

Chemical World This Week

to naphthalene, spin change is faster than when bromine is syn and therefore closer. He likewise says there is no parallel between phosphorescence and intersystem crossing rates on the one hand and radiationless decay rates on the other.

These observations lead the Columbia scientists to conclude that radiationless decay occurs by a different mechanism—something not previously suspected. Current work may determine if the mechanism is photochemical in nature.

VINYL CHLORIDE:

New Lummus process

At 4.75 cents per pound list price, vinyl chloride is low-priced now. But a new process from Lummus developed jointly with Armstrong Cork may knock the tag down even further. Lummus says its new Transcat process produces vinyl chloride directly from ethane with no by-products for at least 1 cent lower materials cost per pound of product.

The new process hits one of the top dozen U.S. organic chemical markets, vinyl chloride, with consumption estimated by Lummus at 3.1 billion pounds in 1970. The material is the monomer for polyvinyl chloride, the number two plastic in the U.S. and number one in Europe. World vinyl chloride production is 10.5 billion pounds, states Lummus.

The key to Transcat (standing for the transition step and catalytic features of the process) is a reaction combining traditional chlorination, oxychlorination, and dehydrochlorination steps in a single reactor system. Starting materials are ethane, chlorine, and air. These react in the presence of a special molten catalyst which Lummus will identify only to clients with the necessary fee.

Transcat does not leave by-product hydrogen chloride, other chlorinated materials, and tars as do existing vinyl chloride processes. Lummus calls the process free of any known pollution problems.

Materials costs break out to 1.6 cents of chlorine and 0.6 cent of ethane per pound of product. The total, 2.2 cents, compares to 3.4 cents total materials cost in the balanced oxychlorination process and 4.2 cents per pound in hydrochlorination and direct chlorination, according to Lummus. Capital costs for Transcat are roughly equal to plant costs for existing processes.

Construction time is about 18 months to two years.

Lummus scientists developed Transcat over six years, in cooperation with Armstrong Cork. Armstrong Cork president Harry A. Jensen says that polyvinyl chloride resin made from Transcat monomer has satisfactory properties.

As an engineering company, Lummus plans to license Transcat to chemical processors. Company president William P. Orr says he would "not be surprised" to see the first plant started this year.

KOREA:

Partner from Japan

Mitsui & Co., Japan's second largest trading firm, is emerging as a substantial partner in South Korea's \$233 million petrochemical complex in the wake of U.S. withdrawals from the project. Now awaiting Korean government approval in Seoul is a package contract whereby Mitsui and Korea's Sam Yang Tire Mfg. Co. will build a 25,000 metric-ton-a-year styrene-butadiene rubber plant in the naphtha-cracking center now taking shape at Ulsan. Mitsui will provide half of the joint venture's \$3 million equity, roughly \$12 million in deferred-payment equipment loans, and SBR know-how from Japan Synthetic Rubber Co. This proposal follows withdrawal last October by American Synthetic Rubber Corp. from a somewhat similar contract with Sam Yang Tire.

The problem, Korea's Ministry of Commerce and Industry tells C&EN, was ASRC's proposal to furnish SBR technology alone as its share of the joint venture's equity. The ministry requested that some equity be put up in cash and also asked more liberal terms for the equipment financing than those arranged by ASRC. Instead, the U.S. firm withdrew from the venture.

Mitsui moved into the gap with its own SBR package, and it's now talking joint venture with Tongshin Polymer Co. as well. Mitsui has already closed a \$12 million engineering and equipment deal with Tongshin for the ethanol and acetaldehyde plants involved. An earlier joint venture contract between Tongshin and National Distillers and Chemical (C&EN, Jan. 6, 1969, page 22) was canceled last year. When Korean sponsors were first chosen for downstream units at Ulsan, Tongshin got the nod for eth-

anol and acetaldehyde. National Distillers entered a 50-50 venture with Tongshin to build a \$7.5 million plant—but only for ethanol. The contract was canceled last year after government insistence that the Tongshin project also include acetaldehyde and some of its derivatives (such as acetic acid and vinyl acetate), operations in which the U.S. firm wasn't interested. But the Japanese were. Mitsui closed its hardware contract last April covering both ethanol and acetaldehyde operations. In December, Tongshin tells C&EN, the two firms reached tentative agreement to operate these units through a joint venture, though Mitsui's equity participation hasn't yet been settled.

Earlier, another U.S. firm—Allied Chemical—backed away from Ulsan. Allied began negotiations in mid-1968 with Chungju Fertilizer over a joint venture to produce caprolactam. Prospects were for a 33,000 metric-ton-a-year unit in which Allied would hold 30% interest. But the U.S. company, ailing financially, soon after began a reshaping of operations that included a cutback of commitments abroad. It ended six months of discussion by withdrawing its Ulsan proposal. Chungju Fertilizer, a Korean government corporation, decided to go it alone with caprolactam and recently landed a \$25 million credit from Asian Development Bank (C&EN, Jan. 4, page 19).

Meanwhile, two other Japanese firms have together got Korean government approval to build a \$15.9 million polypropylene unit at Ulsan jointly with a group of Korean investors (C&EN, Dec. 21, page 31). In what initially was expected to be mainly a Korean/U.S. complex, in fact, only four of the 11 main plants—roughly half the capital outlay—remain Korean/U.S. ventures. The naphtha cracker and related units comprise a \$60 million investment by Korea Oil Corp. (a 50-50 venture of the Korean government and Gulf Oil Corp.), which will supply feedstock from its adjacent refinery to the 100,000 metric-ton-a-year (of ethylene) cracker after the cracker goes on stream in mid-1972. Korea Pacific Chemical, a Dow Chemical/Chungju Fertilizer venture, will use more than half the ethylene output to make polyethylene and vinyl chloride, and Skelly Oil is Chungju's partner in acrylonitrile production.