

Focus on Latest Chinese Talc Trends

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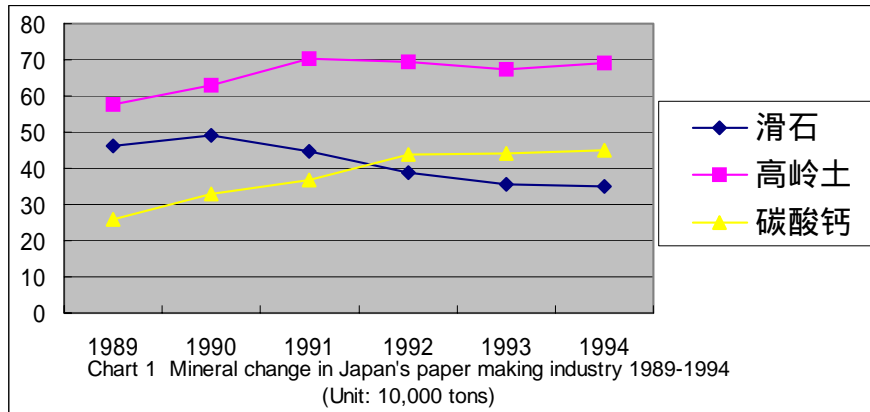
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Abstract: No one could expect the top-level pink talc produced by China were in overstocked mountain-like piles ten years ago despite of the then low price of 83 dollars/ton at the international market. Similarly, no one could foresee such products are out of supply today even when the price has rocketed to 300 dollars/ton. Market changes at a speed out of the pace of people's imagination. PP plastic filler-grade product became the major area of application with the fastest growth in the past 20 years, becoming the pump of the rise of the price of talc. The re-organization of Chinese talc industry will exert a relatively enormous influence over China's market of white talc, making the malicious competition among the Chinese enterprises replaced by a healthy and competitive cooperation environment.

1. New changes in the area of application of talc

Since 1990s, great changes in the area of the application of talc have taken place in the industry of paper-making and plastics, as the amount of the filler-grade talc powder used in paper-making industry declined remarkably while that of the talc powder used in PP plastic industry increased greatly. Such a change at market has produced a significant influence in the scale of market, product quality and the processing technology of China's talc industry, which is shown in the shrink of the number and scale of market and the rise of the added-value of product. Now, the low-mid grade products are giving its place to mid-high grade products, with the 325-600-mesh ordinary products being replaced by 2,000-3,000-mesh products. The development and growth of talc industry are shown in the improvement of the technology for processing micro talc powder.

The major markets of paper-making filler-grade talc powder are in Japan, ROK and China. Japan has remained the largest importer of China's talc, as before 1990, it consumed 60-85% of China's exported talc. Since late 1980s, ROK has become another important importer of China's talc. The shrink of filling-grade talc powder is a result of the wide application of neutral /alkaline sizing method which popularized the calcium carbonate filler materials with its advantage of low price though it could not be used in acid sizing system. In 1980s, the Asian countries like Japan and ROK began to shift from acid sizing method to neutral /alkaline sizing method, causing a decline in the use of talc. Chart 1 below shows the change in the amount of talc, calcium carbonate and kaolin used in the paper-making industry of Japan, which reflects a total rise of 150,000tons' filler materials, a decline of 110,000 tons' talc consumed, and a rise of 190,000tons' calcium carbonate in Japan's paper making industry in 1989-1994 and a decline of more than 200,000tons' talc consumed in the same industry in 1989-2000.



Source: Haichen MinChem Co., Ltd.

