Perm

ORGANIC CHEMICALS DIVISION RESEARCH Report

REPORT NO. P-1609 JOB NO. 2-21-760.01-1113115

TENTATIVE PROCESS

FOR

PYDRAUL 150A™

DATE - February 27, 1971 WRITTEN BY P. D. Fowlkes

Monsanto

ST. LOUIS, MISSOURI

DSW 620384

STLCOPCB4094411

1) Pydraul 150A - Chlorinated diphenyl-free. low temp. fire resistant hydraulic fluid, test product

2) Santicizer 141 - raw material for Pydraul 150A

MONSANTO COMPANY
Organic Chemicals Division

3) Aroclor 5432 - raw material for Pydraul 150A

Technology Department Report No. P-1609

TENTATIVE PROCESS

FOR

PYDRAUL 150A

Job No. 2-21-760.01-1113115

DO NOT REPRODUCE
RETURN REPORT

Written by: P. D. Fowlkes

Work done by: P. D. Fowlkes
P. F. Heimsch
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L. R. Stark

Date: February 27, 1971

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STLCOPCB4094414

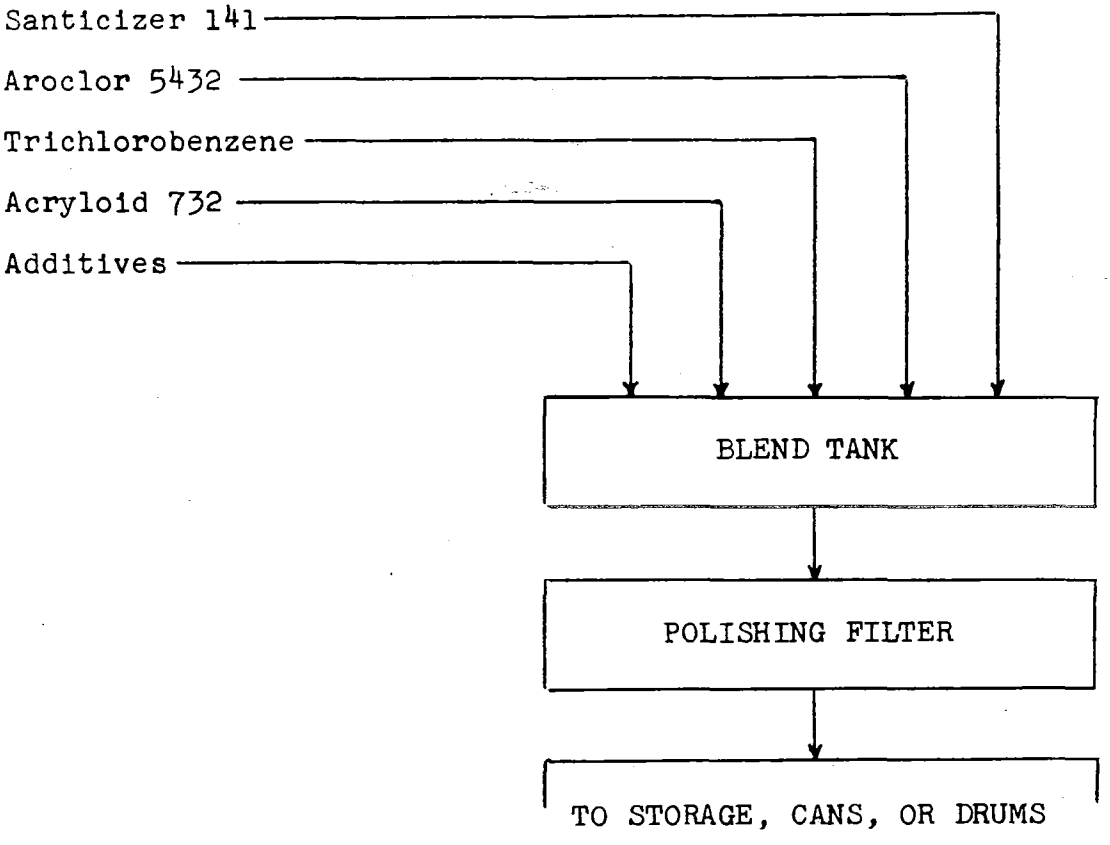
INTRODUCTION

Pydraul 150A is a low temperature fire resistant hydraulic fluid which does not contain chlorinated biphenyl. This blend was developed to replace Pydraul 150.

