Component	Original Analysis wt. %	Hot Face Analysis wt.%
MgO	39-42	20.5
Fe_2O_3	9.5-11	7.6
Cr_2O_3	21-23	27.4
CaO	0.5-1	.12
SiO_2	4.5-5.5	.20
Al_2O_3	20-22	40.6
P_2O_5	0	3.5

Fig. 4 - Analysis of Initial Brick Lining

Fig. 4 - These data are based upon samples tested in the laboratory and are not guaranteed for all samples.

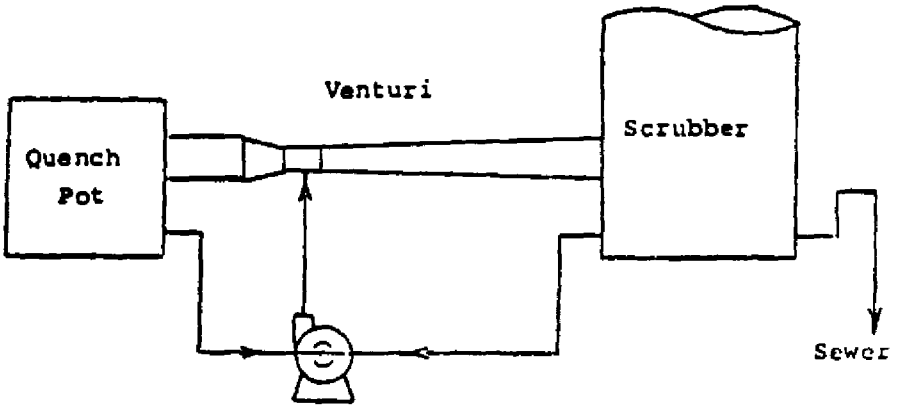


Fig. 5 - Scrubber Water System

Monsanto

MONSANTO INDUSTRIAL CHEMICALS CO
800 N Lindbergh Boulevard
St Louis Missouri 63166
Phone 314 694-1000

This will confirm our
concerning incineration of your fluids.

Enclosed are pre-addressed drum return labels marked "Disposal Only". The drum contents must be marked clearly on <u>each</u> label and every drum must be labeled.

To avoid leakage, use drums which meet DOT 17E specifications (55 gallon drums - 16 gauge steel, 2 burg heads; 5 gallon drums -24 gauge minimum). The outside of the drum must be clean, free from corrosion and bungs tighly sealed. Clean up or other costs incurred or paid for by Monsanto which relate to fluids leaking from drums will be charged to the shipper.

Please show Monsanto identification number _____ on the bill of lading and on <u>each</u> drum. The freight classification is Plastic NOI and the release value is 50¢/lb. Please ship all drums freight prepaid to:

Monsanto Industrial Chemicals Co.
Dept. 831, Incinerator
Sauget, Illinois 62201.

Incineration charges are currently 60¢/lb. with an $8.00 per drum handling charge for each drum returned. Please advise us if you want us to invoice these charges against a specific purchase order number.

Attachment 5-6

Please note that solids such as sawdust, rags, or sludge cannot be handled in our incinerator. Additionally, liquids containing more than 1% water can cause damage to the refractory lining of our incinerator and cannot be accepted. For these materials, we suggest you check local authorities and your own environmental department for an approved disposal method. We also refer you to ANSI C107 Guidelines for handling and disposal of capacitor and transformer askarel containing chlorinated biphenyls. (This is available from American National Standards Institute, 1430 Broadway, New York, New York 10018.)

Any drums containing solid material will not be accepted and will be returned to you at your expense. Additionally, if we, in our judgement, separate and repack unacceptable solids or liquids for safe return to sender, a handling charge of $100 or actual cost whichever is greater will be billed to sender.

The attached instruction should be completed (your phone number) and attached to the carrier's copy of the bill of lading and be brought specifically to the attention of the driver. Do not permit piggyback shipments.

We thank you for your cooperation in arranging the appropriate handling of this consignment for incineration. Please call us again to set up any <u>new</u> incineration arrangements you may need. We will send you instructions for <u>each</u> return to ensure that you are aware of any changes in procedure.

You are reminded that since you own the material which you are sending us for incineration you are liable for all personal injuries and property damages caused by the material. Therefore, it is in your own best interest to ensure that material is properly drummed and labeled, and is in a form which we can incinerate so that we are not forced to return the material to you.

Sincerely,

C. R. Field
Supervisor
Customer Service Center

Enclosures

MONS 219846

CARRIER ADVICE NOTICE

ATTENTION: DRIVER

This shipment contains POLYCHLORINATED BIPHENYL (PCB) which some studies have shown may be persistent, an environmental contaminant, and possibly injurious to certain forms of bird, aquatic and animal life.

Prevent any entry into the environment through spills, leakage, vaporization or otherwise. Spills and leakage must be collected.