图：滑石 Talc 高岭土 kaolin 碳酸钙 Calcium carbonate

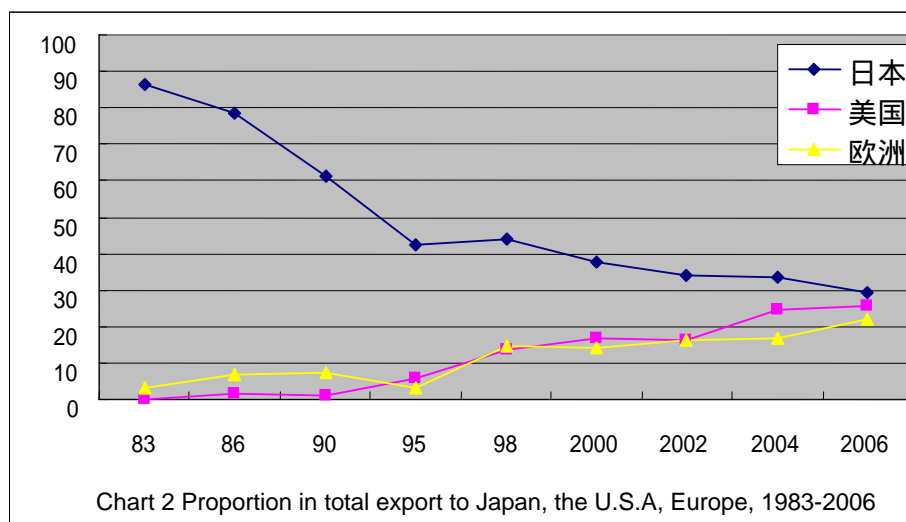
In the past, China's paper making industry used to consume more than 1/2 of the country's talc. In 1990s, China began to use the imported large-scale paper machine which runs with neutral /alkaline sizing method with calcium carbonate as the filler material. In 2000, the amount consumed reached 800,000 tons while in 2006 this number increased to 2.6 million tons. Different from the older type of paper mills using calcium carbonate as the main filler materials, the new paper mill built since 1990s basically runs with talc as the major filler materials, leaving no room for further growth in the amount of the talc used as filler materials. In the next 3-5 years, a portion of old-typed paper mills will reduce their production gradually and be shut down, resulting in a further decrease in the demand in filler-grade talc.

Now, talc occupies a small market share in other fields of paper making industry, but still shows a certain level of potential. For example. As the speed of paper-making machine increases, the resin in the white paper becomes a problem more and more difficult to solve. Talc, with its nature to work better with oil than water, can be used with calcium carbonate to effectively absorb the sticker like resin. Thus talc functions not only as a kind of filler material but also an resin- controlling agent. In addition, when talc is used in coating, the deinking of recycled paper also has a stable market.

It was not until after WWII that talc was used as plastic filler and after the oil crisis in 1970s that it was widely accepted. As a functional filler, talc is mainly used to change the work of polypropylene in the production of the plastics for automobile and household electrical appliances industries There are also a small amount of talc used in polystyrene, nylon, polytene, PVC and EVA. When used as filler, talc is capable of not only reducing the amount of resin consumed, but also keeping or remarkably improving some of the physical functions of the product so as to strengthen its work, like, for example, increase the strength of bending, creep resistance capability and thermal transforming resistance capability, keeping a balance between rigidity and impact strength and the keeping the size at the required level. The price of talc powder is only 1/8-1/10 of polypropylene, thus reducing the cost of the polypropylene products with talc as filler. The more the price of

petroleum (polypropylene) rises, the greater the amount of the talc input, and the bigger the reduction of production cost. This is an important reason for the expansion of the market demand against the rise of the price of petroleum and high-grade white talc. Plastics became the area where the consumption of talc rose the fastest in the last 20 years.

The markets for filler-grade talc in paper making industry are mainly in Japan, ROK and China and those for plastic filler-grade talc powder are in Japan, the U.S. , Western Europe and ROK. As a result of the sharp increase of plastic filler-grade talc, the main areas of the application of talc in China has shift from paper-making filler to plastic filler. The export market has been expanded from the single Japanese-oriented market to multiple centers including Japan, the U.S. and Europe, with Japan remaining as the most important destination. In 1983, the U.S. only imported from China 540 tons of talc. While with the increase in the demand for talc in plastic industry, that number increased to 92,200tons in 1995, accounting for 5.8% of the total export of China of the year; and to 164,800 tons in 2006, about 25.4% of the total of the year. Europe imported 18,400 tons of talc from China in 1983, accounting for 3.4% of the total export of China of the year. While in 2006, that number increased to 141,500tons, about 21.9% of the total of the year. Japan, however, imported from China 462,800 tons of talc in 1983, accounting for 86.6% of the total export of the country of the year. With the shrink of the market of filler-grade talc for paper making, that number decreased to 293,000tons in 2006, about 29.3% of the total of the year. (chart 2)



Source: Chinese Customs Statistics Yearbook 1983-2006

上下 : Japan, U.S.A., Europe

Now, Japan and ROK combined import about 200,000-250,000 tons of filler-grade talc powder for paper making from China each year. To be specific, it is chlorite, or a compound of talc and chlorite. The amount consumed each year in China is about 500,000-700,000 tons which is on continuous slight decrease. For plastic filler, Japan now imports from China about 70,000 tons of micro powder and 30,000 tons of raw materials.

