STANDARD MANUFACTURING PROCESS

FOR

PYDRAUL A-200

In Dept. B-246

Do NOT LOAN
10166

DSW 176387

STLCOPCB4050274

MONSANTO COMPANY

ORGANIC CHEMICALS DIVISION

W. G. KRUMMRICH PLANT

MONSANTO, ILLINOIS

STANDARD MANUFACTURING PROCESS

FOR

PYDRAUL A-200 - DEPARTMENT B-246

Supersedes: Process Description for the Manufacture of Pydraul A-200 in Department B-246, Dated August 4, 1964 and all amendments.

Prepared by: D. E. Harris

Approved by:

C. Newlan
General Superintendent

J W Baker
Research

H. C. Carder
Technical Production Mgr.

Date: 10/66

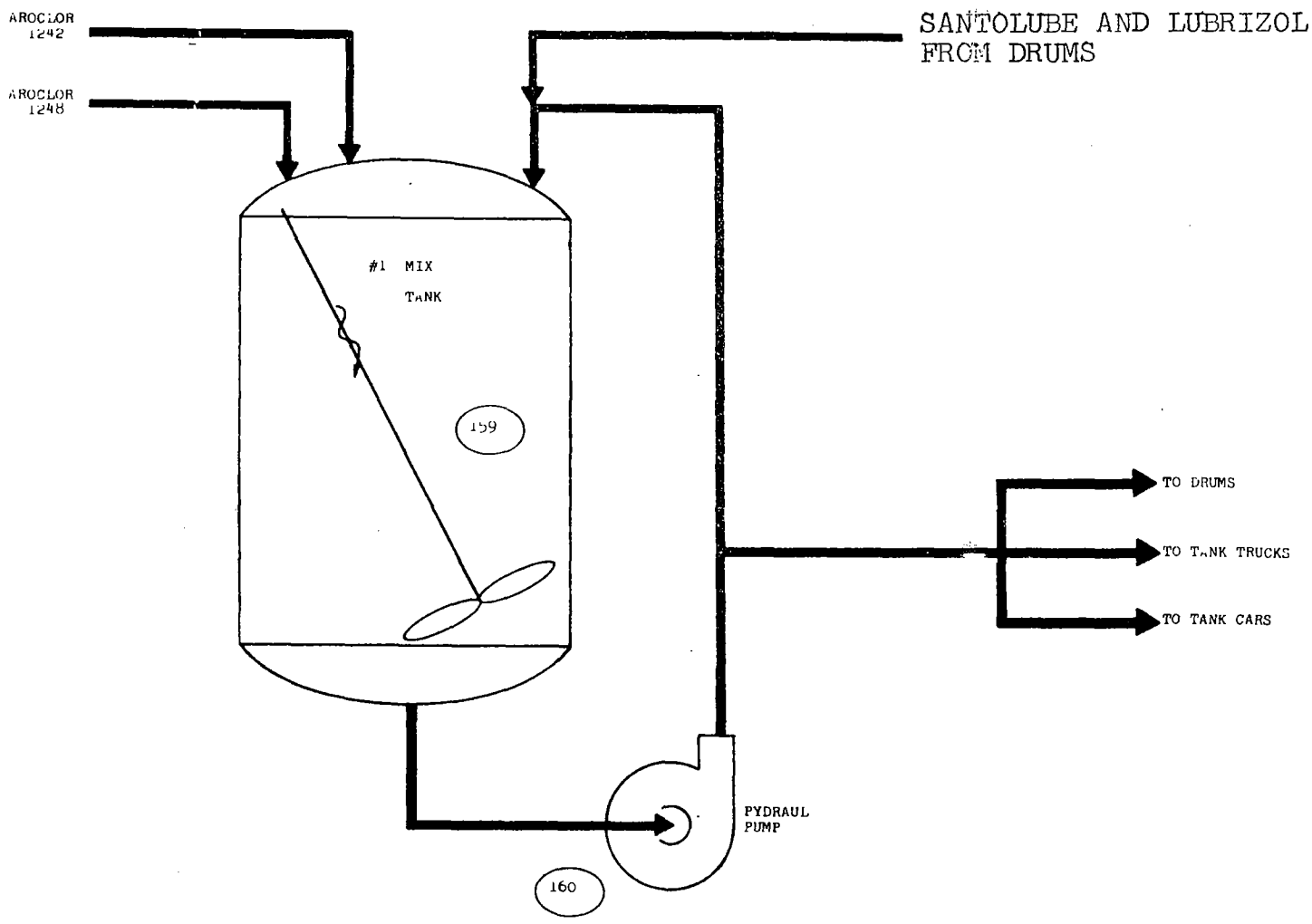
/af

COPY 9 of 15

This process is the property of Monsanto Company and the recipient is responsible for its safekeeping. It contains confidential information of Monsanto Company which must not be reproduced, revealed to unauthorized persons or sent outside the company without proper authorization. Either retain in a secure file or return to the Standard Documents Dept.

TABLE OF CONTENTS

	INDEX	PAGE
SECTION I	SYNOPSIS OF PROCESS	1.
SECTION II	PROCESS FLOW SHEET	2.
SECTION III	PROCESS IN DETAIL	3.- 4.
SECTION IV	COMMENTS ON PROCESS	5.
APPENDIX A	EQUIPMENT LIST	6.
APPENDIX B	FINISHED GOODS AND RAW MATERIAL SPECIFICATIONS	7.
APPENDIX C	PHYSICAL CONSTANTS	8. - 12.
APPENDIX D	UTILITIES	12. - 13.
APPENDIX E	PERSONNEL	14. - 15.
APPENDIX F	PACKAGING AND SHIPPING	16. - 17.
APPENDIX G	MATERIAL BALANCE	18.
APPENDIX H	ATMOSPHERIC AND STREAM DISCHARGE AND WASTE DISPOSAL	19.
APPENDIX I	PROCESS CONTROL PROCEDURES	20. - 21.
APPENDIX J	SAFETY AND TOXICITY DATA AND ACCIDENT REPORTS	22. - 24.
APPENDIX K	BACKGROUND INFORMATION	25.
APPENDIX L	TIME CYCLES	26.
APPENDIX M	QUALITY CONSIDERATIONS	27. - 31.
APPENDIX N	MISCELLANEOUS	32. - 34.



FLOW SHEET
810.96

PYDRAUL A-200

DEPT. B-246

9-23-66

DSW 176390

STLCOPCB4050277

Dept. B-246 - Process Description

PYDRAUL A-200

SECTION I

SYNOPSIS OF PROCESS

Pydraul A-200 is a trade name used to designate a mixture of Aroclor 1242, Aroclor 1248, Lubrizol 1360, Santolube 70, and Dow Corning Fluid 200.

Pydraul A-200 is a fire resistant, industrial hydraulic fluid. The Pydraul series of fire resistant fluids include a low viscosity and low temperature fluid, a high viscosity fluid, and a medium viscosity fluid, Pydraul A-200 is a non-viscosity index improved hydraulic fluid. Pydraul A-200 is the member of the Pydraul series manufactured in Department B-246 of the W. G. Krummrich Plant.