DO NOT STORE OR LOAD with food, animal foodstuffs or pharmaceuticals. Keep containers TIGHTLY closed. In case of leak or spill, contact:

1. Shipper Telephone _____

2. Monsanto Company - call collect (618)271-5835.

IMPORTANT

DO NOT LOAD any drums which are leaking or not tightly sealed.

LOAD securely to prevent drum damage in transit.

MONS 219847

ATTENTION CARRIER! IN CASE OF LEAK OR SPILL, CALL SHIPPER AND MONSANTO IMMEDIATELY.

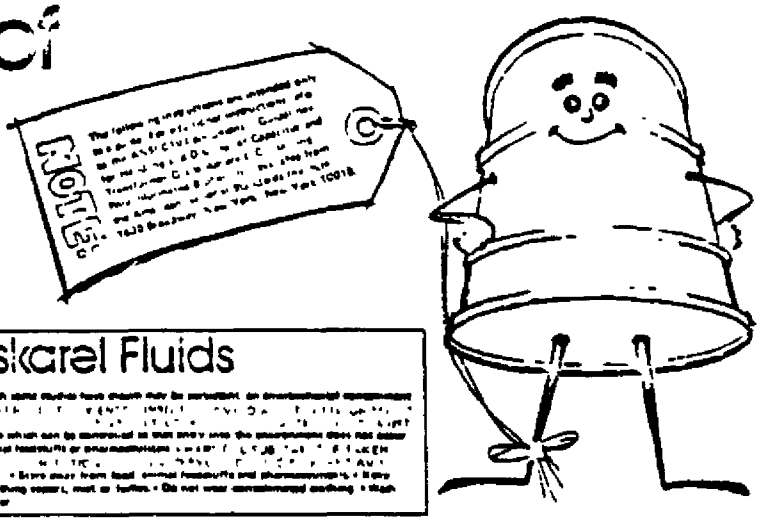
In case of SPILL or LEAK, phone: ( )

RETURNED

MONSANTO COMPANY
Department 831
SAUGET, ILLINOIS 62201

MONS 219848

A Guide to Accumulation and Shipment of



Safe Handling of Askarel Fluids

This product contains POLYCHLORINATED BIPHENYLS PCB of which some studies have shown may be persistent, an environmental contaminant and possibly important to certain forms of life. Askarel and mineral oils [illegible] • Use of this product must be restricted to applications which can be commercial or that entry into the environment does not occur and to applications in which it cannot come into contact with food animal feedstuffs or pharmaceuticals [illegible] • Store away from food animal feedstuffs and pharmaceuticals • Keep container tightly closed • Do not get on skin or inhale when using • Avoid breathing vapors, mist or fumes • Do not wear contaminated clothing • Wash product from skin with soap and water • Wash cloth by thoroughly with water

Accumulation of Waste Fluid:

Each time a fluid is transferred from a process some will be spilled. Therefore, accumulate waste fluids in the empty drums you will use for shipping to reduce the hazard.

DRUMS TO USE

55 gallon drums: Must be 18-gauge steel or heavier and have a 2-bung head

Eighty drums: Must be 24-gauge steel or heavier

(Drums must meet DOT 17-E specifications)

Do Not Use:
- Old drums
- Rusted drums
- Corroded drums
- Damaged drums
- Drums with leads with or drums
- Open-top drums
- Lined drums



LABEL DRUMS

Drums should be labeled "WASTE ASKAREL FLUIDS" and with the above "Safe Handling" statement or its equivalent.



FILLING DRUMS

Liquid Waste Only
Keep all solid materials out of drums used for waste Askarel liquid. Solid materials include rags, paper, absorbent, metal parts. Keep containers out if drum is contaminated and dispose of separately. Contact your environmental department for proper disposal methods for solid materials.



Keep Drums Out of Drums
Never Askarel-filled drums shipped to Monsanto for incineration must not contain more than 1% water or damage to the incinerator will result.

Do Not Overfill Drums
Askarel is heated to allow for possible thermal expansion of the fluid.

Maximum amounts: 55-gallon drums — No. 2 inches; 5 gallon drums — 1 inch

Failure to leave sufficient air space can result in possible fluid leakage or drum failure due to pressure caused by fluid expansion.



Seal the Drums
Use a proper bung to seal the bung and the drum opening as tightly as possible.

Do not use damaged bungs, caps, plates or gaskets as these adequate sealing materials to seal drums.

Moving Filled Drums

Use Proper Drum-Handling Equipment
Askarel-filled drums should be moved only with a proper drum-gripping device. A person both type of drum-gripping device will reduce the possibility of damage to drums. A common drum handling device of this type is the Lift-O-Matic® manufactured by Mayer Industries.



Please Not Recommended
Askarel-filled drums should not be pushed. However, if proper drum-handling equipment is not available and pushing must be used:



- Be sure surface are properly constructed and undamaged to reduce the chance of the drum falling from the pallet when it is moved.
- Stack load all drums in their pallets.
- Drums should be loaded together horizontally to avoid instability to the pallet.
- Be sure how drums are be loaded across the width of a truck to prevent shifting in transit. Multiple 12 to 40 drum air trip should be no more than 48 inches wide.