The U.S. imports from China about 150,000 tons of raw materials, Europe about 90,000 tons of raw materials and 20,000 tons of talc powder; ROK about 50,000 tons of micro powder. The amount consumed annually at China's domestic market is about 50,000-80,000 tons. There is still a room for at least 5%'s, or 10%'s, as estimated by someone, annual increase in the demand for China's plastic filler-grade talc at the international market.

The demand for the paper-making filler-grade talc decreases fast year on year in the past a few years. The materials for paper-making filler are mid-low grade talc or chlorite, while in most cases, those for plastic filler are mid-high grade white talc. Therefore, the paper-making filler talc in excess cannot be used as plastic filler talc. Moreover, the sharp increase in the demand in plastic industry has become the major cause and driving force for the rise of the price of talc in the past a few years.

2. New changes in talc industry

China has scored great achievements in the concentrated use of the mining resources and the follow-up processing of powder in its industry of talc.

The so-called "high output" was based on the consequences-ignoring gopher, which though was limited to the small-medium sized mining mountains of the country, exerted an un-underestimated negative effect on market. From 1980 to 1990, there were more than 100 small-medium sized miners around China, all of which focused on short-term profit and maximum output. A large proportion of the output of talc in those years was from these miners. In Liaoning area for example, the percentage was as high as 60-70%. As a result, the output of talc in China was in excess of demand by a great margin, pressing the price remaining at a low level. Ten years ago, the price of the top grade pink talc powder from China dropped to a low of 83 dollars/ton! Though China's talc industry contributed more than 30 million tons of talc to the world in 1980-2000, the accumulation of the whole industry was still at a meagre level!

Substantial change began in 2000. After nearly 20 years' exploitation, most small-medium sized mines have been or are at the verge of exhaustion, which resulted in a decline in the output of talc. At the same time, the plastic filler market became a pump to increase the demand at international market in the high-grade talc from China, making talc out of supply and the price began to rebound. In 2005, the State issued policies for assorting the resources of mining enterprises for protecting and efficiently using mineral resources and eliminating operational accidents. It was an endeavor to shut down all law-violating mining enterprises, encourage the enterprises with enough resources to merger and buy in the small-medium sized enterprises so as to bring into play the leading role of the major enterprises in the industry and optimize the distribution of resources. Now, the concentrated use of resources is under way with noticeable achievements made. Of the three major origins of white talc, Shangdong and Guangxi have basically established the mode of concentrated use of resources and Liaoning will complete the work within 2007.

Nearly all the small-medium sized mines around the country have been purchased or merged by major enterprises and all the law-violating mining enterprises have been shut down. Now a mining enterprise network composed of Liaoning whose bases are Aihai, Beihai and Shuiquan, Shandong whose bases are Pingdu, Laizhou and Qixia and Guangxi whose bases are Guiguang, Longguang and Huamei have been formed. In the future, 80% of the white talc materials for talc will come from these above nine places.

Speaking from the root cause, the concentrated use of resources is an inevitable result of the development of the talc industry, a process accelerated by governmental moves. Such a concentrated use will exert a far-reaching influence on the future development of the talc industry of the country. Not only the number of mining enterprises is reduced, but also the irrational and rule-violating mining is restricted, both of which contribute to the effective protection and optimized distribution of talc resources and the security of operation. The assorted resources will be exploited on the basis of market demand and according to the long-term development goal of enterprises, thus realizing a rational planning and balance in production and sales. The past problem of excessive supply is substantially addressed, the price of talc in China rebounded to its due level fast and the malicious competition among talc enterprises is being remedied. A healthy environment with the three major origins at Liaoning, Shandong and Guangxi being independent from, competing with, complementing and cooperating with each other has been cultivated. Now the enterprises within each origin places more and more tend to have friendly cooperation and exchange with each other.

After more than 10 years efforts, the level of processing and testing talc powder has been greatly raised. Now there are more than 50 jet mills in China, capable of producing different kinds of products of 800-4,000mesh. The output of the micro mesh product can reach around 150,000 tons in 2007. With their more understanding of the application market, China's talc enterprises are conducting in-depth research. The specialized products used in different areas and a large number of new and down-stream products including surface modification talc powder, particle talc powder, compressed talc powder and Masterbatch have been developed and the production management, quality management, packaging quality have been improved to the internationally advanced level.