The proportion of ingredients used to manufacture Pydraul A-200 is listed below:

% Aroclor 1242	% Aroclor 1248	% Lubrizol 1360	% Santolube 70	Dow Corning Fluid 200
33% (vol)	67% (vol)	0.5% (wt.)	0.5% (wt.)	50 ppm

Most of the final product is dyed to a standard Pydraul color (blue) which does not change any other property.

Dept. B-246 - Process Description

PYDRAUL A-200

SECTION II

FLOW SHEET

This section contains a Pydraul A-200 process flow sheet.

STLCOPCB4050279

DISTRIBUTION SHEET

1. Technical Information Center,
2. Technical Information Center,
3. Central Reports
4. Technical Production Manager
5. Production General Superintendent
6. Production Supervisor
7. TSD Group Leader
8. Plant Research
9. Library
10. ~~Extra~~ D Danna - MMK Jagan
11. Extra
12. Extra
13. Extra
14. Danna — } MCL England
15. Danna — }

DSW 176393

STLCOPCB4050280

AMENDING RECORD SHEET

DSW 176394

Dept. B-246 - Process Description

SECTION III

PROCESS IN DETAIL

A. BACKGROUND AND BATCH DATA

Pydraul A-200 is a trade name used to designate a mixture of Aroclor 1242, Aroclor 1248, Lubrizol 1360, Santolube 70, and Dow Corning fluid 200. The blend is colored with a mixture of Blue A and Azo black dye.

Pydraul A-200 is Monsanto's high Aroclor hydraulic fluid designed as a low cost replacement for Pydraul F-9. Pydraul A-200 was formulated to meet viscosity and lubricating requirements and anti-rust characteristics as specified by the Sales Department.

The use of Santolube 70 in the Pydraul A-200 blend can cause undesirable foaming. A concentration of 50 ppm of Dow Corning Fluid (DCF) 200 will inhibit foaming.

The raw materials necessary to blend Pydraul A-200 are listed below:

Item	12,000 Gal. Batch	8,000 Gal. Batch
Aroclor 1242	4,000 Gal.	2,670 Gal.
Aroclor 1248	8,000 Gal.	5,330 Gal.
Lubrizol 1360	700 Lbs.	500 Lbs.
Santolube 70	700 Lbs.	500 Lbs.
Dow Corning Fluid-200	7.5 Lbs.	5.0 Lbs.
Blue A Dye	326 Gm.	264 Gm.
Azo Black Dye	120 Gm.	80 Gm.

B. BLENDING

Primary chemical reactions are absent in the production of Pydraul A-200. The only process step in Pydraul A-200 production is the unit operation of blending.

Aroclor 1242 and Aroclor 1248 are pumped from storage in department 246 to the #1 mix tank located in Department B-246. The mixture of Aroclors consists of one part Aroclor 1242 to two parts Aroclor 1248.

The mixture of Aroclors is agitated for four hours, and then sampled to measure specific gravity and viscosity. One 16 oz. sample is taken to measure these properties. Small additions of either Aroclor 1242 or Aroclor 1248 are added to alter specific gravity and viscosity to meet specifications if necessary. No steam is applied to the coils of the tank during agitation. Mixing is promoted by heating to 80°C, but must be allowed to cool to 65°C or less to fill drums to the proper weight.

Dept. B-246 - Process Description

SECTION III

PROCESS IN DETAIL (Cont'd.)

B. BLENDING (Cont'd.)

After the period of agitation, Lubrizol 1360 and Santolube 70 are pumped into the #1 mix tank. One half pound each of Santolube 70 and Lubrizol 1360 are added for 100 pounds of finished product. The batch is then circulated until the temperature has fallen below 70°C.

Lubrizol 1360 imparts good anti-wear properties to the Aroclor mixture. Santolube 70 is a rust inhibitor.

Next, Dow Corning Fluid 200 (DCF) is added to the mix - one pound per 2,000 pounds of product. DCF inhibits foaming caused by Santolube 70.

Most of the finished product is dyed a distinctive blue with blue and black dye. The dye does not change any properties other than color.

After all ingredients have been added the batch is agitated an additional 4 hours.

Three 16 oz. samples are taken from the discharge side of the circulating pump and analyzed for moisture, specific gravity, viscosity and foam.

If the batch meets all specifications (See Appendix B), the finished Pydraul A-200 is packaged in 5 gallon cans, 55 gallon drums, or loaded in tank cars and tank trucks.

Three 16 oz. lot samples are taken from each tank car or tank truck.

Dept. B-246 - Process Description

PYDRAUL A-200

SECTION IV

COMMENTS ON PROCESS

A. RAW MATERIAL YIELDS

Raw material yields are about 99% for this blending operation. Small material losses are attributed to samples. The exact amount of raw material usage for a given batch of Pydraul A-200 is not known since slightly different proportions of Aroclors may be needed to meet specific gravity and refractive index specifications.

B. CAPACITY

The capacity of Department B-246 is about 5 million pounds per year. The supply of Aroclor 1242 and Aroclor 1248 for Pydraul production is limited and thus a controlling factor of Pydraul production. Also, storage facilities are a bottleneck in the production rate. The #1 mix tank has a dual purpose and serves as both a blend tank and storage tank for the final product.

C. QUALITY

The specifications of Pydraul A-200 are more readily obtained than some of the other Aroclor-base products. The finished product does not have as many properties with rigid specifications as do Pyranols and Inerteens.

Some of the critical factors in producing a good quality Pydraul A-200 are as follows:

1. The viscosity of the Aroclor mix must be in specification.

2. The temperature of the Aroclor mix must be reduced to 90°C before adding the Santolubes to avoid decomposition of the Santolubes.

3. The temperature of the Aroclor-Santolube mix must be reduced to 80°C before adding the Dow Corning Fluid.

Dept. B-246 - Process Description

PYDRAUL A-200

APPENDIX A

EQUIPMENT LIST - W. G. KRUMMRICH PLANT

Item No.	Equipment Name	Equipment No.	Description
*149	#3 Storage Pump	19-0585 66-0853	Taber Vert. Sub. Pump. Dwg. A-387. Type C-3, 2" x 2", C.I. Body, Length 11'6". Cap. 50 GPM, 60' Static Head, Sp. Gr. 1.18 at 170°F. Motor is 3 H.P., 1800 R.P.M.
*151	#4 Storage Pump	19-0584 66-1501	Taber Vert. Submerged Pump Type L-2, 2-1/2" x 2", Length 11'6". Cap. 50 GPM at 40' Static Head. Motor is 3 H.P., 1800 R.P.M.
*157	#7 Storage Pump	19-2077 66-1691	Balckmer Pump. Monel shaft. 2-1/2 x 2-1/2. Motor is 3 H.P., 1800 R.P.M.
159	#1 Mix Tank	21-0321 23-1288 66-2168	Tank (Nooter), Dwg. D-6455, 14' O.D. x 10' high. 3/8" shell, steel construction. Capacity is 15,000 gallons. Agitator motor is 7-1/2 H.P., 1750 R.P.M.
160	Pydraul Pump	19-1540 66-3133	Taber Horiz., Cent. Pump 304 Stainless Steel, 2" suction, 1-1/2 discharge. Motor is 10 H.P., 1750 R.P.M.
161	Full Flow Filter	15-0239	Sweetland Filter. Size #10 RH, 54 leaves, C.I. Body, lined with Nickel.