Storing Filled Drums Prior to Shipment

If Askarel-filled drums must be stored prior to return to Monsanto

Inspect Drums for Leaks
Inspect drums for leakage around spouts and bung, making sure all seals are tight and undamaged.

Clean Up Spillage
Clean the outside of the drum of any spilled fluids, following approved cleaning methods. Properly dispose of materials used to clean drums.



Store in Protected Area
Drums should be stored in an enclosed area where they will be protected from possible damage and inclement weather.



In Exposed Areas Store on Sides
If drums must be stored in an exposed area store drums on their sides with both bungs below the fluid level so that rain water will not accumulate on the top of the drums. Orient [illegible] to drum with the drum through the bung spot. Use blocks to other drums to keep drums stationary.



Do Not Stack
Do not stack drums, whether moved on their sides or on end.

Before Shipment

Following this procedure for EACH Shipment to Monsanto

1. Contact: Customer Service Supervisor
Monsanto Company
800 N. Lindbergh Boulevard
St. Louis, Missouri 63166
(314) 694-3624



Give the following information:
- Number of drums in the shipment
- Name and address of person to receive drum labels
- Purchase order number. If a specific number is not to be used
- Anything out of the ordinary about the load or the shipment

You will then receive:
- Letter of authorization with Monsanto identification number for the shipment
- Pre-addressed shipment/tracking labels for each drum
- Carrier's Advisory Note to be attached to the bill of lading
- Terms of shipment and charges, if any

Upon receipt of above materials:

2. Fill in EACH label with Monsanto identification number as set with destination and YOUR company name and telephone number.
3. Label EACH drum
4. Put Monsanto identification number and your telephone number on Carrier's Advisory Note and attach to bill of lading

Loading and Shipment



- Perform a final check for leakage, damage and be sure bungs are tightly sealed
- Load and secure drums to prevent shifting en transit.
- If shipment is to be part of a mixed transportation [illegible]
- Be certain drums are aware of Carrier's Advisory Note and have phone numbers in case of leakage or other problem.
- Do not stop en route.

PLEASE NOTE: [illegible]



Monsanto

MONS 219849

A Guide to Accumulation and Shipment of WASTE ASKAREL FLUIDS

Note: The following instructions are intended only as a guide. For additional instructions refer to the ANSI C107 document, "Guidelines for Handling and Disposal of Capacitor and Transformer Grade Askarels, Containing Polychlorinated Biphenyls", available from the American National Standards Institute, 1430 Broadway, New York, New York 10018.

SAFE HANDLING OF ASKAREL FLUIDS

Askarel fluids contain Polychlorinated Biphenyls (PCBs). Care should be taken to prevent entry into the environment through spills, leakage, use, vaporization, or disposal of liquid or containers. Avoid prolonged breathing of vapors or mists. Avoid contact with eyes or prolonged contact with skin. If skin contact occurs, remove by washing with soap and water. Following eye contact, flush with water. In case of spillage onto clothing, the clothing should be removed as soon as practical, skin washed, and clothing laundered.

ACCUMULATION OF WASTE FLUIDS

DRUMS - WHAT TO USE

55-gallon drums: Must be 18-gauge steel or heavier and have a 2-bung head.

5-gallon drums: Must be 24-gauge steel or heavier.

(Drums must meet DOT 17-E specifications)

DO NOT USE: Old drums
Rusted drums
Corroded drums
Damaged drums
Drums with weak walls or seams

MONS 219850

LABEL DRUMS

Drums used for waste askarel fluids should be labeled as to contents and with the above "Safe Handling" statement or its equivalent.

FILLING DRUMS

Liquid Waste Only

Keep all solid materials out of drums used for waste askarel liquid. Solid materials (sludge, rags, paper, sawdust, metal parts, floor sweeping chemicals, etc.) must be accumulated and disposed of separately. Contact your environmental department for proper disposal methods for solid materials.

Keep water out of drums

Waste askarel fluids shipped to Monsanto for incineration must not contain more than 1% water, or possible damage to the incinerator may result.

Do not overfill drums

Airspace is needed to allow for possible thermal expansion of the fluid:

Minimum airspace: 55-gallon drums -- 1 1/2 - 2 inches

5-gallon drums -- 1 inch

Failure to leave sufficient airspace can result in possible fluid leakage or seam failure due to pressures caused by fluid expansion.

SEALING DRUMS

Use a proper bung. Inspect the bung and the drum opening to insure tight, leak-proof seal.

Do not use damaged bungs, rags, pieces of wood, or other inappropriate materials to seal drums.

STORING FILLED DRUMS PRIOR TO SHIPMENT

If askarel-filled drums must be stored prior to return to Monsanto:

Inspect Drums for Leakage

Inspect drums for leakage around seams and bung, making sure

all seals are tight and leakproof.

