

PART 3 – AROMA CHEMICALS from PETROCHEMICAL FEEDSTOCKS

4 VALUE CHAIN ANALYSIS

The value chain for the portfolio of Aroma and Fine Chemicals is shown in Appendix 1. Analysis of this value chain identified a number of business drivers.

Of the products within the proposed portfolio, the major markets are for menthol, vanillin, and pAA. The major use for pAA is in its use as an intermediate in the OMC market. The use of pHB in the production of other products such as raspberry ketone is small and there is no longer a market for the pHB in the manufacture of trimethoxybenzaldehyde. The key market for pHB is therefore its use for conversion through to pAA and vanillin as these are the only markets that can support a reasonably sized plant.

4.1 Menthol

Access to the menthol market is probably the major driver in this business as there are only a few established synthetic suppliers. The key issue is therefore that of cost competitiveness against existing synthetic producers. The CSIR technology allows the cost-effective enzymatic resolution of the required menthol isomer from the mixture of isomers in the hexahydrothymol mixture. Furthermore, further cost advantage is conferred by backward integration to m-cresol produced as a by-product of the novel CSIR oxidation of a mixed cresol feedstock. The technology package therefore has a competitive advantage in the full value chain. The technology for the production of menthol from the m-cresol natural arising of the pHB oxidation must therefore be cost-competitive against existing synthetic producers.

4.2 p-Anisaldehyde

The major competitor in the production of pAA is Atul in India. Atul has successfully become the market leader over the last few years, and driven a number of competitors out of the business. A clear business driver is therefore the position of cost leadership. Any new entrant into the business must have a significant cost advantage over Atul. It is critical that the technology demonstrate overall competitiveness in terms of its full integration through to the production of pAA from the mixed cresol feedstock.

The major end-use market for pAA is in its conversion to OMC. Access to this market is therefore another critical business driver. The cost leader and major competitor in the production of OMC is BASF *via* a non-pAA technology. Since the entry of BASF into the OMC market in 1995 with new non-pAA based technology, Symrise and other OMC producers using pAA have come under increasing cost pressure. BASF's aggressive market entry strategy has caused the OMC price to decline from above \$20.00/kg to \$12.00 - 14.00/kg. Although pAA producers have been pressured to reduce prices, the pAA price has not decreased to the same extent over the same period. It is therefore considered important

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that the economics of the production for OMC from pAA vs the cost leader BASF is understood.

4.3 Vanillin

The existing dominant producer, Rhodia is the only really significant competitor to be considered by a new entrant. The key business driver in the vanillin business is therefore to have a technology that can compete on a cost basis with Rhodia's process. The technology must therefore demonstrate overall competitiveness in terms of its full integration through to the production of Vanillin.