ORGANIC CHEMICALS DIVISION RESEARCH Report

REPORT NO. P-1590 JOB NO. 2-21-760.01-1113615

TENTATIVE PROCESS

FOR

AROCLOR 6037 (MCS 1057-1)

DATE - November 17, 1970 WRITTEN BY L. R. Stark

Monsanto

ST. LOUIS, MISSOURI

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MONSANTO COMPANY
Organic Chemicals Division
St. Louis Research Department

SAFETY REVIEW COMMITTEE
APPROVED
APPROVED

FINAL APPROVAL DATE NOV 25 1970

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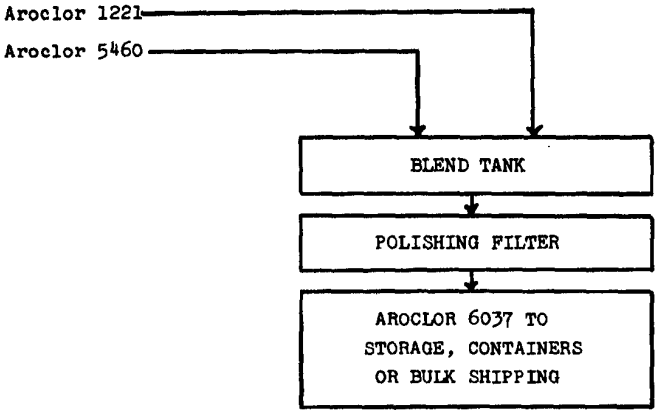
INTRODUCTION

Aroclor 6037 is a special blend of Aroclor 5460 and Aroclor 1221 to give an absolute viscosity at 75-80°F. equal to that of Aroclor 1242. This formulation was developed to replace Aroclor 1242 in an automatic transmission fluid additive formulation (Radiator Specialty Company).

SYNOPSIS OF PROCESS

Aroclor 6037 is prepared by blending Aroclor 5460 and Aroclor 1221. The blended product is filtered to remove any stray debris from raw materials or blending and is transferred to containers or storage.

FLOW SHEET



BILL OF MATERIALS

Basis: 100 lb. of product

	Raw Material	Wt., lbs.
82610	Aroclor 1221	63.0
82622	Aroclor 5460	37.0

PROCESS IN DETAIL

The blending operation may be carried out in any suitable metal or glass-lined vessel. The materials are not corrosive and carbon steel equipment is suitable. An agitator should be provided.

Order of addition is not critical and will be determined by the physical state of Aroclor 5460 and operating convenience. If 5460 is already in the molten state, it may be added first, then Aroclor 1221. If in the solid, flaked state, the Aroclor 5460 should be added to the Aroclor 1221 heel. In both cases the lowest viscosity and consequent minimum agitator power requirements will be obtained by adding the Aroclor 1221 followed by Aroclor 5460.

After the ingredients are combined, agitation should continue 1/2 to 1 hour or until an homogeneous mixture is obtained. It is suggested that the batch be warmed only enough in the 75-150°F. range (25-65°C.) to insure adequate mixing.

The completed batch is then circulated through a polishing filter (cellulosic string wound filter cartridges of 50 micron nominal rating are sufficient or use filtration normally used in Aroclor production). Samples are taken as required for analytical and control purposes. The batch may be held for possible viscosity adjustment or sent to storage. After blending, the temperature may be reduced to 75-130°F.

DISCUSSION OF IMPORTANT VARIABLES

The most important specification property of Aroclor 6037 is viscosity. Adjustments in the blend should be made to keep the 100°F. viscosity within the required range.

If the 100°F. viscosity is low, add Aroclor 5460. One pound of 5460 per 100 pounds of mixture will increase the 100°F. viscosity about 1.2 cs.

If the 100°F. viscosity is high, add Aroclor 1221. One pound of 1221 per 100 pounds of mixture will decrease the 100°F. viscosity about 1.2 cs.

MATERIAL SPECIFICATIONS

Raw Materials

Refer to raw material specification sheets included in the Appendix.