The testing equipment of China's talc industry has been upgraded and the operation techniques have been improved in practice. The chemical indexes are animal glue +EDTA titration, or can be tested through XRF. The particles are analyzed through laser hondrometer and sieve analysis, or sedimentation hondrometer. The heavy metal can be tested with AAS and AFS. For mineral analysis, trace asbest is tested with imported advanced standard which is now being popularized, like XRD+SEM or XRD+PLM and the operation is being improved.

The problem of the possible existence of asbest in talc mines is a matter of wide concern in recent years. As the biggest origin place of talc, China has also becomes a focus of

attention for its talc production. All the talc exported from China is from Liaoning, Shandong and Guangxi. Of the major origin places of white talc, no amphibole or taxoite minerals are found in Haicheng of Liaoning, Pingdu and Laizhou of Shandong and Longsheng of Guangxi. The minerals with problems are found only in a small number of areas. For example, amphibole minerals have been found in some mines at Hengren, Kuandian, Xiuyan of Liaoning and Qixia of Shandong, but whether they are of asbest quality is still to be determined. Though the talc with amphibole accounts for only a neglectable part in the talc from China, the export of them will result in un-underestimable impair to the creditworthiness of China's talc. As China's talc enterprises have realized the gravity of the problem, most major enterprises can set a threshold for their clients to provide amphibole-free and taxoite-free materials. From the position of client, as long as the origin place and purchasing channels remain the unchanged, plus a strict testing, the safety of China's talc can be secured.

3. Development trend in future

Though talc is a kind of resources widely distributed in the world and can be found on their mineral beds at all continents, it is small in reserves in comparison with other minerals. White talc is a special example, as it can be found only in China, India, Australia, France, Italy and Korea, of which only China and India can boast relatively large reserves. Australia, France and Italy combined can produce around 100,000 tons of talc annually. Korea, though with possible noticeable reserves, is not a country of high output. India has expanded its production of talc to the level of 627,000 tons in 2005, according to BGS, but both its known and possible reserves are limited. According to Indian Mineral Yearbook 1994, the reserves of talc already known in India is 2.5 million tons and the possible reserves is 57.30 million tons.

Only China boasts both relatively large reserves and output. According to the statistics of 1992, the untapped talc reserves of China was 250 million tons (not including pyrophyllite). Among the five super-large mineral beds, three are the origins of white talc, with a known reserves of 90 million tons. The consumer of Indian products is mainly from the domestic market, which means the white talc at international market is from China. The advantages of China's products lie in not only reserves and output, but also the super quality of white talc, especially the highly pure white talc (table 1) .Without the export from China, the demand for white talc at international market can by no means be satisfied. Talc is a kind of mineral product of low value, and the consumption mainly comes from the short-distance surrounding market. But China's white talc is an exception. Even the European and American areas with rich talc resources will also import about 250,000 tons of mid-high grade white talc each year. In recent years, China's export of talc has remained at 640,000 tons (chart 3) , more than 95% is mid-high grade white talc. As the product from China is far from satisfying the need at market, the supply-demand gap becomes wider and wider in recent years.

Table 1 China's high grade talc resources

	Powder pieces of Haicheng	Haicheng No. 2	Haicheng No. 3	Pingdu special	Pingdu No. 1	Laizhou special	Laizhou No. 1	Guangxi special	Guangxi No. 1	Guangxi No. 2
SiO ₂ , %	60	60	58	60	60	60	60	60	60	58
MgO, %	30	30	30	30	30	30	30	30	30	28
Loss in burning %	7	7	8.5	6	6	5.5	6	6	6	6
Degree of whiteness %	94	92	90	91	87	94	90	90	88	86

Source: (Aihai, Beihai, Shuiquan, Pingdu, Laizhou, Guiguang, Longguan, Huamei)

