FLUIDS

Technical Questions

Process Fluids

Diphenyl Oxide - Can we satisfactorily bond a thoria phenol dehydration catalyst and have a route to making or procuring 5,000 lbs. before plant design May 1? Can we provide diphenyl ether purification and phenol disposal processes for design before May 1?

Phenylphenol - Can we separate the meta isomer from o- and p-phenylphenol and purify o-phenylphenol from dibenzofuran? Can we design the process to meet 40¢/lb. conversion in existing plant equipment?

Encapsulant Dye Solvents - Can we synthesize a 2 or 3-ring aromatic dye solvent superior in performance to HB-30, Nippon 295 (1-alkylphenyl 1-phenyl ethane) and Marlotherm S (dibenzyl toluene) and manufacture for 12¢/lb?

Dielectric Fluids - Can we provide a process with purification to <5% power factor for tolyl xylyl sulfone and 3,4-dimethylbenzophenone at manufacturing costs <21¢/lb.? These are the high DK base stocks for Aroclor replacement. Can we define blends using the high DK component with low cost fluids, hydrocarbons, esters, ethers to achieve manufacturing costs <13¢/lb.?

Pydraul - Can we find stabilizers to minimize formation of free phenol in making and using phosphate esters as hydraulic fluids and/or find new FR stable base stocks which do not give phenolics on degradation? Can we increase our lead in manufacturing the least toxic, most stable phosphate compounds?

Can we learn to make water a better lubricant in one-phase (water/glycol type) and two-phase (water-in-oil and oil-in-water emulsions) fluids? This technology will apply to hydraulic fluids and to metalworking fluids, rolling oils, extruding oils and cutting oils.

Skydrol - Can we formulate least toxic, high performance aviation hydraulic fluids?

Can we synthesize monocyclohexane epoxides which will stabilize Skydrol without giving shaft seal deposits (as in fluids containing diepoxide compounds) and which have minimum skin sensitizing action?

Limiting Factors - Uncertainties

Process Fluids

Diphenyl Oxide - We are targeting 3 months to work out the catalyst pellet strength-activity and procurement and to work out the purification-product quality problems, a short time.

Phenylphenol - We have 3 month process development time and too tight a budget. The business group wants product first quarter 1974. Uncertainties are life of dehydrogenation catalyst and recovery; cost of separating dibenzofuran from o-pp and m-pp from p-pp.

Encapsulant Solvents - We face 20¢/lb. superior performance Japanese and German competition for Nashua and Wiggins-Teape business. The starting quantities of 1-2$\overline{M}$ lbs. at Nashua are small when manufacturing a new chemical, but combined business could be 10$\overline{M}$ lbs. by 1975. Might face Nippon application patents on 1-alkylphenyl 1-phenyl ethanes.

Dielectric Fluids - Will aromatic sulfones be compatible with ester blends in capacitor life testing? Will we have the lowest cost/performance dielectric fluid in a competitive market?

Pydraul - It's difficult to stop hydrolysis of phosphate esters in hydraulic use. The rate can be slowed but neither phosphate ester nor free phenols are acceptable in waste water streams. For those customer plants who don't treat waste water, non-phenolic phosphate esters may be required.

Improving the lubricity of water is difficult. Water is solvent enough to keep polar additives away from metal interfaces and it doesn't form friction polymers.

Skydrol - The stabilizer problem is probably a balance between molecular weight to make product skin sensitive, cost on an epoxy content and compatibility with elastomers.

Success or Failure to Business Group

Process Fluids

Diphenyl Oxide - The heat transfer line needs to be rebuilt following loss of FR Therminol. This project will bring sales of $.75$\overline{M}$ in 1974, 1.5\overline{M}$ in 1976.

Phenylphenol - Want o-phenylphenol to improve their line of biocides. Specialty Products wants sale of o-pp for dye carrier and of p-pp to NCR for receiver sheets and mixed o,p-phenylphenols for phosphate esters. Project at 10.0M lbs. would mean $5.0M in sales by 1976.

Encapsulant Solvents - Nashua-Wiggins-Teape will require improved solvents to hold the future business $3-5M.

Dielectric Fluids - $10M sales - To stay in this business we need to provide customers with alternates to PCB. Pressure is now in supplying capacitors to Japan where PCB is banned.

Pydraul - $6.0M - We want to keep EPA off our customers' backs with regard to phenolic discharge in waste water. This concerns the future of aromatic phosphate esters. Water base fluids are not important to us now but they will be very important in the future if the technical problems of lubricating performance and biodegradability are satisfactory.

Skydrol - Replacement of the present diepoxide in Skydrol 500C and LD is required to avoid deposit problems now being encountered, $3.0M; and could add $1.0M in sales in 1975. Reformulation of Skydrol 500A for erosion control could add $1.0M in 1974.

Historical Data

Year	$	% Sales
1968	1,330	5.7
1969	1,270	4.1
1970	993	3.1
1971	1,130	3.6
1972	918	3.8
1973	1,036	4.2

I. Pydraul Hydraulic Fluids

II. Dielectric Fluids
Capacitors
Transformers

III. Therminol - Heat Transfer Fluids

IV. Santosol - Encapsulant Dye Solvents
for Carbonless Copy Paper

V. Dye Carriers

I. Pydraul Hydraulic Fluids

Replace PCB

Replace PCT

Conversion Products

Components in Blends

- N_2CP - NCP
- Santicizer 141
- Santicizer 148
- TBP
- CDP
- Humble 676

New Phosphates

- Product
- Process
- Cumylphenol

Conversion Products

	Old Product	New Product
Selector 1	Pydraul 60	Pydraul 10E (same)
	Pydraul 150A	Pydraul 29E LT
	Pydraul AC-A WG	Pydraul 30E
	Pydraul A-200B	Pydraul 50E
	Pydraul F-9A	Pydraul 50E
	Pydraul AC-A	Pydraul 90E
	Pydraul 625A	Pydraul 115E
Selector 2	Pydraul 135A	Pydraul 230C
	Pydraul 230A	Pydraul 230C
	Pydraul 312A	Pydraul 65E & Pydraul 312C
	Pydraul 540B	Pydraul 540C

Environmental Testing

1. Acute

   Oral

   Skin adsorption

   Skin irritation

   Eye irritation

   Vapor inhalation

2. Chronic

   90 day feeding

   High dose feeding
   2-4 weeks + tissue analyses

   2 year feeding + tissue analyses

3. Special Tests

   Demyelination

   Skin sensitivity - humans

4. Semi-continuous Activated Sludge (SCAS)

5. Acute Fish Toxicity

6. EC-201 & EC-202

MONS 041184

II. Dielectric Fluids

Aroclor 1016

New Candidates

- Sulfone-hydrocarbon
- All C, H, O
- Other

Considerations

III. Therminol - Heat Transfer Fluids

Therminol 66 (HB-40)

Therminol 55

Therminol 44

MONS 041186

IV. Encapsulant Dye Solvents

Santosol 100 (MCS 1175)

- Chemistry
- Process
- Environment

Santosol 200 (MIPB)

Santosol 300 (HB-30)

Santosol 340 (HB-40)

New Customers

- 1-4 DPMP

V. Dye Carriers

MCS 1109