

V Future forecast

V-1 Driving forces in the industry

- Market demand

Demand for fumaric acid has increased rapidly since 2001, but the annual output didn't change until 2003, being only about 25,180 tonnes, which led to a large demand gap in that year. In the end of 2004, the average price of fumaric acid was very high, reaching RMB12,000/t, because its output couldn't meet the market demand.

To pursue high profit, many Chinese producers invested in fumaric acid industry. Most installations of fumaric acid were built and put into production. That is why the capacity of fumaric acid increased rapidly after 2003. In 2006, its capacity reached 105,000t/a. The average increase rate has surpassed 30% since 2003. Fumaric acid industry develops rapidly, but it still can't meet the market demand.

With the development of downstream industries including L-aspartic acid, UPR and food additive, the market demand will be a key factor driving the fumaric acid industry to develop in the future.

- Raw material

✓ Benzene

As a starting raw material for fumaric acid production, benzene directly influences the production cost of fumaric acid. In recent years the price of benzene kept increasing which was unfavorable to domestic fumaric acid industry.

✓ Acid liquor generated in the production of maleic anhydride or phthalic anhydride

Fumaric acid production is also relative with the production of maleic anhydride and phthalic anhydride because to some domestic producers, fumaric acid is only one byproduct of maleic anhydride or phthalic anhydride. If they stop production of maleic anhydride or phthalic anhydride, they will have no acid liquor generated in the production of maleic anhydride or phthalic anhydride to satisfy their fumaric acid production.

- Technology innovation

At present, Chinese fumaric acid producers all use benzene oxidized method. The method will be used a long time in future though it has some disadvantages. Chinese producers are to improve the technology and equipment, which can promote the capacity and quality of fumaric acid.

And in the long-term view, benzene oxidized method will be replaced by N-butane oxidized method which is widely used in developed countries. The N-butane oxidized method is the development trend, as it is more advanced. It has the advantages of high efficiency, high output and non-pollution.

- Domestic policies on fumaric acid industry

Governmental policy will have great influence on domestic fumaric acid industry.

- ✓ Export rebates decrease
- ✓ Government policy restricting the production of producers who seriously pollute the environment

Since the production of fumaric acid has high pollution, implementation of these policies in China can promote the structural adjustment of the industry. The companies whose production scales are too small to reach the requirement will be closed down, and those companies, whose cost is higher than others for their insufficient resource, low-tech or backward management, less competitiveness in the market, will be defeat by others and phased out.

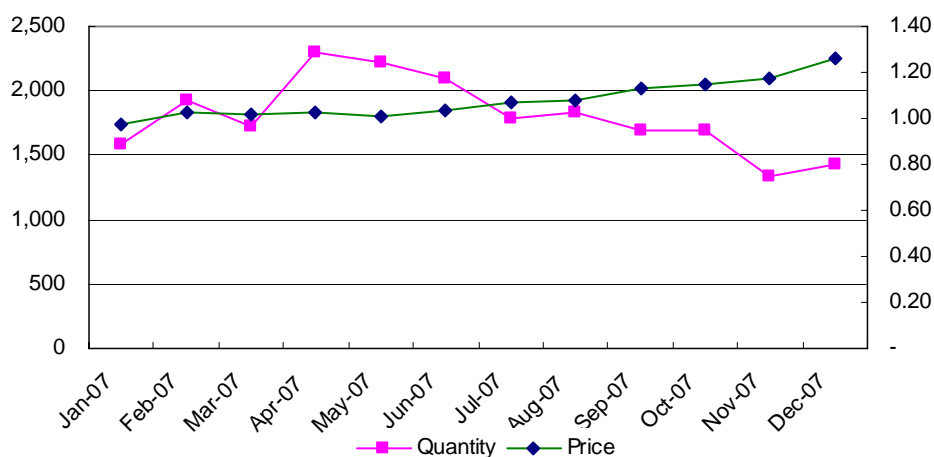
V-2 Difficulties in fumaric acid industry

- The adjustment of export tax rebate

Since Jul. 1st 2007, export tax rebate on fumaric acid has been reduced from 13% to 8%, which causes fumaric acid exporters to raise price to ensure their profit, thus the competitiveness of China's fumaric acid has been reduced in the overseas market.

After Jul. 1st 2007, the export price of fumaric acid from China increased by USD0.05/kg~USD0.1/kg. Correspondingly, the export volume from Jul.2007 to Dec.2007 decreased by 1,645.097 tonnes year on year.

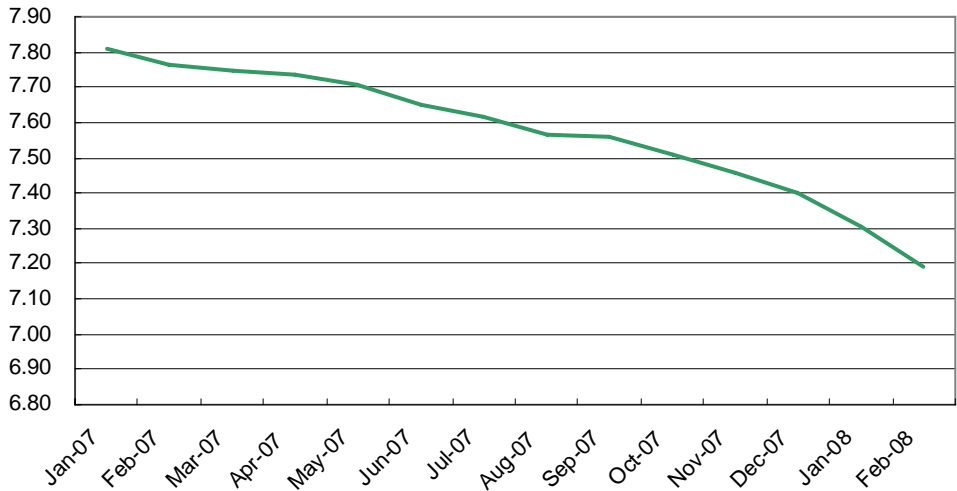
Figure V-2-1 Export price and export volume of fumaric acid in 2007(Price: USD/kg Quantity: tonne)



- **The depreciation of US dollar**

During the whole year of 2007, the US dollar has depreciated by 7% calculated by RMB, which means that the profit of fumaric acid export has shrunk. At present, most exporters are willing to export fumaric acid with the payment of RMB and the depreciation of US dollar acts as a disincentive to China's fumaric acid exporters.

Figure V-2-2 RMB/USD Exchange Rate in 2008~2012



V-3 Quantities forecasts of market in the next 5-10 years

Our forecast is based on economic theories and relative forecast technologies in econometrics and, a model, established in system dynamics technology with Vensim® software by CCM, is used to conduct our forecasts on the development of fumaric acid in China (2007-2011). System dynamics, which has been applied in many research fields, is a useful methodology & tool for policy analysis and assistant decision-making. The following items are integrated in the model:

- ✓ Relative data in the past
- ✓ Industry chain of fumaric acid
- ✓ Domestic policies on fumaric acid at present and in future
- ✓ Driven forces discussed in the above
- ✓ CCM's understandings on fumaric acid industry

The output of L-aspartic acid may increase slightly in the future 5 years, CCM predicts that output of L-aspartic acid will increase to 87kt in the year 2012, with the CAGR of 12.2% from 2008 to 2012.

- **Production**

In the next 5 years, the output of fumaric acid will keep a rising trend, but its CAGR will not be