*Equipment assigned to Department 246 also.

Dept. B-246 - Process Description

PYDRAUL A-200

APPENDIX B

SPECIFICATIONS - W. G. KRUMMRICH PLANT

The following is a list of the raw materials used for the manufacture of Pydraul A-200. Specification Sheets that are available are included for the materials.

Material Code	Raw Material
82113	Santolube 70
31100	Dow Corning Fluid 200
81101	Aroclor 1242
81102	Aroclor 1248
20640	Blue A Dye
20317	Azo Black Dye
39050	Lubrizol 1360

The following is a list of the finished products manufactured in Department B-246. Specification Sheets are included for the materials.

Products Code	Product
81096	Pydraul A-200

Monsanto
ORGANIC CHEMICALS DIVISION

RAW MATERIAL SPECIFICATION

MATERIAL CODE	MATERIAL
82113	Santolube 70
PLANT	**USING DEPTS.**
WGK	B-246, C-246
DATE EFFECTIVE AUG 10 1965	**SUPPLIER** Nitro Plant

APPROVALS

PRODUCTION	RESEARCH
P. E. Heisler	W. D. Robinson
PROCUREMENT	**QUALITY CONTROL** *(Chief Chemist)*
for Nitro Plant: J. N. Roark	W. J. Gresham

GENERAL DESCRIPTION

CHEMICAL FORMULA

SUPERSEDES SPECS OF	SAMPLE FOR ANALYSIS	ISSUED BY
4-13-62	1 x 16 oz. WM Bottle	M. D. Dealy

CHARACTERISTIC	LIMITS	METHOD	
		Nitro	WGK
Appearance	Dark Oily Liq.	6-C-01	T-2134
Color, ASTM Dil.	5.0, max.	6-C-21	T-2141
Neutralization Number	50 - 60	6-A-24	T-2135
Sp. Gr. @60/60°F	Ca. 0.92	6-D-07	T-2139
Emulsification Test	30, max.	6-S-28	
Rust Test	Pass	6-R-04	
Visc. @210°F	Ca. 240 SUS	6-X-02	
Flash Point	350°F, min.	6-0-01	T-2138

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 for internal use only.

DSW 176400

(R) Routine Analysis, All others Analysed by request only.

Monsanto
ORGANIC CHEMICALS DIVISION

RAW MATERIAL SPECIFICATION

MATERIAL CODE	MATERIAL
31100	Dow Corning 200 Fluid - 350cs.
PLANT	**USING DEPTS.**
WGK	B-246
DATE EFFECTIVE	**SUPPLIER**
MAR 18 1965	Dow Corning Corp.

APPROVALS

PRODUCTION	RESEARCH
P. E. Heisler	R. W. Bucknell
PROCUREMENT	**QUALITY CONTROL** *(Chief Chemist)*
R. F. Neunuebel	W. J. Gresham

GENERAL DESCRIPTION

CHEMICAL FORMULA

SUPERSEDES SPECS OF	SAMPLE FOR ANALYSIS	ISSUED BY
3-14-62	1 x 8 oz. W.M. Bottle	M. D. Dealy

CHARACTERISTIC	LIMITS	METHOD
UNRESTRICTED INFORMATION		
Appearance	Syrupy Liquid	T-2134
Viscosity @25°C	330 - 370 cs.	T-2132
Color-Modified ASTM D-848-45T	1.5, max.	T-2142
Flash Point	600°F, min.	T-2138
Neutralization Number	0.05, max.	80-B (JFQ)
Stability (Viscosity Change after 16 hrs. @200°C)	10, max.	118-31100 (JFQ)

This material is shipped upon invoice certification of compliance with specifications.

DSW 176401

(R) Routine Analysis, All others Analyzed by request only.

MONSANTO CHEMICAL COMPANY
ORGANIC CHEMICALS DIVISION
Krummrich and Anniston
FINISHED PRODUCT SPECIFICATION

PRODUCT CODE	DEPT. OR JOB
81101-82612	WGK-246-Ann.27

USE: Sales

SALES CODE: 1040-240-04/11/16-03/09

Issued
W. G. Krummrich Plant
By M D Daly

PRODUCT (Trade Name)	TYPE
Aroclor 1242	Non-Electrical Grade
PRODUCT (Chemical Name)	TYPE

CHEMICAL FORMULA

Mixture

MOL WT.

SUPERSEDES SPECS OF	SAMPLE FOR ANALYSIS
5-4-61	3 x 16 oz. W. M. Bottles

UNRESTRICTED INFORMATION

Routine Tests	Specification	WGK	Anniston Method No.
Condition	Clear	10084	G-1
Color, APHA	100 max.	10084	046
Sp. Gr. (25/15.5°C)	1.381 - 1.392	10114	052
Acidity (mg. KOH/g.)	0.010, max.	10087	050
Moisture (H_2O) (ppm.)	50, max.	10620	047
General Tests			
Distillation Range (ASTM D-20 Corrected)		10117	14-31-54
10% Distilled by wt.	325°C, min.		
90% " " "	360°C, max.		
Viscosity @100°F (SUS)	82-92	10086	049
Flash Point (°F)	338 - 392	10123	14-28-54
Fire Point	None	10123	14-28-54

DSW 176402

IN 84 (REV. 12/68)

STLCOPCB4050289

MONSANTO CHEMICAL COMPANY
ORGANIC CHEMICALS DIVISION
Krummrich and Anniston
FINISHED PRODUCT SPECIFICATION

PRODUCT CODE	DEPT. OR JOB
81102 - 82641	WGK 246-Ann.27

USE: Sales

SALES CODE: 1040-260-04/11/16-03/09

Issued 7/15/64
W. G. Krummrich Plant
By M D Daly

PRODUCT (Trade Name): Aroclor 1248
TYPE: Non-Electrical Grade
PRODUCT (Chemical Name):
TYPE:
CHEMICAL FORMULA: Mixture
MOL WT.

SUPERSEDES SPECS OF: 5-4-61
SAMPLE FOR ANALYSIS: 3 x 16 oz. W. M. Bottles

UNRESTRICTED INFORMATION

Routine Tests	Specification	WGK Method No.	Anniston No.
Appearance	Colorless to light yellow-green liquid	10084	G-1
Condition	Clear	10084	G-1
Color, APHA	100 max.	10084	046
Sp. Gr. @65/15.5°C	1.405 - 1.415	10114	052
Acidity (mg. KOH/g.)	0.010, max.	10087	050
Moisture (H_2O) (ppm.)	50, max.	10620	047
Viscosity @130°F (SUS)	73 - 80	10086	049
General Tests			
Flash Point (°F)	370, min.	10123	14-28-54

DSW 176403

Monsanto
ORGANIC CHEMICALS DIVISION

RAW MATERIAL SPECIFICATION

MATERIAL CODE	MATERIAL
39050	Lubrizol 1360
PLANT	**USING DEPTS.**
WGK	B-246
DATE EFFECTIVE	**SUPPLIER**
NOV 20 1964	Lubrizol

APPROVALS

PRODUCTION	RESEARCH
P. E. Heisler	R. W. Bucknell
PROCUREMENT	**QUALITY CONTROL** *(Chief Chemist)*
C. H. Campbell	W. J. Gresham

GENERAL DESCRIPTION **CHEMICAL FORMULA**

SUPERSEDES SPECS OF	SAMPLE FOR ANALYSIS	ISSUED BY
New	2 x 16 oz. W.M. Bottle	M. D. Dealy

CHARACTERISTIC	LIMITS	METHOD
UNRESTRICTED INFORMATION		
Specific Gravity @15.5/15.5°C	about 1.125	*
Phosphorus	7.8%, min.	
Sulfur	16.0%, min.	
Zinc	8.2%, min.	
Viscosity @210°F (98.9°C)	about 60 SSU	
Pounds/gallon @15.5°C	about 9.35	

*Analyses to be obtained from Supplier on request.