Finished Aroclor 6037

Typical analyses and suggested specification limits follow:

Property	Tentative Specification	Typical Value	Anniston Method
Appearance	Clear yellow liquid, free of foreign matter	Same	G-1
Color, NPA	2.0 max.	1.5	G-4
Viscosity at 100°F.	20 to 24 cs. (98 to 115 SUS)	21.3 cs.	049
Specific Gravity 25/25°C.	1.31 to 1.34	1.33	052
Acidity, mg KOH/gm	0.05 max.	0.013	050
Moisture	250 ppm, max.	63 ppm	047
As Requested:			
Flash Point, C.O.C.	---	265 to 290	114
Fire Point, C.O.C.	---	345 to 360	114

ANALYTICAL METHODS

No new or special analytical procedures are required for this product. A cross reference table appears in the Appendix listing standard analytical procedures used at J. F. Queeny Plant, W. G. Krummrich Plant, and the Anniston Plant. These procedures are currently used on similar products.

TOXICITY AND HAZARDS

No unusual toxicity or hazards are expected with the raw materials or fininhed blend. The process is a simple blending procedure and no hazardous reactions or heats of mixing should occur between the components.

Aroclor 1221 and 5460 have been produced by Monsanto for many years. Recently these have been combined in such products as Aroclor 6040, a substitute for Aroclor 1242 in plasticizer applications. (Note: Current specific toxicity information

is being requested from the Medical Department on the Aroclor 6037 blend and it is suggested these be included in the Appendix when obtained.)

General precautions include the following:

1. Goggles should be worn where splashing or spillage may occur.

2. Any material in contact with the skin should be removed by washing with soap and water.

3. Prolonged or repeated exposure to the skin may cause irritation due to removal of skin oils with resulting dryness and chapping.

4. Material may be irritating to sensitive skin areas and eyes. In case of contact with eye tissue, flush copiously with water and then get medical attention.

5. In case of internal ingestion, get immediate medical attention.

6. Avoid inhaling volation material or mists.

POLLUTION CONTROL

No waste by-products are generated by this process. Used filtering material, flushings from the system during cleaning, as well as any spoiled product should be disposed of as dictated by local regulations.

Every effort should be made to prevent chlorinated biphenyl or chlorinated terphenyl from being mixed with water and drained to the sewer. Non-aqueous solvents should be used to clean the blending tanks and equipment. Suggested fire resistant solvents are trichloroethylene or trichlorobenzene.

Minimum or no equipment cleanout would be needed if production is scheduled to have blends with similar components before and after Pydraul 6037, ie. 6040 or MCS 1004.

Vapor generation should be reduced by limiting the heating of the blend and raw materials to as low a value as possible consistent with practical blending requirements.

Solids containing the chlorinated biphenyl or chlorinated terphenyl (filter) must be disposed of at an appropriate land fill. Burning of these materials should be avoided at this time. When suitable high temperature incineration equipment is available, which will completely decompose such materials, burning will be an acceptable method of disposal.

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November 17, 1970

APPENDIX

L. R. Stark

File Copy Approved by:

Manager of R&D _____ (date) _____

Manager of Manufacturing _____ (date) _____

Manager of Process Technology _____ (date) _____

/is
11/17/70

PHYSICAL CONSTANTS DATA

SUBSTANCE	STRUCTURAL FORMULA
PYDRAUL 6037	AROCLOR 1221 63% AROCLOR 5460 37%
COMPILED BY: L. R. Stark	DATE: 11/16/70

NAME		SOURCE & DATE
Formula	Blend	
Molecular Weight		
Appearance	Clear light yellow liquid	
Boiling Point at 760 mm		
Boiling Point at mm		
Boiling Point at mm		
Boiling Point at mm		
Crystallizing Point	None	
Melting Point	None	
Solution Point		
Specific Gravity @ 25/25 C	1.33 typical	
Specific Gravity @		
Pounds per Gal. @ 25 °C	11.1	
Coefficient of Expansion		
Refractive Index @ n_D°		
Infra Red Spectrum (Reference)		
Ultra Violet Spectrum (Reference)		
Viscosity @ 100 F	21.3 typical	
Viscosity @		
Surface Tension		
Solubility in Water	Nil	
Solubility in		
Solubility in		
Flash Point °F (Method) COC	265 to 290 typical	
Fire Point °C	345 to 360 typical	
Heat of Combustion		
Heat of Formation		
Thermal Stability (cal./kg./min.)		
Latent Heat of Fusion		
Latent Heat of Vap.		
Specific Heat		
Critical Temperature		
Critical Pressure		
Dissociation Constant		
Other Constants		
Toxicity (Give Reference)		