SYNOPSIS OF PROCESS

Pydraul 150A is prepared by blending Santicizer 141, Aroclor 5432, trichlorobenzene, Acryloid 732, and additives. The finished product is then filtered to remove any stray debris from raw materials or blending, and transferred to containers or storage.

FLOW SHEET



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RAW MATERIAL REQUIREMENTS

Basis, 100 lbs. of product

	Raw Material	Wt., lbs.
80150	Santicizer 141	68.7
60200	Trichlorobenzene	8.2
50031	Acryloid 732	8.0
82621	Aroclor 5432	14.8
51351	Santolube 70A	0.3
20640	DuPont Oil Blue A	0.0007
31100	DC 200, 350 cs.	0.005

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.

To the clean, dry vessel charge the Santicizer 141, trichlorobenzene and Acryloid 732. A short time (5-15 min.) should be allowed for the mixing of these ingredients prior to adding the Aroclor 5432. It would probably be convenient to add the dye, Santolube 70A and DC fluid at this time. Add the 5432, warm to 125-150°F. (50-65°C.) and stir for a minimum of 1/2 hour.

Aroclor 5432 is a resinous, sticky solid at room temperature. It may be handled easily if it is heated to 150-180°F. (65-82°C.). At 150°F., viscosity is 100-400 cs. and at 180°, 40-100 cs.

The Acryloid 732 should not be the last ingredient added because it floats on top of the blend until dispersed and a "bathtub ring" of 732 could result. This would cause the mixture to be outside spec on 100°F. and 210°F. viscosity.

The batch is then circulated through a polishing filter. Samples are taken as required for analytical purposes. The batch may be held for possible viscosity adjustment or be sent to storage. After blending is complete, it is recommended that the temperature be reduced to 80-129°F. (26-49°C.). Prolonged exposure at higher temperatures may cause some product quality deterioration.

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DISCUSSION OF IMPORTANT VARIABLES

The most important specification property of Pydraul 150A is viscosity. Adjustments in the blend should be made to keep the 100°F. viscosity within the required specification range.

If the 100°F. viscosity is low, add Aroclor 5432. One pound of 5432 per 100 pounds of blend will increase the viscosity about 0.5 centistokes.

If the 100°F. viscosity is high, add trichlorobenzene. One pound of trichlorobenzene per 100 pounds of blend will decrease the viscosity about 0.4 centistokes.

The quantity of dye added should be carefully measured on a suitable small balance or scale. This is important to insure uniform color from batch to batch.

Another caution mentioned in the previous section concerned prolonged heating. It is suggested that maximum temperatures of 125-150°F. be limited to 2 or 3 hours. Also, manner of heating the batch should control film temperatures so there are no significant hot spots. Prolonged heating may cause gradual darkening of the product as well as gradual increase in acidity due to decomposition of the Santicizer 141.

MATERIAL SPECIFICATIONS

Raw Materials

Refer to raw material specification sheets included in the Appendix.

Finished Pydraul 150A

Typical analyses and suggested specification limits follow:

Property	Tentative Specification	Typical Value	JFQ Method
Appearance	Cloudy blue liquid		16-B
Viscosity, cs.			
at 100°F.	29-33 cs.	30.9	126-A
at 210°F.	7.2-7.8	7.51	
Acidity, mg. KOH/gm.	0.30 max.	0.22	80-B
Specific Gravity 25/25°C.	1.122-1.130	1.125	116-A
Moisture, KF	0.15 max.	0.05	78-B
Pour Point (each 10th lot)	-55°F.	-55°F.	100-A

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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 at 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 finished blend. The process is a simple blending procedure and no hazardous reactions should occur between the various components.

Animal testing indicates that the components used in this blend have a very low order of acute and oral toxicity.

(Note: Current specific toxicity information is being obtained from the Medical Department on these materials and it is suggested these be included in the Appendix of this report.)

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.

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While the materials used in Pydraul 150A have not been identified as environmental contaminants, it is strongly recommended that care be exercised in preventing any tank flushings or other residue from entering the sewers.

Since Pydraul 150A is highly insoluble in water, any material introduced into the sewer would be an easily identifiable oily pollutant.