Clean Up Spillage

Clean the outside of the drum of any spilled fluids, following approved cleaning methods. Properly dispose of materials and any water used to clean drums.

Store In Protected Area

Drums should be stored in an enclosed area where they will be protected from possible damage and inclement weather.

In Exposed Areas Store On Sides

If drums must be stored in an exposed area, store drums on their sides with both bungs below the fluid level so that rain water will not accumulate on the top of the drums. (As drums "breathe", water can be drawn into the drum through the bung seal). Use blocks or other device to keep drums stationary.

Do Not Stack

Do not stack drums, whether stored on their sides or on end.

IN-PLANT DRUM TRANSPORTATION

Use Proper Drum-Handling Equipment

Asbarel-filled drums should be moved only with proper drum-grabbing device. A parrot beak type of drum-grabbing device will reduce the possibility of damage to drums. Common drum handling devices of this type are the Lift-O-Matic, manufactured by Marvel Industries, or the Vert-O-Matic drum carrier.

Pallets Not Recommended

Asbarel-filled drums should not be palletized. If pallets must be used:

- Be sure pallets are properly constructed and undamaged to minimize the possibility of the drum falling from the pallet while being transported.

. Steel-band all drums to their pallets.

Drums should be banded together horizontally as well as vertically to the pallet.

. So that four drums can be loaded across the width of a truck to prevent shifting in transit, multiple (2 or 4) drum pallets should be no more than 46 inches wide.

DRUM LABELING

The following procedure must be adhered to for labeling askarel-filled drums shipped to Monsanto. For EACH Shipment:

1A. Contact: Mr. C. R. Field
Monsanto Company
800 N. Lindbergh Boulevard
St. Louis, Missouri 63166
(314) 694 3024

1B. Supply the following information to Mr. Field:

- Number of drums in the shipment.
- Name and address of person to receive drum labels.
- Purchase order number, if a specific number is to be used.
- Anything out of the ordinary about the fluid or the shipment.

1C. Mr. Field will then send the following:

- Letter of authorization for the shipment
- Pre-addressed shipment/warning labels for each drum.
- Carrier's Advisory Note to be attached to the bill of lading
- Terms of shipment and charges, if any.

Upon receipt of above materials:

2. Fill in EACH label with Monsanto identification number, product description and YOUR telephone number.

3. Label EACH drum
4. Put Monsanto identification number and your telephone number on Carrier's Advisory Note and attach to bill of lading.

LOADING AND SHIPMENT

- Perform a final check for leakage, damage, and to assure bungs are tightly sealed.
- Load and secure drums to prevent shifting in transit.
- If shipment is part of a mixed consignment, be certain drums are stowed away from any human or animal feedstuffs or pharmaceuticals.
- Be certain driver is aware of Carrier's Advisory Note and telephone numbers in case of leakage or other problems.
- Do not ship via piggyback.

Please note: Monsanto checks all shipments upon arrival. Failure to adhere to above guidelines could result in fluids being returned to the shipper and additional charges assessed.

Monsanto (logo)

All Approved U.S./Canadian Dielectric Customers

Dear Sirs:

We wish to bring to your attention problems associated with disposal of waste chlorinated biphenyl products in our incinerator at Sauget, Illinois.

1. Some recent returns have been in completely unsuitable drums which have been severely corroded and unsealed. Some drums have been overfilled so that expansion in-transit has not been contained. Loose stowage in trucks has resulted in movement of the load in-transit.

   The results have been spillage into the truck and in some cases, contamination of other goods in the truck which then had to be destroyed. We have had to hold trucks at our plant for cleaning, attracting demurrage charges and diverting plant personnel from productive tasks.

   The potential cost of clean-up, had such leaks in-transit caused detectable environmental contamination, might have been significant.

   Truck clearing at Sauget increases the risk of escape of PCB-containing effluent from our own plant which could jeopardize our ability to continue normal controlled production. It would indeed be distressing if these incidents led to the inability of the industry to use chlorinated biphenyl in spite of industry efforts on ANSI C-107 and EIA ad-hoc committees

   We seek your assistance in ensuring that returns from your company are appropriately packed, sealed and stowed for return.

   Costs incurred in handling inadequately packed returns will be billed to the company involved.

2. We have requested prior contact before EACH return so that we can send the required number of PCB Warning Labels. We are still receiving drums without warning labels. In the event of a spill in-transit, the absence of warning labels could be a factor in assessing liability. We seek your help in ensuring that we send you enough suitable labels for each return.