Shippers analysis covering the above requirements will be mailed to the W. G. Krummrich Plant Laboratory - Chief Chemist the same day shipment is made.

DSW 176404

(R) Routine Analysis, All others Analyzed by request only.

Monsanto
ORGANIC CHEMICALS DIVISION

FINISHED PRODUCT SPECIFICATION

PRODUCT		DEPT.
PYDRAUL A-200		B-246
PLANT	PRODUCT CODE	USE
WGK	81096	Sales
DATE EFFECTIVE	SALES CODE	
6/29/66	4595-200-11-03	

APPROVALS

PRODUCTION	RESEARCH
P. E. Heisler	M. E. Gibbs
SALES	QUALITY CONTROL *(Chief Chemist)*
W. E. Ault	W. J. Gresham

GENERAL DESCRIPTION — CHEMICAL FORMULA

MIXTURE

MOL WT.

SUPERSEDES SPECS. OF	SAMPLE FOR ANALYSIS	ISSUED BY
7/12/63	2 x 16 oz. W.M. Bottles	J. P. Prader

CHARACTERISTIC	LIMITS	METHOD
UNRESTRICTED INFORMATION		
(R) Appearance	Cloudy, Blue Liquid	12,809
(R) Flash Point	350°F., min.	12,803
(R) Moisture, K.F.	0.05%, max.	12,810
(R) Neutralization Number	0.80 - 1.10 mg. KOH/g.	12,794
(R) Sp. Gr. @ 25/25°C.	1.415 - 1.430	12,804
(R) Viscosity,		12,837
@ 50°F.	900 cs., max.	
@ 100°F.	30.0 - 33.0 cs.	
@ 210°F.	2.80 - 3.00 cs.	
RESTRICTED INFORMATION		
(R) Foam Test	150 ml., max.*	12,805

*Disposition of lots failing this limit will require approval of the Sales Department.

DSW 176405

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

Dept. B-246 - Process Description

PYDRAUL A-200

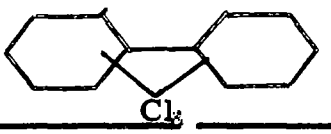
APPENDIX C

PHYSICAL CONSTANTS - W.G. KRUMMICH PLANT

This section contains constants sheets that are available and physical and function properties of Pydraul A-200. Pydraul A-200 was formerly named OS-95.

IN 619

PHYSICAL CONSTANTS DATA

SUBSTANCE	STRUCTURAL FORMULA
AROCLOR 1242	
COMPILED BY: A. M. Ellenburg	DATE: 4-25-57

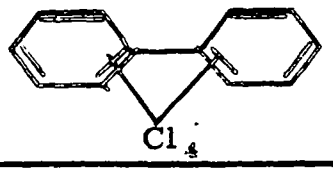
NAME		SOURCE & DATE
Formula	$C_{12}H_7Cl_3$	
Molecular Weight	257 (avg.)	
Appearance	Colorless Mobile Oil	Monsanto Bull. OP-115 (1956
Boiling Point at 760 mm Range	325 - 360 °C.	"
Boiling Point at 3 mm "	155-195 °C.	"
Boiling Point at mm		
Boiling Point at mm		
Crystallizing Point	Non-crystallizing	"
Melting Point		
Solution Point		
Specific Gravity @ 25/25 °C.	1.380	"
Specific Gravity @ 25/15.5 °C.	1.381 - 1.392	Specification 2-14-55
Pounds per Gal. @ 25 °C	11.50	M. B. OP-115
Coefficient of Expansion 25-65 °C.	0.00068 cc/cc/°C.	"
Refractive Index @ 25 °C. n_D	1.6245 - 1.6265	Specification 2-14-55
Infra Red Spectrum *(Reference)*		
Ultra Violet Spectrum *(Reference)*		
Viscosity @ 210 °F.	34-35 SUS	M. B. OP-115
Viscosity @ 100 °F.	82-92 SUS	"
Surface Tension Dynes/cm @ 20 °C.	45.3	J. Coll. Sci. 7, 166, (1952)
Solubility in Water	Insoluble	M. B. OP-115
Solubility in 3A Alcohol @ 29 °C.	23.3 g./100 cc	"
Solubility in Pyridine @ 30 °C.	132.5 g./100 cc	"
Flash Point °C *(Method)* c.o.c.	180 °C.	"
Fire Point °C c.o.c.	None	"
Heat of Combustion		
Heat of Formation		
Thermal Stability (cal./kg./min.)		
Latent Heat of Fusion		
Latent Heat of Vap. cal/gm.	61	Calculated
Specific Heat @ 25 °C.	0.293	M. B. OP-115
Critical Temperature		
Critical Pressure		
Dissociation Constant		
Specific Heat @ 300 °C.	0.380	"
Other Constants		
Pour Point	-14 °C. or lower	"
Thermal Conductivity, cal/cm/°C/sec.	24.0 @ 28 °C.	To be published
Dielectric Constant, 100 °C., 60 cy.	4.7 - 4.9	M. B. OP-115
Toxicity *(Give Reference)*	Contact Medical Dept.	M. B. OP-115

DSW 176407

NOTE: *These data should not be released outside of Monsanto Chemical Company. Use additional sheets if necessary.*