Used filters and tank flushings should be drummed and disposed of either in the WGK incinerator or sent to the toxic land fill.

APPENDIX

P. D. Fowlkes 3/17/71
P. D. Fowlkes

L. R. Stark 3/17/71
L. R. Stark

File Copy Approved by:

UR Richard Manager of R&D	3/17/71 (Date)
R Tracy Manager of Manufacturing	3/17/71 (Date)
Charles Farmer Manager of Process Technology	3/22/71 (Date)

/ls
3/9/71

DSW 620392

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Analytical Procedures

Property	WGK	JFQ	Anniston	ASTM *
Appearance	12809	16-B	G-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.

DSW 620393

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MONSANTO COMPANY
ORGANIC CHEMICALS DIVISION
J. F. QUEENY PLANT
FINISHED PRODUCT SPECIFICATION

PRODUCT CODE	DEPT. OR JOB
80150	

USE Sales - W. F. Waychoff, Manager and Internal

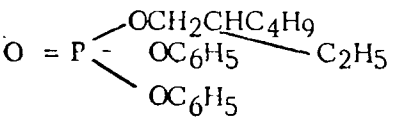
SALES CODE 7680-941-04-001

ISSUED JAN. 16, 1967
STANDARDS DEPARTMENT
John F. Queeny Plant
By Paul N. Biren

PRODUCT (Trade Name) SANTICIZER 141 — TYPE

PRODUCT (Chemical Name) 2-ETHYL HEXYL DIPHENYL PHOSPHATE — TYPE

CHEMICAL FORMULA



MOL WT. 362.40

SUPERSEDES SPECS OF July 2, 1963

SAMPLE FOR ANALYSIS 2 x 16-ounce NN Bottles

TEST	UNRESTRICTED SALES LIMITS	INTERNAL WARNING LIMITS	METHODS
On each lot			
Acidity	0.20 meq/100 grams max. (=0.01% as H_3PO_4)	0.05 meq/100 grams max.**	4-A
Appearance	Clear, oily liquid	Clear, oily liquid	16-B
Color	APHA 40 max.	APHA 20 max.	38-D
Foaming test:			54-A
Initial	---	10 to 60 ml.*** (Plasticizer Sales 80 ml. max.)***	
After 10 minutes	---	10 ml. max.***	
Moisture	0.10% max.	0.08% max.	78-B
Odor	Slight, sweet	Slight, sweet	84-A
Specific gravity @ 25/25°C	1.088 1.093	1.089 - 1.092	116-B
Volatiles	----	0.70% max. (Sales 0.80 max.)**	128-B
Water soluble salts	----	10 ppm max. (Sales 25 ppm max.)***	130-A
Upon request			
Refractive index @ 25°C	1.507 - 1.510	1.507 - 1.510	104-A

Sampling procedure

1. Receivers: Take two 16-ounce dip samples and submit to the laboratory for analysis.
2. Drums or Tank Cars: Take two 16-ounce samples from the filling line, about midway the filling operation, and submit to the laboratory for analysis.

*Disposition of material failing these limits will require approval of the Sales Department.
**Release of material on these properties to be based on Finished Goods control analysis.
***Santicizer 141 to be used in Functional Fluids must be within these limits.

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Monsanto
ORGANIC CHEMICALS DIVISION

RAW MATERIAL SPECIFICATION

MATERIAL CODE	MATERIAL
60200	Trichlorobenzene
PLANT: WGK	USING DEPTS.: 246
DATE EFFECTIVE: JUN 3 1965	SUPPLIER: Hooker

Raw for

APPROVALS

PRODUCTION	RESEARCH
P. E. Heisler	R. W. Bucknell
PROCUREMENT	QUALITY CONTROL (Chief Chemist)
G. C. Kamenko	W. J. Gresham

GENERAL DESCRIPTION: TCB

CHEMICAL FORMULA:

SUPERSEDES SPECS OF	SAMPLE FOR ANALYSIS	ISSUED BY
8-29-63	3 x 5 pt amber bottles	M. D. Dealy