Attachment 5-7

3. We attach a copy of the form letter that we will be sending with labels to advise on correct return procedure.

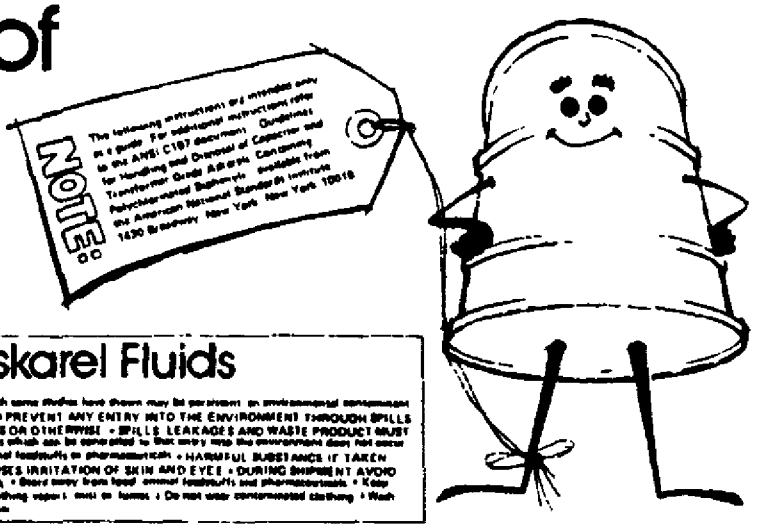
   You will note that this letter advises that our incinerator cannot handle solid waste. It is designed to handle liquid streams only. We still receive drums containing rags, sawdust, and metal and wooden components. In the past, our plant personnel have taken care to separate solid wastes and have arranged separate special disposal of the solid wastes. This will not continue. As from June 1, 1975, a charge of at least $100 will be made if labor is diverted to separating solid waste. Additionally, the solid waste will be suitably packaged and returned freight collect to the sender.

   While we wish to continue to assist the electrical industry in disposal of liquid waste chlorinated biphenyl in our incinerator, we cannot and will not permit the service to become inoperable because of abuse by a small number of companies.

We thank you for your assistance in regulating returns from your company.

Regional Manager

A Guide to Accumulation and Shipment of **WASTE ASKAREL FLUIDS**



Safe Handling of Askarel Fluids

This product contains POLYCHLORINATED BIPHENYLS (PCB's) which some studies have shown may be persistent in environmental compartments and possibly injurious to various forms of land, aquatic and animal life • PREVENT ANY ENTRY INTO THE ENVIRONMENT THROUGH SPILLS LEAKAGE DISPOSAL VAPORIZATION REUSE OF CONTAINERS OR OTHERWISE • SPILLS LEAKAGES AND WASTE PRODUCT MUST BE COLLECTED • Use of this product must be restricted to applications which can be completed so that empty soap the environment does not occur and to applications in which it cannot come into contact with food animal feedstuffs or pharmaceuticals • HARMFUL SUBSTANCE IF TAKEN INTERNALLY OR IF IN PROLONGED CONTACT WITH SKIN • CAUSES IRRITATION OF SKIN AND EYES • DURING SHIPMENT AVOID SPILLS AND LEAKAGE INTO INLAND WATERWAYS AND THE SEA • Store away from food animal feedstuffs and pharmaceuticals • Keep containers tightly closed • Do not eat or smoke when using • Avoid breathing vapors, mist or fumes • Do not wear contaminated clothing • Wash product from skin with soap and water • Wash eyes by flushing with water

Accumulation of Waste Fluids

Each time a fluid is transferred there is always some will be spilled. Therefore accumulate waste fluids in the same drums you will use for shipping to reduce this hazard.

DRUMS TO USE

55 gallon drums - Must be 18 gauge steel or heavier and have a 2" bung head

5 gallon drums - Must be 24 gauge steel or heavier

(Drums must meet DOT 17 E specifications)

Do Not Use:
- Old drums
- Rusted drums
- Corroded drums
- Damaged drums
- Drums with weak welds or seams
- Open top drums
- Lined Pails



LABEL DRUMS

Drums should be labeled "WASTE ASKAREL FLUIDS" and with the above "Safe Handling" statement or an equivalent.



FILLING DRUMS

Liquid Waste Only

Keep all solid materials out of drums used for waste Askarel liquid. Solid materials (sludge, rags, paper, product, metal parts, floor sweeping, chemicals, etc.) must be accumulated and disposed of separately. Contact your environmental department for proper disposal methods for solid materials.



Keep Water Out of Drums

Waste Askarel fluids shipped to Monsanto for incineration must not contain more than 1% water or damage to the incineration system results.

Do Not Overfill Drums

Airspace is needed to allow for possible thermal expansion of the fluid.

Minimum airspace: 55 gallon drums - 6½" - 7 inches
5 gallon drums - 1 inch



Failure to have sufficient airspace can result in considerable fluid leakage or drum failure due to pressures caused by fluid expansion.

Seal the Drums

Use a proper bung wrench to tighten the bung and the drum opening to insure tight, leak proof seal.

Do not use damaged bungs that prevent proper wrench or other improper plastic materials to seal drums.

Moving Filled Drums

Use Proper Drum-Handling Equipment

Askarel filled drums should be moved only with a proper drum grabbing device. A correct hook type of drum grabbing device will reduce the possibility of damage to drums. A specialized drum handling device of this type is the "Lift-O-Matic" manufactured by Marvel Industries.



