

## **I-1.2 Changes in the Production Structure in 2003 & Influence on the Import**

Prior to 2003, there were basically two species of pentaerythritol:

- technical grade pentaerythritol: annual output is about 40,000t, merely satisfy the demand in the Chinese marketplace.
- monopentaerythritol (by Yuntianhua): Annual output is about 10,000t

The annual demand for the monopentaerythritol prior to 2003, saying 2002, is about 20,000t. So about 10,000t/a of monopentaerythritol imported from the overseas companies in meet the demand from the high-grade alkyd industry in China. From 2000 to 2002, China has been importing about 10,000t monopentaerythritol.

But this situation changed dramatically since May 2003. China was no longer a net importer of monopentaerythritol in the world and China has changed gradually to a net exporter. There are several reasons attributed to the dramatic change.

- The major reason is the price of petroleum oil began to roar up since 2003 in the international market. The price of major basic chemical followed the raise at significant space. Of course the price of pentaerythritol increased a lot.
- The price gap between the Chinese pentaerythritol and overseas pentaerythritol became obvious. So most Chinese importers, usually they are traders instead of consumers, turned to source cheaper product in the Chinese marketplace, and gradually decrease the import from the overseas.
- At the same time, the major end use section of monopentaerythritol, alkyd resin which has been used to make coating and paint, faced difficulties in maintaining the regular production as the price of other raw materials like phthalic anhydrous and oleic acid roared up. As a result, many alkyd producers began to turn their eye to find lower grade pentaerythritol, other rather monopentaerythritol which is expensive.
- It is at that time that Hubei Yihua launched commercial production of 94-95% penta and 98% penta at scale of 10,000t/a. The production of 94-95% material simply meets the demand from the domestic consumers and snatched quite a large part of market in China. At the same time Hubei Yihua successfully turned these consumers from high-grade penta to middle grade penta. Although Liyang Ruiyang entered the market in 2001 with ambitious determination, it seems that the impact from Liyang Ruiyang is not as strong as Hubei Yihua.
- In fact the ever-increasing price of penta in the international market attracted many domestic penta producers to export their product to the overseas market. So China has seen ever-increasing export of low-grade penta, middle grade penta and high grade penta, high grade pent in particular. From a certain point of view, China has the potential to become a large exporter of monopenta and technical penta influencing the world market.

### I-3.1.3 Import Situation of Pentaerythritol in 2005

Table I-3.1.3-1 Import price of penta by month in 2005

Month	Dipenta			Motopenta			Total	
	Quantity (t)	Value (USD)	Unit price (USD/kg)	Quantity (t)	Value (USD)	Unit price (USD/kg)	Quantity (t)	Value (USD)
Jan	1.768	10,481	5.93	151.885	195,743	1.29	153.653	206,224
Feb	0.056	608	10.86	113.501	144,580	1.27	113.557	145,188
Mar	5.513	29,778	5.40	211.205	273,778	1.30	216.718	303,556
Apr	3.937	22,220	5.64	306.800	390,327	1.27	310.737	412,547
May	1.424	15,473	10.87	55.427	71,333	1.29	56.851	86,806
Jun	0.83	8,601	10.36	183.675	233,745	1.27	184.505	242,346
Jul	0.81	11,450	14.14	77.309	94,163	1.22	78.119	105,613
Aug	1.606	14,588	9.08	139.385	191,353	1.37	140.991	205,941
Sep	0.02	127	6.35	183.361	232,710	1.27	183.381	232,837
Oct	-	-	-	134.958	164,975	1.22	134.958	164,975
Nov	4.18	34,030	8.14	154.999	192,668	1.24	159.179	226,698
Dec	3.24	17,122	5.28	249.705	337,759	1.35	252.945	354,881
<b>Total</b>	<b>23.384</b>	<b>164,478</b>	<b>7.03</b>	<b>1,962.210</b>	<b>2,523,134</b>	<b>1.29</b>	<b>1,985.594</b>	<b>2,687,612</b>

### I-3.2.3 Export Situation of Pentaerythritol in 2005

In 2005, China total exported 20,151t penta, with the year-on-year growth rate being 41.3%. It shows that the quality of Chinese penta makes great progress and it is approved by foreign clients.

In 2005, the export destinations of Chinese penta are mainly located in India, Indonesia, Korea, Malaysia and Chinese Taipei. China total exported 11,075t penta to these countries and regions, amounting to 55% of total export volume.

Hubei Yihua was the largest exporter. In 2005, the company total exported 8,474t penta.

#### - About export of dipenta

In 2005, China total exported 419t dipenta, and the average price was about USD2.90/Kg. The largest manufacturer was Hubei Yihua, who total produced about 250t dipenta.

All dipenta produced by Chinese manufacturers is exported to oversea market, and there is no any down stream industries of dipenta in China.

## I-5 Consumption Pattern of Pentaerythritol in China

### I-5.1 Market Size in Major End Use Segments

Basically the specification of pentaerythritol decides its application. E.g. the 86-90% assay pentaerythritol is used in industrial area. While the pentaerythritol with assay more than 98% is used to make explosive, or tetranitropentaerythritol, one of the raw material for explosive.

Table I-5.1-1 Consumption structure of pentaerythritol in China in recent years (t)

End use sections	2001		2002		2003		2004		2005		2006	
	Volume	%	Volume	%	Volume	%	Volume	%	Volume	%	Volume	%
Alkyd resin	41,832	83.00%	45,525	75.00%								
Polyurethane	1,550	3.08%	2,480	4.09%								
Synthetic lubricant	500	0.99%	700	1.15%								
Rosin/tall oil ester	2,500	4.96%	4,250	7.00%								
Others	4,018	7.97%	7,745	12.76%								