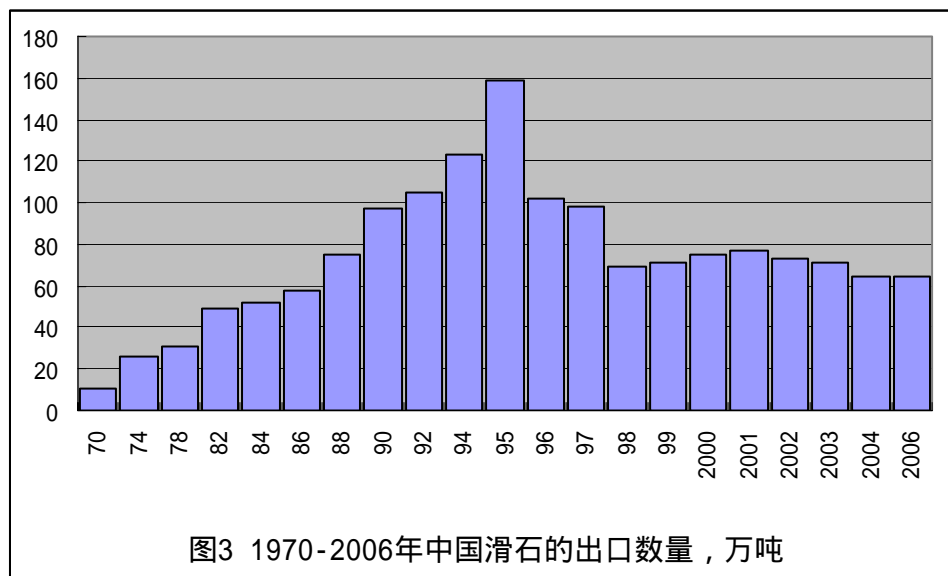


图3 1970-2006年中国滑石的出口数量，万吨

来源：中国海关统计年鉴 1970-2006

Chart 3 Export volume of talc, China, 1970-2006, 00,000tons

Source: Chinese Customs Statistics Yearbook 1970-2006

Worldwide, both the reserves and output of the highly pure white talc are rather limited. This is true even in the resources-abundant China. As China is the largest talc producer, exporter and consumer in the world, its annual output has become the concern and the focus of attention of the consumers in world.

According to the report of BGS, the output of China was 2.55 million tons in 2001, 2.7 million tons in 2005, showing a seemingly growth. According to the statistics of a non-official consultation company of Britain, China still has 15 major talc producer enterprises, providing 2.3 million tons of talc each year. But regrettably, the biggest of these 15 enterprises has stopped production. But it is still estimated to be producing 390,000 tons of talc each year, higher than the annual output of Shandong. Another three

enterprises with less than 30,000 tons of products are estimated to produce 300,000tons, 140,000 tons and 120,000 tons of talc each year respectively, an amount similar to the total output of Guangxi. However, China's major talc enterprises in Beihai, Pingdu and Shuiquan are not mentioned by even a single word. It is not known where the above statistics come from, but they are substantially different from fact, including in terms of output. Such statistics can lead to a conclusion totally contrary to reality: the output of the talc of China is still like the past, or even on increase!

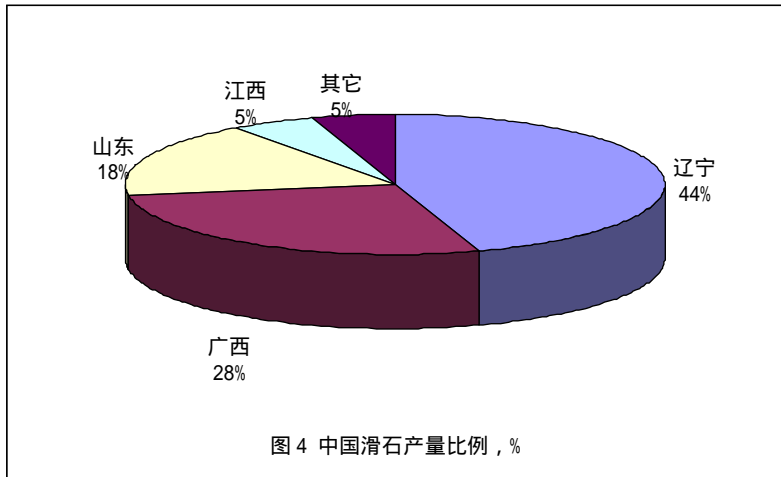
The output of China's talc in statistics is often higher than real output due to different factors. For example. Some tailings are calculated into output volume, chlorite is classified as talc, repeated calculation and human factors, etc. Likewise, the source and accuracy of foreign statistics also need improving. A rather large part of the talc of China is the low-grade talc or tailing. The paper-making grade talc powder exported from Liaoning and Shandong, most paper-making talc powder consumed within China, a large amount of coating grade talc powder, Liaoning No.2 and Shangdong Pingdu No. 3 contain less than 50% of talc, or even less than 30%. Accurately speaking, these products are the tailings of talc or the compound of chlorite and talc.

The fact now is, the output of talc in recent years declined by a great margin in comparison with that of ten-odd years ago. The current annual output is around 2 million tons, of which white talc is about 1.7 million tons, mid-high grade talc around 1 million tons, high-grade purely white talc around 0.5 million tons. See table2 and chart 4 for output at major origins and their proportion.