*Trademark of Marvel Industries Inc.

Pallets Not Recommended

Askarel filled drums should not be palletized. However, if proper drum handling equipment is not available and pallets must be used:



- Be sure pallets are properly constructed and undamaged to reduce the chance of the drum falling from the pallet when being moved.
- Steel band all drums to their pallets.
- Drums should be banded together horizontally as well as vertically to the pallet.
- No more than four drums can be loaded across the width of a truck to prevent shifting in transit; multiple (2 or 4) drum pallets should be no more than 48 inches wide.

Storing Filled Drums Prior to Shipment

All Askarel filled drums must be stored outdoors on returns to Monsanto.

Inspect Drums for Leakage

Inspect drums for leakage around seams and bung, making sure all seals are tight and leakproof.

Clean Up Spillage

Clean the outside of the drum of any spilled fluids following approved cleaning methods. Properly dispose of materials used to clean drums.



Store in Protected Area

Drums should be stored in an enclosed area where they will be protected from possible damage and inclement weather.



In Exposed Areas Store on Side

If drums must be stored in an exposed area store drums on their sides with both bungs below the fluid level so that rain water will not accumulate on the top of the drums. Otherwise as drums "breathe" water can be drawn into the drums through the bung seal. Use blocks or other devices to keep drums stationary.



Do Not Stack

Do not stack drums, whether stored on their sides or on end.

Before Shipment

Following this procedure for EACH Shipment to Monsanto:

1 Contact Customer Service Supervisor
Monsanto Company
800 N. Lindbergh Boulevard
St. Louis, Missouri 63166
(314) 694-3074



Give the following information:
- Number of drums in the shipment
- Name and address of person to receive drum labels
- Purchase order number if a specific number is to be used
- Anything out of the ordinary about the fluid or the shipment

You will then receive:
- Letter of authorization with Monsanto identification number for the shipment
- Pre-addressed shipment/warning labels for each drum
- Carrier's Advisory Note to be attached to the bill of lading
- Terms of shipment and charges if any

Upon receipt of above materials:

2 Fill in EACH label with Monsanto identification number, product description and YOUR company name and telephone number

3 Label EACH drum

4 Put Monsanto identification number and your telephone number on Carrier's Advisory Note and attach to bill of lading

Loading and Shipment



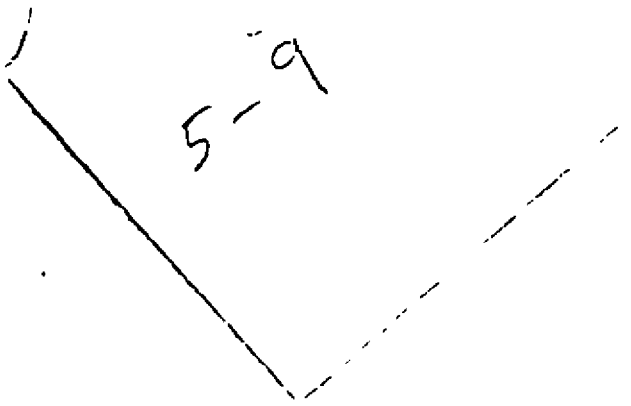
- Perform a final check for leakage, damage and to insure bungs are tightly sealed.
- Load and secure drums to prevent shifting in transit.
- If shipment is to be part of a mixed consignment, ensure Askarel fluids are not to be shipped in vessel loads with raw materials for animal food, food grade chemicals, foods, food packaging materials, or pharmaceuticals. Contamination of such products subject them to embargo or destruction.
- Be certain driver is aware of Carrier's Advisory Note and has phone number in case of leakage or other problems.
- Do not ship via piggyback.

PLEASE NOTE: Monsanto should not shipments which are not sent to us to follow the above guidelines could result in drums being returned to you and additional charges incurred.



Monsanto

MONS 219857



MONSANTO

PCB LABELING MANUAL

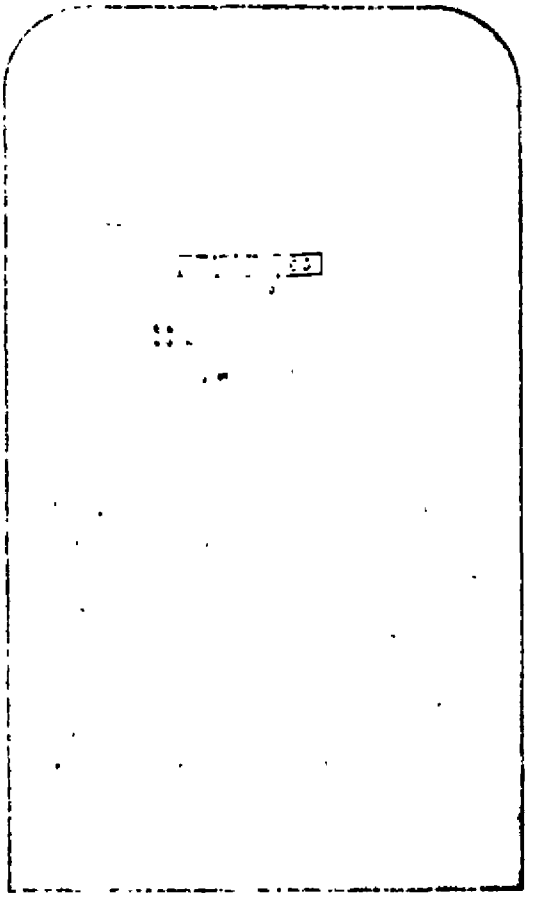
11-1-73

Attachment 5-9

NEW FROM MONSANTO:

The "YELLOW [illegible]"

... exclusively designed for dielectric fluids handling.



