

I-3 Theoretical Model of Raw Material

To learn the process producing glucosamine hydrochloride and its cost, CCM has perused more than 100 relevant research papers and patents published between 1995 and 2005 about producing glucosamine hydrochloride. On the base of full understanding of the research papers and patents, CCM made the flow chart of the producing way by two steps and confirmed the theoretical unit consumption and unit cost of each raw material by two steps too. And CCM made the unit cost of raw material after getting the unit price of each raw material.

In Chinese marketplace, glucosamine hydrochloride products are usually conformed to USP28. Their unit costs are listed in the following tables. Having communicated with experts and engineers and consulted literature, CCM understood that, during the production of glucosamine hydrochloride, 2 tones of chitin can produce 1 tone of glucosamine hydrochloride, and 3.3 tones of shell can produce 1 tone of chitin.

Table I-3-1 Theoretical consumption of raw materials to produce chitin* (industrial grade) from shell

Raw material	Unit consumption (kg/kg final product)	June 2006	
		Price (RMB/kg)	Unit cost (RMB/kg)
Shell of shrimp or crab (dry)	█	4.00***	█
HCl (31%)	█	0.58	█
NaOH (solid, 96%)	█	2.20	█
KMnO ₄ (Industrial, 99.3%)	█	16.50	█
Na ₂ C ₂ O ₄ (99.0%)	█	40.00	█
Water	█	0.002	█
Total		/	█

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I-4.2 Estimation on Manufacturing Cost

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- It is said that 25 employees are needed to produce 20 tonnes of glucosamine hydrochloride product each month. If the average salary is RMB1, 200/month, the cost of labor for glucosamine hydrochloride product is around RMB1.50/kg.
- Cost of packing: Glucosamine hydrochloride product is usually packed in cardboard barrel. Based on the unit price (RMB15) of cardboard barrel whose capacity is 30kg glucosamine hydrochloride product per barrel, CCM can estimate that the packing cost of glucosamine hydrochloride product is around RMB0.5/kg.
- The direct and indirect manufacturing of glucosamine hydrochloride product costs are assumed to be the fixed costs, which include depreciation, maintenance, etc. CCM

estimated that the cost for depreciation and maintenance is around RMB0.5/kg.

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Table I-4.2-1 Estimation on manufacturing cost in producing glucosamine hydrochloride from chitin

No.	Item	June- 06	
		Unit Cost (RMB / kg final product)	
1	Raw Materials		■
2	Utilities		■
3	Labor		■
4	Packing		■
5	Manufacturing direct + indirect		■
	Total		■

I-4.4 Estimation on Total Production Cost

The total costs of production are the summation of the manufacturing costs and the management costs.

Table I-4.4-1 Estimation on the total production cost of glucosamine hydrochloride (Time: June-06)

Item	Unit Cost (RMB / kg glucosamine hydrochloride)
Manufacturing cost	■
Management cost	■
Production cost	■

I-5 Estimation on Profit in Chinese Manufacturers

I-5.2 Profit Estimation in Chinese Manufacturers

The profit of producing glucosamine hydrochloride from chitin in China is estimated in accordance with the average price of the product and CCM's production cost estimation as mentioned.

Table I-5.2-1 The profit estimation on producing glucosamine hydrochloride from chitin

Item	RMB/kg product	Remark (Time: June 2006)
Price	■	Price including VAT
1. Income	■	/
Total Costs	■	Production cost
VAT	■	$83.00 \div 1.17 \times 17\%$ - $(71.33 - 0.018) \div 1.17 \times 17\%$ - $0.018 \div 1.06 \times 6\%$ - $1.80 \div 1.17 \times 17\%$ - $0.5 \div 1.17 \times 17\%$
EAT & CT	■	VAT×10%
2. Expense	■	Total costs+VAT+EAT&CT
3. Gross Profit	■	Income – Expense
4. Profit tax	■	Gross profit ×33%
5. Profit	■	Gross profit – Profits tax

According to this estimation, the total production cost of producing glucosamine hydrochloride from chitin in China is around RMB ■/kg. If the third part is willing to purchase chitin product at the above price level, then the profit will be near RMB ■ per ton of glucosamine hydrochloride. However, this is a very small profit. Considering that most manufacturers produce chitin by themselves, which makes the production cost lower than what is expected, the above data are reasonable and the model to estimate the cost and profit is correct.