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Analytical Procedures

Property	WGK	JFQ	Anniston	ASTM *
Appearance	12809	16-B	C-1	-
Viscosity	12837	126-A	049	D-445
Flash & Fire Point	12803	50-A	114	D-92
Specific Gravity	12804	116-B	052	-
Pour Point	13005	100-A	053	D-97
Cloud Point	-	36-A	-	D-2500
Acidity	12794	80-B	050	D-664/D-974
Moisture	12810	78-B	047	D-1744
Foam	12805	54-A	-	D-892
Refractive Index	13123	104-A	048	D-1218
Distillation Range	10117	-	054	Modified D-20

* Approximate equivalent ASTM method.

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ORGANIC CHEMICALS DIVISION

FINISHED PRODUCT SPECIFICATION

AROCLOR 1221 | Ann. 608

PLANT	PRODUCT CODE	USE
Anniston	826.10	Sales

DATE EFFECTIVE	SALES CODE
3-1-69	1040-225-04/11-009

APPROVALS

PRODUCTION	RESEARCH
H. Williams 2/19/69	M. E. Gibbs 3/12/69
SALES	QUALITY CONTROL (Chief Chemist)
W. Ault 3/10/69	R. Blowers 3/26/69 G. W. Miller 2/15/69

GENERAL DESCRIPTION

MIXTURE

MOL WT.

SUPERSEDES SPECS. OF	SAMPLE FOR ANALYSIS	ISSUED BY
4/25/61	2 x 1/2 gal. Amber Bottles	G. Miller

CHARACTERISTIC	LIMITS	METHOD
(R) Condition	Clear	G-1
(R) Color, APHA	100 Max.	046
(R) Specific Gravity (25/15.5°C)	1.182-1.192	052
(R) Acidity, (Mg KOH/g)	0.014 Max.	050
(R) Viscosity @ 100°F	38-41 SUS 4.0-5.5 Cp	049

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(R) Routine Analysis, All others Analyzed by request Only

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ORGANIC CHEMICALS DIVISION

FINISHED PRODUCT SPECIFICATION

PRODUCT			DEPT.
Aroclor 5460 (High Soluble Grade)			27-S
PLANT	PRODUCT CODE	USE	
Anniston	826.22	Sales	
DATE EFFECTIVE	SALES CODE		
3-11-66	1040-480-04-009		

APPROVALS

PRODUCTION	RESEARCH
R. G. Moody /s/ 12-30-65	L. R. Stark /s/ 3-8-66
SALES	QUALITY CONTROL (Chief Chemist)
W. E. Ault /s/ 3-2-66	O. E. Dolin /s/ 12-29-65

GENERAL DESCRIPTION: Mixture

CHEMICAL FORMULA:

MOL WT.

SUPERSEDES SPECS. OF	SAMPLE FOR ANALYSIS	ISSUED BY
4-21-61	1 x 16 oz. Can or W.M. Bottle	J. A. Liddle 11-30-65

CHARACTERISTIC	LIMITS	METHOD
UNRESTRICTED INFORMATION		
(R) Appearance and Color	Clear, yellow to amber brittle resin or flakes	G-1
(R) Color, NPA, Molten	2 Max.	G-4
(R) Softening Point, °C	98 - 105	115
(R) Solubility (25 g in 25 g. Acetone @ 25°C.)	3 hour, Min.	117
Acid No., Mg KOH/gm.	0.05 Max.	116
Chlorine, %	58.5 - 60.6	093
RESTRICTED INFORMATION		
Hydrolysis Stability, ppm Cl	300 Max.	092

MONS 034953

(R) Routine Analysis. All others Analysed by request Only