MONS 219860

ENGLISH **IMPORTANT** **CHLORODIPHENYLS (42 % - 54 %) (or 60 %) (PCB)**

This product contains POLYCHLORINATED BIPHENYLS (PCB's) which some studies have shown may be persistent, an environmental contaminant and, possibly, injurious to certain forms of bird, aquatic and animal life

PREVENT ANY ENTRY INTO THE ENVIRONMENT THROUGH SPILLS, LEAKAGE, DISPOSAL, VAPOURISATION, RE-USE OF CONTAINERS OR OTHERWISE.

SPILLS, LEAKAGES AND WASTE PRODUCT MUST BE COLLECTED.

Use of this product must be restricted to applications which can be controlled so that entry into the environment does not occur and to applications in which it cannot come into contact with food, animal feedstuffs or pharmaceuticals.

HARMFUL SUBSTANCE IF TAKEN INTERNALLY OR IF IN PROLONGED CONTACT WITH THE SKIN.

CAUSES IRRITATION OF SKIN AND EYES.

DURING SHIPMENT AVOID SPILLS AND LEAKAGE INTO INLAND WATERWAYS AND THE SEA.

Store away from food, animal feedstuffs and pharmaceuticals.

Keep container tightly closed.

Do not eat or smoke when using.

Avoid breathing vapours, mist or fumes.

Do not wear contaminated clothing.

Wash product from skin with soap and water.

Wash eyes by flushing with water.

THIS COPY, THIS SIZE, IN SEVEN LANGUAGES IS PAINTED ON 30 AND 55 GALLON DRUMS USED FOR PCB SHIPMENTS.

MONS 219861

DEUTSCH WICHTIG — CHLORIERTE DIPHENYLE (42 % - 54 %) (oder 60 %) (PCB)

Dieses Produkt enthält POLYCHLORIERTE BIPHENYLE (PCB's). Untersuchungen haben gezeigt, dass dieses Produkt die Umwelt dauerhaft verschmutzen und möglicherweise für bestimmte Vogelarten sowie Land- und Wassertiere schädlich sein kann.
JEGLICHES EINDRINGEN IN DIE UMWELT DURCH VERSCHÜTTEN, LECKAGEN, VERDAMPFEN, WIEDERGEBRAUCH VON BEHÄLTERN ODER ÄHNLICHES IST ZU VERHINDERN.
VERSCHÜTTETES UND ABFÄLLE MÜSSEN GESAMMELT WERDEN.
Der Einsatz dieses Produktes muss auf kontrollierte Anwendung beschränkt bleiben, so dass ein Eindringen in die Umwelt und die Berührung mit Lebensmitteln, Tierfutter oder Pharmazeutika verhindert wird.

GESUNDHEITSSCHADLICH BEI VERSCHLUCKEN ODER BEI LÄNGERER BERÜHRUNG MIT DER HAUT
REIZT HAUT UND AUGEN
VERSCHÜTTEN ODER LECKAGEN IN FLÜSSE ODER SEEN WÄHREND DES TRANSPORTES VERMEIDEN.
Von Lebensmitteln, Tierfutter und Pharmazeutika fernhalten.
Behälter dicht geschlossen halten
Beim Arbeit nicht essen oder rauchen
Dämpfe nicht einatmen.
Beschmutzte Kleidung nicht wiederverwenden
Nach Hautkontakt sehr gründlich mit Wasser und Seife waschen
Nach Augenkontakt mit viel Wasser spülen

FRANÇAIS IMPORTANT — DIPHENYLES CHLORES (42 % - 54 %) (ou 60 %) (PCB)