UNRESTRICTED INFORMATION

	CHARACTERISTIC	LIMITS	METHOD
	Color	APHA 15, max.	10105
(R)	Condition	Clear	10105
(R)	Sp. Gr. @15.5/15.5°C	1.460 - 1.477	10114
	Acidity (mg. KOH/g.)	0.014, max.	10109
	Moisture (H_2O)	75 ppm., max.	10620
(R)	Refractive Index @25°C	1.5680 - 1.5715	10125
	Free Chlorides	0.10 ppm., max.	10118
	Crystallizing Point	10°C, max.	10107
	Dielectric Strength @25°C	30 KV, min.	11605
	Distillation Range (ASTM D-850, Modified) (corrected for Stem and Barometric Pressure)		10103
	First Drop	205°C, min.	
	5% by volume	210°C, min.	
	50% by volume	213°C, min.	
	90% by volume	215°C, min.	
	Corrosion Test, 6 hrs at 210°C with bright aluminum foil		10126
	Change in weight of Al	0.0%	
	Color	APHA 200, max.	
	Condition	Clear	
	Acidity (mg. KOH/g.)	0.014, max.	
	Free Chlorides	0.10 ppm., max.	
	Monsanto Stability Test	0.5 ppm., max.*	11503
	Hydrolysis Stability Test	0.5 ppm., max.	12672
	Fire Point	None to boiling point	10123
	Fixed Chlorine	58.5%, min.	10088

*Every other car can be over 0.5 ppm but never over 1.0 ppm. Values over 0.5 ppm to be cleared in advance.

Certificate of Analysis required on the above properties - To be mailed to the Chief Chemist, W. G. Krummrich Plant the same day shipment is made.

DSW 620395

STLCOPCB4094422

[illegible] COMPANY
CHEMICAL CHEMICALS DIVISION

J. F. QUERRY PLANT

TENTATIVE
RAW MATERIAL SPECIFICATION

MATERIAL CODE: 50031

USED IN: Pydraul F-9 & 150

PROPOSED BY: L. R. Stark

DISTRIBUTION:
W. Kuhn - 1 - GO/B240/N
B. Petty - 1 - GO/B2N
N. Johnson - 1 - GO/B2S
A. Uelner - 4 - J.F.Q.
P. F. Catens - 1 - J.F.Q.
Q. M. Capocefalo - 1 - J.F.
H. L. Powell - 1 - J.F.Q.
J. D. Leyerle - 1 - J.F.Q.
W. Richard - 1 - GO/T380
J. F. Herber - 1 - GO/T306
L. R. Stark - 1 - GO/W205
Standards - 3

NAME: RESIN, ACRYLOID 732

CHEMICAL FORMULA:

MOL. WT.:

DATE PROPOSED	EFFECTIVE UNTIL	SUPPLIER	SAMPLE FOR ANALYSIS
12/15/69	12/15/70	Rohm and Haas	1 x 8-ounce [illegible] Bottle

NOTE: All samples processed by this tentative specification will require disposition of the authorized releasing agent.

TEST	UNRESTRICTED PURCHASE LIMITS	INTERNAL CONTROL LIMITS	PROCEDURES
On each lot			
Appearance	Clear, viscous liquid, free of sediment, foreign particles, or polymer globules	----	16-B
Identification	----	Infrared Spectrum Normal	62-50030
Neutralization Number	Acid 0.50 max.	----	80-B
Viscosity @ 210°F	850-950 cs.	----	126-A
Separation Appearance Test	----	Clear with no cloudy or opaque appearance	See attached procedure
As requested			
Color, ASTM D-1500	4.5 max.		38-I
*Flash Point	375°F, min.		52-A

*After dilution with 3 parts of 375°F flash neutral oil to reduce viscosity.

DSW 620396

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[illegible]
ORGANIC CHEMICALS DIVISION

TENTATIVE SPECIFICATION

[illegible]	[illegible]	[illegible]
PLANT: Anniston	[illegible]	[illegible] Sales
DATE EFFECTIVE: 7/15/70	[illegible]	
AUTHORIZED BY: J. L. Corder	SOURCE OF SPECIFICATION: Research	

GENERAL DESCRIPTION

CHEMICAL FORMULA

CHLORINATED TERPHENYL

NO.	EFFECTIVE UNTIL	SAMPLE FOR ANALYSIS	ISSUED BY
1	1/15/71	1 x 1/2 gal. Bottle	J. T. Bell

CHARACTERISTIC	LIMITS	METHOD
(R) Color, NPA	2 Max.	G-4
(R) Specific Gravity @ 90°C	1.263-1.290	052
(R) Appearance	Clear Yellow Oil	G-1

GENERAL INFORMATION

Chlorine Content, %	30.5-33.0	093

DSW 620397

(R) [illegible] All [illegible] Analyzed by request only.