1N 619

PHYSICAL CONSTANTS DATA

SUBSTANCE	STRUCTURAL FORMULA
AROCLOR 1248	
COMPILED BY: A. M. Ellenburg	DATE: 4-25-57

NAME		SOURCE & DATE
Formula	$C_{12}H_6Cl_4$	
Molecular Weight	292 (Avg.)	
Appearance	Yellow Tinted Mob. Oil	Monsanto Bull. OP-115(195
Boiling Point at 760 mm Range	345-385°C.	"
Boiling Point at 3 mm "	165-210°C.	"
Boiling Point at mm		
Boiling Point at mm		
Crystallizing Point	Non-crystallizing	"
Melting Point		
Solution Point		
Specific Gravity @ 25/25 °C.	1.445	"
Specific Gravity @ 65/15.5°C.	1.405-1.415	Specifications 9/9/54
Pounds per Gal. @ 25 °C	12.04	M.B. OP-115
Coefficient of Expansion 25-65°C.	0.00070 cc/cc/°C.	"
Refractive Index @ 25°C n D	1.6285-1.6305	Specification 9/9/54
Infra Red Spectrum *(Reference)*		
Ultra Violet Spectrum *(Reference)*		
Viscosity @ 130°F.	73-80 SUS	M.B. OP-115
Viscosity @		
Surface Tension Dynes/cm @20°C.	44.2	J. Coll. Sci. 7, 166, (1952)
Solubility in Water	Insoluble	M.B. OP-115
Solubility in 3A Alcohol @ 25°C.	15 g./100 cc	"
Solubility in Pyridine @ 29°C.	111.4g./100 cc	"
Flash Point °K *(Method)* c.o.c.	196°C.	"
Fire Point °C c.o.c.	None	"
Heat of Combustion		
Heat of Formation		
Thermal Stability (cal./kg./min.)		
Latent Heat of Fusion		
Latent Heat of Vap. cal/gm.	54	Calculated
Specific Heat @ 25°C.	0.277	M.B. OP-115
Critical Temperature		
Critical Pressure		
Dissociation Constant		
Specific Heat @ 300°C.	0.356	"
Other Constants		
Pour Point	0°C. or lower	"
Thermal Conductivity, cal/cm/°C/sec.	23.6 @ 28°C.	To be published
Dielectric Constant, 100°C., 60 cy.	4.5-4.7	M.B. OP-115
		DSW 176408
Toxicity *(Give Reference)*	Contact Medical Dept.	M.B. OP-115

NOTE: *These data should not be released outside of Monsanto Chemical Company. Use additional sheets if necessary.*

STLCOPCB4050295

PYDRAUL A-200

APPENDIX C

PHYSICAL CONSTANTS - W. G. KRUMMRICH PLANT

*PYDRAUL A-200-PHYSICAL & FUNCTIONAL PROPERTIES

Appearance: Slightly cloudy, light yellow, oily liquid.

Viscosity:	Centistokes	Saybolt Universal Seconds
at 210°F	2.86	35.8
at 100°F	30.14	142.
at 40°F	1920.	8500.

Density:

at 100°F	1.4161 gm./ml.
at 60°F.	1.4305 gm./ml.

Flash Point (COC): 380°F.

Fire Point (COC): 680°F.(1)

Hot Manifold (MIL-F-7100), 1300°F.- Does not flash or burn on tube or after leaving tube.

Low Pressure Spray Flammability (AMS 3150-B) - Flame brightened, but did not increase.

High Pressure Spray Flammability (AMS 3150-B)- Will not ignite.

Molten Metal Ignition (molten aluminum alloy at 1150 to 1250°F) - Does spontaneously ignite. Flashes by spark.

Pour Point: +15°F.

Neutralization No. mg KOH/gm. to pH 11: 0.83(2)

Steam Turbine Oil Rust (ASTM D-665) 10.0 at 48 hours(3)

Foam (ASTM D-892)

	Foam Vol. ml.	Collapse Time Seconds
at 75°F	30	60
at 200°F.	8	60
at 75°F	35	60

Shell Four-Ball Wear: Steel-on-steel 4 Kg. - 0.21 mm.

167°F, 630 RPM, 1 hr. 10 Kg. - 0.29
40 Kg. - 0.43

*Pydraul A-200 was formerly named OS-95.

DSW 176409

STLCOPCB4050296

Dept. B-246 - Process Description

PYDRAUL A-200

APPENDIX C

PHYSICAL CONSTANTS (Cont'd.) - W. G. KRUMMRICH PLANT

Shell Four-Ball Wear: 167°F, 630 RPM, 1 Hr.	Steel-on bronze	4 Kg. - 1.20 10 Kg. - 1.40 40 Kg. - 1.70
Almen E.P.	Passing load - 48 lb.	24,000 psi.
	Passing torque - 41 lb.	
Almen Wear (wt. loss mg.):	1.3 mg.	
Timken Load (passing):	50 lb., 16,340 psi film strength	

Steam Turbine Oil Oxidation (ASTM D-943): (1008 hours exposure)

Viscosity	
100°F. Initial	30.12 cs.
Final	30.03 cs.
210°F. Initial	2.87 cs.
Final	2.86 cs.
Acidity Initial, TAN	0.82
Final, TAN	0.21
Fluid Appearance	Greenish brown with greenish white deposit in tube bottom.
Steel Appearance:	Soft black deposit on surface.
Copper App.	Black rough (etched) surface.
Four-Ball Wear:	Initial 10 Kg.-0.29 mm., Final 10 Kg.-0.41 mm.

Oxidation-Corrosion: (Fed. Sped. 791 Method 530.8, 168 hrs. at 250°F).

Metal Attach (wt. change mg/cm.^{2})

Copper	- 0.05 no etch, greenish to straw stain.
Aluminum	-+0.01 clear
Magnesium	- 0 very slight trace surface pitting
Steel	-+0.01 clear
Cadmium Plate	- 0.01 clear

Viscosity	
100°F. Initial	30.1 cs.
Final	31.8 cs.
210°F. Initial	2.86
Final	2.93
Acidity, TAN	
Initial	0.82
Final	0.68
Evaporation Loss, %:	0.6

DSW 176410

PYDRAUL A-200

APPENDIX C

PHYSICAL CONSTANTS (Cont'd.) - W. G. KRUMMRICH PLANT

Oxidation-Corrosion: (Fed. Spec. 791 Method 530.8, 168 hrs. at 250°F.) (Cont'd.)

Fluid Appearance: Clear, light amber, no deposits.

(1) fluid boiled over onto heater.
(2) apparent high acidity due to nature of additives present.
(3) rust rating: REL M-400, 10.0 - no rusting.

PYDRAUL A-200

APPENDIX D

UTILITIES - W. G. KRUMMRICH PLANT

The utility calculations are based on design calculations for a 5 million pounds per year production rate.

The breakdown of utility by individual equipment is only an estimate. The estimate of utility usages are average values in most instances as it is difficult to measure the operating time and load for a particular piece of equipment with great accuracy.

The total usage of each utility was taken from the cost sheets. Estimates of individual operating time and percentage of total load were made to calculate the distribution of utilities as given in the following pages of this section.

1. POWER CONSUMPTION

A. Electricity - 440 V. 3 phase, 60 cycle

Item No.	Equipment Motor	Motor H.P.	Peak Load KW	Monthly Usage KWH
160	Pydraul Pump	10.0	8.8	240
149	#3 Aroclor Storage Pump	3.0	2.6	20
151	#4 Aroclor Storage Pump	3.0	2.6	20
157	#7 Aroclor Storage Pump	3.0	2.6	20
159	#1 Mix Tank	7.5	6.6	600
	Agitator	26.5	23.2	900

B. Electricity - 110 V., One-phase, 60 Cycle

Equipment	Peak Load KW	Monthly Usage
Miscellaneous	2	200

2. COMPRESSED PLANT AIR

Item No.	Using Equipment	Normal use SCFM	Peak Use SCFM	Monthly Usage MSCF
159	#1 Mix Tank	15	30	1000

DSW 176412

STLCOPCB4050299

Dept. B-246 - Process Description

PYDRAUL A-200

APPENDIX D

UTILITIES - W. G. KRUMMRICH PLANT (Cont'd.)

3. LOW PRESSURE STEAM

80 psig at 325° F.