Table2 Annual output of talc, China, 00,000tons

Liaoning	90
Guangxi	55
Shandong	35
Jiangxi	10
Others	10
Total	200

Source: China Talc Association



Source: China Talc Association

Chart 4 Proportion of talc in China Shandong, Jiangxi, else, Liaoning, Guangxi

China is also rich in grey (black) talc resources, as they can be found in 15 provinces, cities and autonomous regions. But the tapping and the exploitation of these resources still remain at a relatively low level. One important factor is the pitiable low price of China's white talc in the past scores of years, which made it no good to use grey (black) talc economically. However, with the rise of the price of white talc, such situation is to be improved.

Against the rise in the demand in China's white talc at the international market, China has not enhanced its capability for provision, or its capability has been weakened. Therefore, people began to seek substitute resources outside China. It is natural for more white talc to enter international market. But when judged from price and amount of supply, it is early to predict a replacement of China's talc in the near future. What is remarkable is the mining industry, processing industry and the supporting industry established in the past nearly 30 years since the start of reform and opening-up, together with the consuming market both home and abroad, and the development of logistics service and port, cannot be matched in a short period by the other two developing countries with relatively rich white talc resources.

To satisfy the excessive demand for highly pure talc at the international market, some foreign talc providers believe China can increase its output through modernized tapping method to fill the market. Is it feasible? At present, the major Chinese talc enterprises feel satisfied to their profit and boast a relatively sufficient fund. When the price continues to rise, a restricted tapping today will leave more resources and benefit for the enterprise tomorrow. It has become common sense for the talc enterprises of China. Particularly, when resources are assorted, people more firmly believe in the protective tapping of white talc resources, with nobody willing to retake the route of increasing profit through production expansion. It is not practical to expect China to seek immediate return through blind production expansion or at the sacrifice of long-term benefit.

Japan, ROK and Southeast Asia mainly need talc powder, which is of sufficient supply. Most of the micromesh talc powder comes from Haicheng Area of Liaoning, and the supply from Shandong and Guangxi is increasing steadily. In the next three years, the output of China's micromesh product will reach 180,000 tons. The raw materials for mid-high grade talc product will be in a long-term's insufficient supply without possibility of improving, making the best being to maintain the current level. The major market of export will be in Europe and the U.S. The demand at Japanese market will shrink and more micro talc will be needed as substitute. The mid-high grade materials will mainly come from Guangxi, and the amount in Liaoning and Shandong will not increase.

Worldwide, it is likely only the Chinese talc enterprises are selling raw materials, with profit mainly coming from mining and the sales of raw materials and only a slight amount from the powder processing links. It is not proper to say subjectively such a fact is good or not. But it is believed such a situation will not change in the future. The low cost in labor and powder processing will promise a greater benefit for the client processing powder in China. Moreover, more and more talc powder and less talc pieces will be exported. It is also possible for the Chinese government to encourage the processing of talc piece within the country and develop the down-stream talc products through adjustment in export policy.

The price of China's talc witnessed a sharp rise in recent years, but still remains the cheapest among the talc products of the same grade, due to four reasons: 1. low resources tax and resources refunding cost; 2. low cost in labor; 3. low input or no input for eco recovery; 4. good geographical conditions and low cost for the major production bases at the coastal areas.

As the major talc enterprises feel satisfied to their profit level, the price rise will be moderate even though there is still room for such rise. The main reason for higher price is the further expansion at the market demand for PP plastics making the supply even shorter. The second reason is the appreciation of RMB, and the third reason is the increase in the cost in production, labor and export license. What is to be known is the zero duty for the export of talc, which makes it very probable to levy a duty over the export of talc. The current export duty over non-mineral products is 5-15%, indicating a possibility for a rise by a great margin in the resources tax in the future.

The international market has been an important driving force for the development of China's talc industry. But in recent years, noticeable changes have taken place at the domestic market.

In the past, the main products at the domestic market are of the low grade. But in the recent a few years, the high-grade product used in the fields of plastics, medicine, food and coating materials increased very fast. What is more noticeable is China imported about 20,000 tons of talc annually in the past a few years(chart 5), with the average price remaining at USD426-504/ton(table3). Two factors are behind the growth of the domestic high-grade talc market: one is the raised level of the products of the domestic enterprises

requires quality materials; the other is the coming-in of a number of foreign companies that start their production in China as either foreign company or joint venture when the world's manufacturing center shifts to China. In a few years to come, there will be still a fast growth in the domestic demand for the high-grade talc. If the major driving force for the development of China's talc industry in the past 30 years was from export market, then the engine-like domestic demand for future, with its great potential, cannot be neglected. The Changjiang Delta and Zhujiang Delta will be the most important consumption areas. Though the coating materials, paper making and porcelain will remain the important market of consumption goods, the growth point at the domestic market will be at plastics, especially the PP plastics for automobile, household electrical appliances and packaging industry. The following examples illustrate the market potential for the application of China's PP plastics.

