insects attack. In the poultry industry, poultry products are put in melted wax and then are cooled until wax settles. Using a machine to remove wax from the surface of poultry, so poultry's feathers will leave into wax.

### Utilization of *Chinese* wax in the castor oil phosphate<sup>7</sup>

Using wax and its derivative as P<sub>2</sub>O<sub>5</sub> dispersant obviously decreased the reaction time of castor oil phosphate and prevented P<sub>2</sub>O<sub>5</sub> making big particles. Finally it was observed that the yield of products increased by 7% and the MAP content of phosphate. Castor oil phosphate is widely used in the various areas such as leather, fur, textile, printing and dyeing, daily chemicals, etc.

**Table 1.** Output and import and Chinese wax (million tons)

Unit	Total output	Fully refined wax	Semi-refined wax	Food grade wax	Crude scale wax	Soap wax	Others	Import yield	Incremental yield
Yanshan	6.2367	0.2635	5.9672	0.0060				0.8100	2
Dalian	16.9049	3.6955	2.6429	5.0866	4.1347	1.3452		5.6456	3
Fushun	22.1638	5.4645	10.9573	0.2010	0.3275	5.2135		5.1944	15
Jinxi	3.2186		1.8001			1.4185		0.9557	
Daqing	13.0773	0.0140	12.6222	0.1779	0.2220	0.0552		8.9290	2
Gaojiao	10.8195	1.4019	6.4534		1.5655		1.3987		3
Jinan	1.0202				1.0202				
Luoyang	0.1541		0.1541						
Jingmen	7.5395		2.9824		0.7686		0.0324	1.4354	2
Maoming	8.1736		2.1812	0.0422		0.6720		4.3247	2
Lanzhou	2.8857		0.6064		0.7943	1.4850			10.5
Jiangnan	1.0429		0.9409		0.1020				
Qingdao	0.0007	0.0007							
Jilin	0.0829	0.0829							
Yumen	0.0643		0.0643						
Nangchong	0.4627		0.3594		0.1843				
Total	93.8478	10.9230	47.7318	5.5137	9.1191	10.1894	1.4311	27.2948	39.5

#### Utilization of Chinese wax in the tail gas recovery <sup>8</sup>

In the cotton industry, gases from cotton seed cake unit include some solvents. They have a bad effect on the energy standard and safe production of cotton seed cake unit. Using wax can remove solvent from gases. Tail gases may reach the qualifying standard to discharge into atmosphere.

#### Utilization of Chinese wax in electrodes <sup>9</sup>

Mao Qinglu used solid wax as an adhesive agent to produce carbon paste electrodes. The carbon paste electrodes have high activity. Their property can be studied under unstable condition. Other electrodes cannot replace them.

#### Conclusion

Based on the above review, wax is widely used in different areas such as rubber products, leather, food, synthesis of caster oil phosphate, tail gas recovery and electrodes. China owns a considerable amount of paraffin base petroleum and high quality wax.

It is an urgent need for Chinese people to utilize wax sources in a more rational way, involving new processes, which could result in improving the product's value. These newer processes may improve the energy efficiency and decrease the environmental pollution as well.

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