Item No.	Using Equipment	Normal use Lb/Hr.	Peak use Lb/Hr.	Monthly Usage M Lbs.
159	#1 Mix Tank	700	1000	400
	Miscellaneous	200	500	400
		900	1500	440

Dept. B-246 - Process Description

PYDRAUL A-200

APPENDIX E

Departments 246, A-246, B-246 and C-246 are closely related. Operating personnel may work in all of the departments in a given day. For this reason, the description of operating classifications and assignments for departments 246, A-246, B-246 and C-246 is given as though all four of the departments are just one department.

Operating Classifications

Job	Number of Men	
	7 day/week Schedule	10 & 4 Schedule
Premium Operator	4	3
Second Operator	4	3
Repairman	1	1
Standard Operator	2	2
Porter	½	½
Swingman	1	0
TOTAL	12½	9½

The swingman works two shifts per week (Saturday and Sunday) as a relief foreman, two shifts as a repairman, and one shift operating the premium job. There is an open shift on the second operator job that is covered by overtime. The premium operator and second operator cover three shifts each day. The repairman works the day shift, and with the swingman, there is 7 days per week repairman coverage. Standard operators work the day and middle shift 5 days per week. The porter works half time in department 246 and half time in department 243. The premium operator has lead responsibility for his shift.

The work force works all three departments Aroclor, Pyranol and Pydraul as one coordinated operation. The assignment of time is 70% to Aroclors, 15% to Pyranol and 15% to Pydraul.

Operating Assignments:

Premium Operator: Has overall responsibility and operates 5 chlorinators 2 stills and covers the necessary absences of the standard operator.

Second Operator: Operates 2 blend tanks filter, 2 finished product tanks, storage tanks, makes Pyranol and Pydraul mixes, loads trailer, and tank cars, charges chlorinators and transfers receivers and also belongs to the Fire Brigade.

Repairman: Unloads cars and trailers of Biphenyl, Trichlorobenzene and Tetra-Trichlorobenzene and finished product, makes weekly safety inspections and department minor repair work.

DSW 176414

STLCOPCB4050301

Dept. B-246 - Process Description

PYDRAUL A-200

APPENDIX E - PERSONNEL (Cont'd.)

Standard Operator: Fills, stencils and labels 5 gallon, 30 and 55 gallon drums and clean-up assignments when not drumming.

Porter: Cleans office, control room, repair room, wash room and smoking shelter.

Swingman: Works one day per week as premium operator, two days as repairman and two days as relief foreman. As relief foreman takes overall supervision and day shift on weekends including arranging for maintenance, night sheets and line-up of work.

Dept. B-246 - Process Description

PYDRAUL A-200

APPENDIX F

PACKAGING & SHIPPING

Aroclor, Pyranol & Pydraul are filled about half in drums and half in tank cars or tank trucks.

A substantial amount (about 40%) of Aroclor is used to make Pyranol and Pydraul.

Sales are largely directly to the customer. The remainder is in bulk shipments to the J. F. Queeny Plant.

All electrical grade tank truck shipments are made in the customers trucks which are stainless steel. Non-electrical Aroclors are shipped in leased trucks and may be iron although other materials of construction are suitable. Pydraul is shipped in steel tank trucks.

Electrical grade Aroclor and Pyranols are shipped in solid aluminum tank cars or in lined tank cars either 4,000 or 8,000 gallons in capacity. The lining is either tin, zinc or aluminum spray because iron contamination is detrimental to the electrical properties. Electrical grade cars are either owned by Monsanto or on a long term lease. Non-Electrical grade Aroclor is shipped in steel cars.

All electrical grade lots and bulk shipments of non-electrical material are sampled from the final container. That is all tank cars and tank trucks are sampled and analyzed after loading. All electrical grade drums are sampled from one of the drums.

Tank cars and tank trucks are inspected to be sure they are free of dirt and water or other foreign material before loading. Heels are drained before loading some materials. Car washing when necessary is done by the repair track. Tank cars are sealed with a numbered aluminum seal.

Lacquer lined drums are used for Aroclor and Pyranol and plain steel drums are used for Pydrauls.

A summary of products, weights and containers current use is as follows:

	Weights and Containers				
Product	5 Gal.	30 Gal.	55 Gal.	TT	TC
1232	-	-	600#	-	-
1242	55	-	600#	Yes	Yes
1248	60	-	600#	Yes	Yes
1254	60	-	600#	Yes	Yes
1254 Xylene	-	-	600#	-	-
1260	60	-	600#	Yes	Yes
1262	60	-	600#	-	-
MCS295	-	-	645#	-	-
Pyranol 1488	-	-	675	-	-
Pyranol 1481	-	-	675	-	-

DSW 176416

Dept. B-246 - Process Description

PYDRAUL A-200

APPENDIX F

PACKAGING & SHIPPING (Cont'd.)

Product	Weights and Containers 5 Gal.	30 Gal.	55 Gal.	TT	TC
Pyranol A-13B3B	65	360#	675#	-	4000 Gal.
Inerteen PPO	60	360#	674#	-	4000 Gal. & 8000 Gal.
Pydraul A-200	59	-	645#	Yes	-
Pydraul 280	60	-	625#	-	-

STLCOPCB4050304

Dept. B-246 - Process Description

PYDRAUL A-200

APPENDIX G

MATERIAL BALANCE - W. G. KRUMMRICH PLANT

A detailed material balance on Department B-246 was not made because blending and material losses in the process are negligible. The greatest material losses are the samples which are less than 1 pound per hundred pounds of finished product.

DSW 176418

STLCOPCB4050305

Dept. B-246 - Process Description

PYDRAUL A-200

APPENDIX H

ATMOSPHERIC - STREAM DISCHARGE

Waste materials are absent in the production of Pydraul A-200; no materials are sewered.

The temperature of the blend is about 70°C. At this temperature evaporation losses of the finished product are very small. Thus, almost no product is discharged to the atmosphere.

DSW 176419

STLCOPCB4050306

Dept. B-246 - Process Description

PYDRAUL A-200

APPENDIX I

PROCESS CONTROL PROCEDURE - W. G. KRUMMRICH PLANT

The data sheet in this section is typical of those used by operating personnel to record the various stages of the blending process as they are completed.

The process control procedure is listed below:

Sampling Point	Frequency	Reason for sample	Normal Range	Method Number
Discharge of circulation pump of #1 Mix Tank	One 16 oz. sample every batch	Sp. gravity viscosity	0.011 10 SUS	10,114 10,086
Discharge of circulation pump of #1 Mix Tank	Three 16 oz. samples every batch	Sp. gravity viscosity Moisture Flash Point Nuetralization Number Foam Test	0.015 50°F - 900 CS., Max. 100°F - 3.0 CS 210°F - 0.17 CS 0.05%,Max. 350°F,Min. 0.30 mg/KOH/g 150 ml,Max.	12,804 12,837 12,810 12,803 12,794 12,805
Tank truck or Tank Car	Three 16 oz. samples once every load	The samples are the same as those in Item 2 above.		

DSW 176420

STLCOPCB4050307

DEPT. B-246 (#1 Mix Tank) APPENDIX I (Cont'd.)