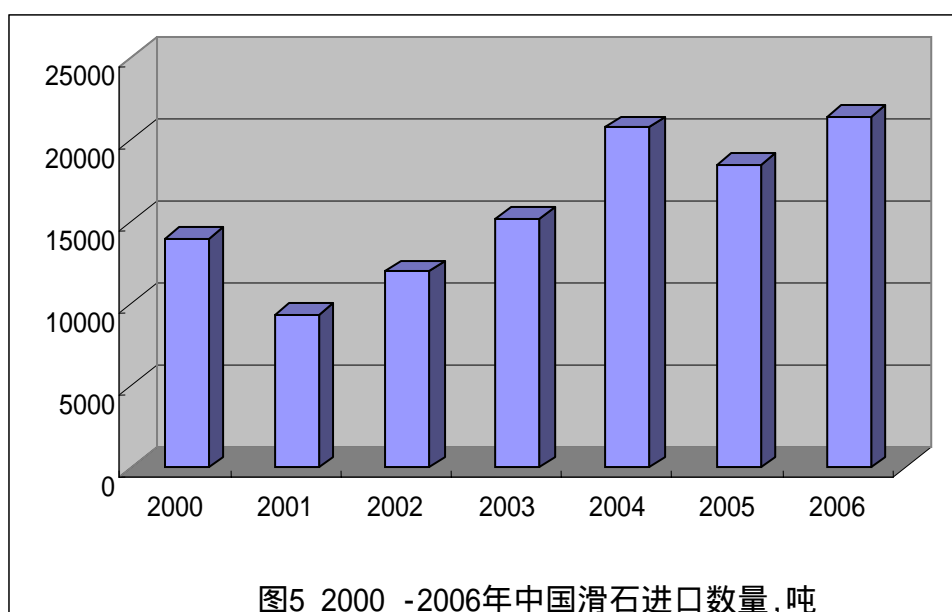


Chart5 Volume of import of talc, China, 2000-2006, ton

Source: Chinese Customs Statistics Yearbook 1970-2006

Table 3 Average Price of Imported Talc Delivered at Ports of China USD/MT

Year	2000	2001	2002	2003	2004	2005	2006
Price	491.34	494.24	467.71	462.95	479.06	504.99	464.29

Source: Haichen MinChem Co Ltd.

Table 4 shows a strong rise in the demand for China's PP and PE plastics. According to statistics concerning per capita plastics consumption, the Chinese 10kg/person in 2003 and 14kg/person in 2007 were far behind the average level of 30-40kg/person of the developed country. It is expected the plastic processing industry of China will grow at a high speed, bringing about a sharp rise in per capita consumption. The development of China's plastics industry, particularly the wide application of plastics in automobile, household electrical appliances and package products will create an enormous room for the further expansion of the market of talc.

Table 4 Development and forecast of China's plastics product industry in 2000-2010 (00,000ton)

Year	2000	2001	2002	2003	2004	2005	2007	2010
Total output	1,080	1,283	1,400	1,700	2,200	3,000	3,500	5,000
Demand	2,046	2,333	2,636	2,979	3,366	3,804	5,000	7,000
PE·PP · output				996	1,048	1,210	1,526	2,039
PE·PP·demand				1,556	1,705	1,870	2,139	2,620
PE·PP Export				PP130 PE180	PP150 PE200	PP160 PE220	PP160 PE200	PP160 PE200
PP·PE·net demand				1,246	1,355	1,430	1,780	2,260
Per capita consumption kg/P				10	11	12	14	17

Source: Haichen MinChem Co Ltd.

Now, China's automobile industry is still in its cycle of development. The output volume was 7.28 million in 2006, an increase of 27.6/% in comparison with the previous year, surpassing Germany to become the third largest producer after the U.S. and Japan. The output in 2007 is expected to be 8 million. According the estimation by State Information Center, the output volume will reach 11.5 million in 2010 (chart 6), making China rank the second produce before Japan. In addition, China still needs a large number of agriculture-use vehicles, promising a huge market. Now, each car consumes an average of 50 kg plastic product in China, less the average level of over 60kg of Germany and Japan. With the measures of light automobile, petroleum conservation, environment protection and recycling put into force, PP plastics products will be used more widely in automobile. The average annual increase in the demand for the plastics for automobile industry will remain at 10%, which will pump the continuous growth of the consumption of talc.

