PART 3 – AROMA CHEMICALS from PETROCHEMICAL FEEDSTOCKS

15 CONCLUSIONS

The growth of a globally competitive and sustainable aroma and fine chemicals industry in South Africa, given the state, history and legacies of the South African chemical industry, is a challenging target. Achieving this will require the rapid implementation of a number of the initiatives already identified by the Department of Trade and Industry to stimulate and grow the chemical industry sector. The Department of Trade and Industry's Integrated Manufacturing Strategy has recognized that the previous strategic options that focused on the dependence on local raw materials, cheap labour, proprietary production technology and privileged access to markets are no longer sustainable. Increasingly, highly trained human resources, continuous improvement, technological innovation and smart acquisition of know-how will become the major differentiators for growth and sustainability of the chemical sector in South Africa.

A producer of the proposed portfolio of products will have to compete with well-established major players in these markets. To become globally competitive, it will have to generate a significant and sustainable competitive position to succeed. Based on the AECI/CSIR technologies, the techno-economic analysis for an optimized Aroma and Fine Chemicals portfolio, produced from a mixture of a petrochemical based, meta- and para-cresols feedstock, within the context of the South African fiscal and economic environment, identified two potential economically viable business cases for establishing a local Aroma and Fine Chemicals value chain:

1. A Fully Integrated business producing 1,500 tpa menthol, 2,000 tpa OMC (octylmethoxycinnamate), 381 tpa technical grade pAA and 200 tpa flavour grade pAA.

2. An upstream Bulk Intermediates business displaying commodity type characteristics producing 1,720 tpa pAA and 2,000 tpa m-cresol, coupled with a dedicated downstream Aroma and Fine chemicals business consuming the pAA and m-cresol to produce 1,500 tpa menthol and 2,000 tpa OMC.

The Study concluded that the technologies for pHB, pAA and menthol are internationally competitive against the world leaders provided that a mixed cresol feedstock price, equivalent to a pure cresol price of $ 1,250 – 1,458/ton is obtained and the m-cresol price credit exceeds $ 1,800/ton. The technologies for vanillin and ethyl vanillin are however not competitive against the major world producers.

The Study furthermore indicated that a far greater stumbling block than competitiveness against the pAA market leader is the pAA prices required by the end-user OMC producers to compete with the cost leader in this market. The OMC market leader uses a different and more competitive process. These pAA prices are extremely low compared to market prices

and it is doubtful that these prices could be matched on a plant based on any current or developed pAA technologies. A South African fully integrated OMC producer using internationally competitive technology could however be competitive against the world leader at the indicated mixed cresol and m-cresol prices. This Study therefore concluded that a South African pAA producer should be fully integrated through to the production of OMC in order to compete. Technology for the production of OMC from pAA has not been developed in South Africa. Furthermore, it is still covered by patent protection.

The aroma chemical industry is characterised by the difficulty of penetrating the international market. Aroma chemical formulations are developed around a particular specification or organoleptic quality acquired from a certain source of the ingredient. It is therefore very difficult for the end-user to change its source of supply once a product is formulated. Securing market access and establishing long-term customer relationships is critical to success in this value chain. This is particularly valid for menthol and OMC, the key drivers within the proposed suite of products.

A number of small-volume high-value Aroma Chemicals, which could be added to the portfolio of products in this value chain, have been identified. These include zingerone, heliotropin, p-anisyl alcohol, musk ambrette and menthol derivatives such as menthyl isovalerate and menthyl acetate. These products may be more suited to production by SME type businesses.

This study therefore has concluded that the goal of establishing a globally competitive and sustainable Aroma and Fine Chemical value chain can be achieved through an investment in the optimized portfolio of products by:

- Erecting world-scale plants as business clusters for selected products, rather than a few disparate small operations;
- Implementing leading edge technologies and operations;
- Accessing secure and competitively-priced raw materials;
- Securing market access; and
- Constantly innovating and introducing new products into the portfolio.

Although this FRIDGE study clearly demonstrated that South Africa has access to an internationally competitive suite of enabling technologies relevant to the production of a portfolio of Aroma and Fine Chemicals, it also highlighted the fact that South Africa lacks a number of critical factors required in order to implement this new value chain.

- South Africa has a shortage of suitably trained personnel capable of developing and implementing competitive fine chemical technologies.

- The ability to meet the organoleptic requirements of the customer depends on the skills of a "flavour" chemist or olfactory expert. These skills are however practically impossible to recruit in South Africa.
- A substantial financial gap to bridge the chasm between innovation and commercialization remains. Funds are limited and the expected time frames for return on investment are generally too short.

Based on the project techno-economics of the optimized product portfolio and the demonstration of a suite of competitive technologies, commercialization of this value chain could therefore represent an attractive opportunity for South Africa as a platform for the launch of an Aroma and Fine Chemicals value chain in South Africa. However before this can be achieved, the constraints impeding the creation of this value chain must be removed in order to prevent the technologies moving offshore to countries where these limitations do not exist and so potentially denying South Africa from benefiting from the opportunity to locally commercialize in-house developed novel technologies.