Kind of Mix _____ Lot No. _____ Date _____

Material Added	BP	AP	Date	Time	AM	PM	Operator	Comments

Sampled by _____ Date _____ Time _____ AM PM

Analysis Received: Date _____ Time _____

Sp. Gr. _____ Viscosity _____

Adjustments & Resamples

Material Added	BP	AP	Date	Time	Operator	Date	Time	Analysis Received Operator	Date	Time	Sp.Gr.	Viscosity

Material	Lbs.	Time	Operator
Lubrizol 1360			
Santolube 70			
D. C. 200 Fluid			
Blue A Dye			
Azo Oil Black Dye			

Final Sample Taken by _____ at _____ AM PM

Final Sample OK'd by Lab at _____ AM PM

DSW 176421

STLCOPCB405030S

Dept. B-246 - Process Description

PYDRAUL A-200

APPENDIX J

SAFETY AND TOXICITY DATA - W. G. KRUMMRICH PLANT

SAFETY EQUIPMENT*

The following is a list of safety equipment (personal and departmental) required in Department 246.

1. FIRE EXTINGUISHERS

   A. Dry Chemical (3) - Southwest corner Bldg. CR-Main Floor.

   - West wall at top of stairs of Second Floor

   B. Carbon Dioxide Snow - Southwest corner of Bldg. CR, ground level.

2. CHLORINE GAS MASKS (4) - Southwest corner, second floor

   - Control room, second floor

   - East side, outside control room

   - Wall, southwest corner of sprinkler house, main floor.

3. SCOTT AIR MASKS -

4. SAFETY SHOWERS (2) - Southeast corner of Bldg. CR, ground level.

5. DAVIS VAPOTESTER

6. EYE BATHS

7. SPRINKLER SYSTEM

*The safety equipment for Department B-246 is the same as that of Department 246.

STLCOPCB4050309

Dept. B-246 - Process Description

PYDRAUL A-200

APPENDIX J

SAFETY AND TOXICITY DATA (Cont'd.)

SAFETY PRECAUTIONS

The following are safety precautions followed in the operation of Department 246.

1. SAFETY EQUIPMENTOF EMPLOYEE

Each employee has the following safety equipment: (1) hard hat (2) safety glasses (3) goggles (4) rubber or canvas gloves (5) rubber overshoes.

Special equipment may be issued as necessary for performing a particular job in a safe manner.

2. SAMPLING

Precaution must be taken to avoid skin contact of samples and inhalation of vapors.

3. FIRES

Pydraul A-200 is not a fire hazard. Automatic fire extinguishers and sprinklers have been installed in building CR to combat any fires that may come about.

4. TOXICITY

Toxicity does not present a serious problem. However, a complete change of clothes is supplied to each person, and time is allotted at the end of each shift to take a bath. Instructions are also issued to avoid actual skin contact with Pydraul A-200 as much as possible and to wash hands and face before eating.

5. MISCELLANEOUS

There are many accidents that can occur which may be classified as health and safety hazards. These accidents may result from such things as broken steam lines, acid leaks, bare steam lines, etc.

6. SAFETY RECORD

The last lost-time accident in Department 246, A-246, B-246 and C-246 was January 28, 1948. The frequency of minor injuries is low, around one per month for all departments combined.

DSW 176423

STLCOPCB4050310

Dept. B-246 - Process Description

PYDRAUL A-200

APPENDIX J

TOXICITY DATA

AROCLORS AND PYDRAULS

TOXICITY:

This material is a liquid under normal conditions and has a medium toxicity range for liquid injestion and a high toxicity for vapor inhalation. The maximum allowable concentration (M.A.P.) is 1 mg/cubic meter.

FIRE HAZARD:

There is no fire hazard under normal conditions.

OTHER HAZARDS:

This material can cause dermatitis, systemic poisoning from the fumes, and yellow atrophy of the liver. There are skin, mucous membrane and eye hazards encountered in handling this material.

TREATMENT AND ANTIDOTES:

Call a physician and remove patient from fumes.

STORAGE AND HANDLING:

Protect the skin, lungs, and eyes by wearing approved protective clothing, respirator and goggles. There are no special storage restrictions under normal conditions except to store in a ventilated area.

SHIPPING:

There are no special shipping restrictions.

DSW 176424

STLCOPCB4050311

Dept. B-246 - Process Description

PYDRAUL A-200

APPENDIX K

BACKGROUND INFORMATION

Monsanto has been actively interested in functional fluids since 1948. Two lines of products, Skydrol fire resistant aircraft hydraulic fluids and Pydraul fire resistant industrial hydraulic fluid, have been introduced and several individual fluids have reached commercial status.

Formulation work was done by Monsanto on an Aroclor base fluids in an effort to develop a satisfactory fluid of lower price than the Pydrauls available on the market. Viscosity index improved versions were abandoned due to unfavorable costs and performance characteristics. This project resulted in a non-viscosity index improved, fire resistant, Aroclor base industrial type hydraulic fluid designated OS-95.

In May 1958, six batches of OS-95 (later to be named Pydraul A-200) were prepared for the first time in the research pilot plant.

Dept. B-246 - Process Description

PYDRAUL A-200

APPENDIX L

TIME CYCLES

The design capacity of Department B-246 is 500,000 pounds per month, or 6 million pounds per year. The normal production of the department is around 4 million pounds per year. The limiting factor of the process is the amount of Aroclor available to form Pydraul A-200 and the available storage facilities of the finished product. The following table shows the time cycle to blend a 12,000 gallon batch of Pydraul A-200.

TIME CYCLE

ITEM	TIME
Charge Aroclor 1242	2.5 Hrs.
and Aroclor 1248	5.0 Hrs.
Agitate Aroclor 1242 and Aroclor 1248 Mixture	4 Hrs.
Charge Lubrizol 1360	3 Hrs.
and Santolube 70 and	1½ Hr.
Charge DCF-200	1½ Hr.
Charge Dye to Batch	½ Hr.
Circulate Blend (Agitate, Air)	3 Hrs.
Transfer to Storage	16-48 Hrs.
	48.5-73.5 Hrs.

The time cycle for the preparation of Pydraul A-200 batch illustrates the storage bottleneck. It takes approximately 16 hrs. to pump a finished batch into a tank truck, and approximately 48 hours to drum a finished batch.

STLCOPCB4050313

Dept. B-246 - Process Description

PYDRAUL A-200

APPENDIX M

QUALITY CONSIDERATIONS

Pydraul A-200 is an Aroclor base, fire resistant, industrial type hydraulic fluid which was formulated to meet viscosity and lubricating requirements, and anti-rust characteristics specified by the sales department. The physical and functional properties of Pydraul A-200 are discussed in the following sections.

1. VISCOSITY

The required viscosity range of Pydraul A-200 is 200 to 300 absolute SUS. The results of formulation work as given in table 1 indicate that a mixture of one part Aroclor 1242 to two parts of Aroclor 1248 by weight exhibits the lower limit viscosity of 200 SUS absolute at 100°F.

2. LUBRICATING PROPERTIES

Results of four-ball wear tests on the Aroclor base stocks as given in table 2 indicates the necessity of an anti-wear additive. Lubrizol 1360 imparts good anti-wear properties to Aroclor based fluids.