STLCOPCB4094424

MONSANTO COMPANY
ORGANIC CHEMICALS DIVISION

J. F. QUEENY PLANT
RAW MATERIAL
SPECIFICATION

MATERIAL CODE
81797-

USING DEPTS
Fluid Blends

SUPPLIER
Monsanto - Nitro Plant

ISSUED MAY 9, 1965
STANDARDS DEPARTMENT
John F. Queeny Plant
By Paul N. Bowen

MATERIAL
SANTOLUBE 70-A

CHEMICAL FORMULA

Blend of:	Santolube 70	98.35%
	Santolene C	1.65%

MOL. WT.

SUPERSEDES SPECS OF 6-21-67 for Santolube 70; Nitro code 81787

SAMPLE FOR ANALYSIS
1 x 16-ounce WM Bottle

TEST	RESTRICTED INTER-PLANT LIMITS	PROCEDURES NITRO	PROCEDURES JFQ
On each lot			
Appearance	Dark, oily liquid	6-C-01	16-B
Color ASTM Dilute	5.5 max.	6-C-21	38-I
Neutralization No.	51 to 61	6-A-24	80-A
Solubilities: 5%/vol. in PE	Clear	6-V-15	112-B
Specific gravity @ 25/25°C	0.89 to 0.97*	6-D-07	116-B
Upon request			
Emulsification test	40, 40, 0 (30 min.)	6-S-28	-----
Santolene C presence	Positive phosphorous test	-----	-----
Viscosity @ 210°F	70 to 300 SUS*	6-X-02	126-A

*Typical ranges submitted by Nitro.

Special requirements

This material is shipped upon invoice certification of compliance with specifications. Prior permission will be obtained to ship non-specification grade material.

This specification is the property of Monsanto
and is intended for internal use only.

DSW 620398

IN-55 REV 12-67

STLCOPCB4094425

ORGANIC CHEMICALS DIVISION

RAW MATERIAL SPECIFICATION

USING DEPTS.
Fluid Blends

SUPPLIER
Dow Corning Corporation

FEB. 8, 1965
STANDARDS DEPARTMENT
Paul N. [illegible]

MATERIAL
DOW CORNING 200 FLUID - 350 cs.

CHEMICAL FORMULA

MOL WT.

SUPERSEDES SPECS OF
October 28, 1964

SAMPLE FOR ANALYSIS
1 x 8-ounce Bottle

TEST	UNRESTRICTED PURCHASE LIMITS	METHODS
On each lot		
Appearance	Syrupy liquid	16-B
Refractive index @ 25°C	1.4020 to 1.4040	104-A
Specific gravity @ 25/25°C	0.969 to 0.975	116-A
Viscosity @ 25°C	332.5 - 367.5	126-31100
Upon request		
Color - modified Barrett	1.5 max.	38-H
Flash point	600°F min.	50-A
Neutralization No.	0.01 max.	80-B
Volatility (24 hrs./150°C)	0.5% max.	128-B

DSW 620399

IN 51 (REV. 12/63)

STLCOPCB4094426

PHYSICAL CONSTANTS DATA

SUBSTANCE: Pydraul 150A

STRUCTURAL FORMULA:
68.7% Santicizer 141
14.8% Aroclor 5432
8.0% Acryloid 732
8.2% Trichlorobenzene
0.3% Santolube 70A

COMPILED BY: P. D. Fowlkes

DATE: 2/27/71

NAME		SOURCE & DATE
Formula		
Molecular Weight	Blend	
Appearance	Cloudy blue 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.	1.125	
Specific Gravity		
Pounds per Gal. 25 °C	9.39	
Coefficient of Expansion		
Refractive Index n_D^{β}		
Infra Red Spectrum *(Reference)*		
Ultra Violet Spectrum *(Reference)*		
Viscosity 100°F.	30.89	
Viscosity 210°F.	7.51	
Surface Tension		
Solubility in Water	Nil	
Solubility in		
Solubility in		
Flash Point °F *(Method)* COC	425	
Fire Point °F	465	
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		

Comments:

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