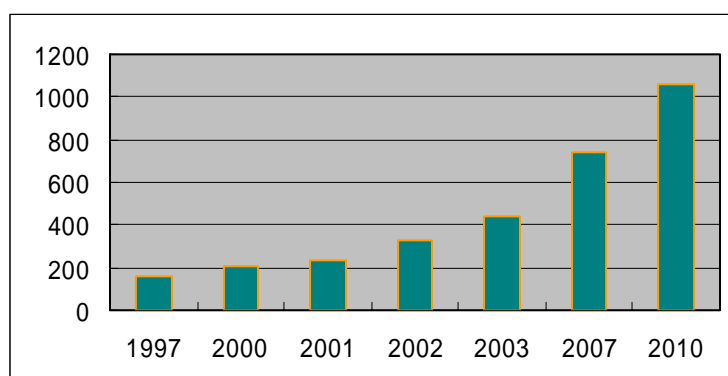


Chart 6 Automobile output volume in 1997-2010 (00,000)

Source: State information Center

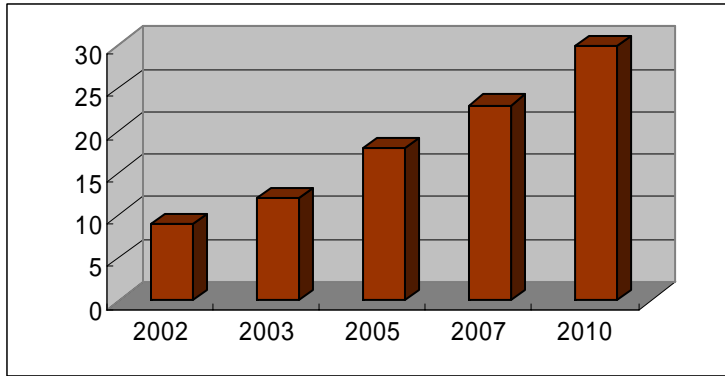


Chart 7 Amount of plastics products consumed by China's automobile in 2002-2010 (00,000tons)

Source: Haichen MinChem Co Ltd.

Moreover, China boasts other unique market opportunities against other countries, like the woven bag and plastic film industries. In China, woven bag accounts for a considerable portion at the polypropylene market, as it is widely used in the areas like the package of cement, fertilizer, grain and other produce, chemical product, animal fodder, industrial salt and sugar. (chart 8) In 1990, the output volume of woven bag was 6.5 billion, while in 2001, the number increased to 3.43 billion, requiring 2.33 million tons of PP. In 1990-2001, the average increase rate of the demand in woven bag was 15%. In 2006, the production capacity exceeded 50 billion. Most products came from Zhejiang, Shandong, Jiangsu and Guangdong. In 2005, woven bag bit a small share of the market of polypropylene. But with the increase of woven bag used in the field of cement and fertilizer, the demand for woven bag will still rise continuously. In 2010, the output volume will probably exceed 5.5 billion per year, requiring 3.6 million tons of PP. Talc will have a remarkable space for development at this part of market.

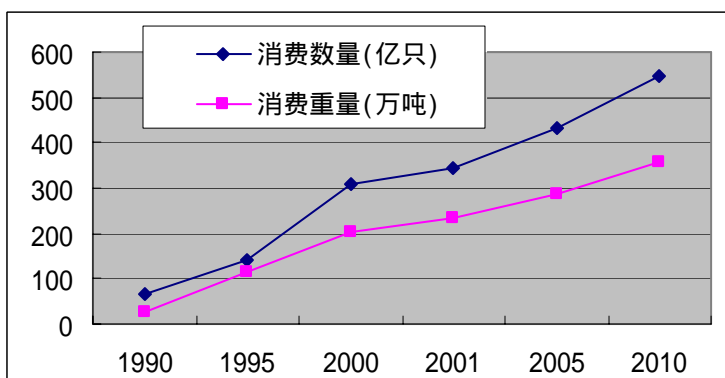


Chart 8 Amount of woven bags consumed in China in 1990-2010

Source: Haichen MinChem Co Ltd.

消费数量 amount of products consumed (0.1billion)

消费重量 weight of products consumed (00,000 tons)