3. RUST INHIBITION

Previous work with rust inhibitors for Pydrauls has indicated that Santolube 70 is relatively effective as an inhibitor as measured by the ASTM D-665 rust test.

4. MISCELLANEOUS

A. APPEARANCE

Pydraul A-200 is a blue liquid with a hazy appearance. The haze is due to very small quantities of antifoamant, DCF-200.

B. FOAM

The use of Santolube 70 in the Pydraul blend causes undesirable foaming. A concentration of 50 ppm Dow Corning Fluid 200 inhibits foaming.

C. NEUTRALIZATION NUMBER

Unused Pydraul A-200 has a total acid number of about 0.8. This apparent high acid number is due to the nature of the Lubrizol 1360 and Santolube 70 present.

STLCOPCB4050314

PYDRAUL A-200

APPENDIX M

QUALITY CONSIDERATIONS

4. MISCELLANEOUS (Cont'd.)

It is important that any contemplated process changes be carefully evaluated before the actual change is made, since the quality of Pydraul A-200 can only be determined by full scale performance tests. Tests such as those given in table 3 are necessary to evaluate the product.

STLCOPCB4050315

TABLE 1

HIGH AROCLOR FLUID FORMULATION

Formulation Number	Formulation (% wt.)	Kinematic Viscosity Centistokes		Saybolt Seconds	
		100°F.	210°F.	Kin, 100°F.	Abs, 100°F.
1	55% Aroclor 1248, 45% Aroclor 1242	27.6	----	130	183
2	18% Aroclor 1254, 82% Aroclor 1242	24.7	----	117	166
3	78% Aroclor 1248, 22% Aroclor 1232	22.6	----	108	150
4	61% Aroclor 1248, 39% Aroclor 1242	29.0	----	---	193
5	20% Aroclor 1254, 80% Aroclor 1242	25.7	----	---	---
6	81% Aroclor 1248, 19% Aroclor 1232	24.30	----	---	---
7	65% Aroclor 1248, 35% Aroclor 1242	30.17	----	142	200
8	27% Aroclor 1254, 73% Aroclor 1242	29.6	----	---	---
9	88% Aroclor 1248, 12% Aroclor 1232	31.3	----	---	---
10	66% Aroclor 1248, 33% Aroclor 1242, 0.5% Santolube 393, 0.5% Santolube 70, 100 ppm. DCF-200	30.22	2.87	142	200

DSW 176429

STLCOPCB405031 6

TABLE 2

PYDRAUL A-200 ADDITIVE STUDY

Aroclor 1242		Aroclor 1248		Sant. 393	Sant. 70	Other Additive	4-Ball Wear	Almen EP	
Lot	%	Lot	%	%	%	%	(1)	Load Pounds	Torque psi
Pydraul F-9							0.63	50	43
Cellulube 220							0.56	27	35
T-410	100	--	0	0	0	0	0.81	--	--
---	0	T-512	100	0	0	0	0.83	50	38
T-410	33	T-512	66	0.5	0	0	--	44(2)	39
T-410	33	T-512	65.95	1.0	0.05	0	--	40(2)	34
T-410	33⅓	T-512	66.3	0.5	0.05	0	0.55	38(2)	46
T-412	33⅓	T-523	66.3	0.5	0.05	0	0.53	34(2)	38
T-410	33	T-512	66	0.5	0.5	0	0.46	48	41
T-412	33	T-523	66	0.5	0.5	0	0.45	50	40
T-412	33.1	T-523	66.1	0.5	0.05	0.25(3)	--	38(2)	40
T-412	33.1	T-523	66.25	0.5	0.05	0.10(4)	--	--	--
T-412	33.0	T-523	66.15	0.5	0.05	0.20(4)	--	--	--
---	33.0	---	66	0.1	0	0	0.53	--	--

(1) 1 hr., 40 kg., 630 rpm, steel-on-steel.
(2) Squealing during most of run.
(3) No. 5 Process Oil (Santolube 70 inert).
(4) Dioctylmaleate.

DSW 176430
STLCOPCB4050317

TABLE 3

EVALUATION OF USED PYDRAUL A-200

Chevrolet - Bay City Division - 260 Hrs. (14 hrs. at 190°F.)

	Pydraul A-200 New	Pydraul A-200 Chev.-Bay City Div., 260 Hr.
Viscosity		
100°F., cs.	30.63	31.8
210°F., cs.	2.89	3.05
4-Ball Wear (630 RPM, 1 Hr., 167°F.)		
Steel-on-steel		
4 kg.	.21	.20
10 kg.	.29	.26
40 kg.	.43	.59
Steel-on-Bronze		
4 kg.	1.20	.95
10 kg.	1.40	1.48
40 kg.	1.70	1.69
Neutralization Number	0.82 TAN	0.82 TAN
Rust Test (REL, F-101, 10.0=Perfect)	10.0	10.0
Appearance	Yellow, slight cloudy	Reddish-brown-nearly opaque

DSW 176431

STLCOPCB4050318

Dept. B-246 - Process Description

PYDRAUL A-200

APPENDIX N

MISCELLANEOUS

This section contains the following information:

1. Additional Raw Material Information
2. References
3. Production Cost Standard

Dept. B-246 - Process Description

PYDRAUL A-200

APPENDIX N

RAW MATERIALS

1. AROCLOR 1242

Aroclor 1242 is received from Department 246 by pipeline. Aroclor 1242 batches are composited in a storage tank and a lot analysis is run on the composite sample. The Aroclor 1242 must pass all non-electrical specifications before it is transferred to Department B-246.

2. AROCLOR 1248

Aroclor 1248 is received from Department 246 by pipeline. Aroclor 1248 is composited and sampled in the same manner as Aroclor 1242.

3. LUBRIZOL 1360

Lubrizol 1360 is received in 55 gallon drums.

4. SANTOLUBE 70

Santolube 70 is received from the Nitro plant in 55 gallon drums.

5. BLUE A DYE

Blue a dye is purchased from the DuPont Company. The material is received in 25 lb. boxes.

6. AZO BLACK DYE

Azo black dye is from the Allied Chemical Company. The material is received in 25 pound boxes.

7. DOW CORNING FLUID 200

Dow Corning Fluid 200 is purchased from the Dow Corning Corporation. The material is received in 5 gallon cans.

STLCOPCB4050320

Dept. B-246 - Process Description

PYDRAUL A-200

APPENDIX N

REFERENCES

1. St. Louis Research Report No. 2472, Job No. 2-02-760.01-3505 (II), February 16, 1960.

Title: Functional Fluids Application Research

Summary: This Report includes application studies of Aroclor base fluids. Discussion includes formulation, physical and functional properties of Pydraul A-200.

2. St. Louis Research Report No. 2842, Job No. 2-02-750.01-3550, November 7, 1961.

Title: Application Research - Fire Resistant Fluids

Summary: Report includes investigation of problem areas arising in Pydraul fluids. Reference job numbers are 3505, 3766 and 4009.

3. St. Louis Research Report No. 1562, Job No. 2-02-750.01-2815, July 6, 1956.

Title: Function Fluids - Application Research for 1954-55.

Summary: Report includes formulation studies, property determinations, and sample preparations of Pydrauls.