Ce produit contient des DIPHENYLES CHLORES qui, selon certaines études, pourraient être persistants contaminer l'environnement et de ce fait, être nocifs pour certaines espèces d'oiseaux, de vie animale et de vie aquatique.
EMPECHER QUTIL NE SE REPANDE DANS L ENVIRONNEMENT PAR SUITE DE FUITES, DEVERSEMENTS PROCEDES D ELIMINATION VAPORISATION RE-UTILISATION DES RECIPIENTS ETC
LES PERTES, FUITES ET DECHETS DOIVENT ETRE RECUEILLIS
L utilisation de ce produit doit être limitée aux applications contrôlables afin que le produit ne se répande dans l'environnement, ainsi qu aux applications où il ne peut pas entrer en contact avec l alimentation humaine et animale ou les produits pharmaceutiques
SUBSTANCE NOCIVE PAR INGESTION OU PAR CONTACT PROLONGE AVEC LA PEAU
IRRITANT POUR LA PEAU ET LES YEUX
DURANT LE TRANSPORT EVITER DEVERSEMENTS ET PERTES DANS LES COURS D'EAU ET LA MER
Tenir à l'écart d'alimentation humaine et animale et des produits pharmaceutiques
Tenir le récipient bien fermé
Ne pas manger et ne pas fumer pendant l utilisation
Eviter de respirer les émanations
Ne pas porter de vêtements souillés par le produit
Enlever le produit de la peau avec de l'eau et du savon
Rincer abondamment les yeux avec de l eau

NEDERLANDS BELANGRIJK — GECHLOREERDE DIFENYLS (42 % - 54 %) (of 60 %) (PCB)

Dit product bevat GEPOLYCHLOREERDE BIPHENYLEN (PCB s) waarvan enige studies hebben aangetoond dat ze persistent en milieuverontreinigend zouden kunnen zijn en mogelijkerwijze schadelijk voor bepaalde vormen van dieren en het leven onder water
ER LET DAT HET PRODUKT IN HET MILIEU GERAAKT DOOR MORSEN, LEKKAGE, VERNIETIGEN, VERDAMPEN, HERGEBRUIKEN VAN CONTAINERS ENZ
GEMORS LEKKAGES EN VERSPILD PRODUKT MOETEN VERZAMELD WORDEN.
Het gebruik van dit produkt moet beperkt worden tot die toepassingen welke gekontroleerd kunnen worden zodat verzwerging in het milieu niet kan voorkomen en tot toepassingen waarbij het niet in kontakt kan komen met voedsel dierlijk voedsel of farmaceutica
SCHADELIJKE SUBSTANTIE WANNEER GEADSORBEERD OF BIJ LANGDURIG KONTAKT MET DE HUID
VEROORZAAKT IRRITATIE VAN HUID EN OGEN.
VERMIJD GEMORS EN LEKKAGES IN BINNENWATEREN EN ZEE GEDURENDE VERSCHEPING
Bewaar verwijderd van voedsel dierlijk voedsel en farmaceutica.
Houd container behoorlijk gesloten
Eet noch rook tijdens gebruik
Vermijd inademen van dampen, nevels en uitwasemingen
Draag geen verontreinigde kleding.
Verwijder produkt van de huid door wassen met zeep en water
Was ogen met stromend water

ENGLISH IMPORTANT — CHLORODIPHENYLS (42 % - 54 %) (or 60 %) (PCB)

This product contains POLYCHLORINATED BIPHENYLS (PCB s) which some studies have shown may be persistent, an environmental contaminant and possibly injurious to certain forms of bird aquatic and animal life
PREVENT ANY ENTRY INTO THE ENVIRONMENT THROUGH SPILLS LEAKAGE DISPOSAL VAPOURISATION, RE-USE OF CONTAINERS OR OTHERWISE
SPILLS, LEAKAGES AND WASTE PRODUCT MUST BE COLLECTED
Use of this product must be restricted to applications which can be controlled so that entry into the environment does not occur and to applications in which it cannot come into contact with food animal foodstuffs or pharmaceuticals.
HARMFUL SUBSTANCE IF TAKEN INTERNALLY OR IF IN PROLONGED CONTACT WITH THE SKIN
CAUSES IRRITATION OF SKIN AND EYES.
DURING SHIPMENT AVOID SPILLS AND LEAKAGE INTO INLAND WATERWAYS AND THE SEA
Store away from food, animal foodstuffs and pharmaceuticals
Keep container tightly closed
Do not eat or smoke when using
Avoid breathing vapours, mist or fumes
Do not wear contaminated clothing.
Wash product from skin with soap and water
Wash eyes by flushing with water

THIS LABEL WAS USED ON 5 GALLON CANS UNTIL PAINTED UNITS WERE ESTABLISHED.

MONS 219862

ITALIANO IMPORTANTE **CLOROBIFENILI (42 % - 54 %) (oppure 60 %) (PCB)**

Questo prodotto contiene POLICLOROBIFENILI (PCB) che secondo i risultati di alcuni studi sembrano essere persistenti e contaminare l'ambiente e probabilmente nocivi per alcune specie di uccelli e di vita animale ed acquatica

PREVENIRE LA PENETRAZIONE NELL AMBIENTE A CAUSA DI PERDITE FUGHE SCARICHI.
EVAPORAZIONE RIUTILIZZO DEI CONTENITORI OD ALTRO
LE PERDITE FUGHE O SCARTI DEVONO ESSERE RACCOLTI.
L'utilizzo di tale prodotto deve essere limitato a quelle applicazioni che possono essere controllate in modo da evitare la penetrazione nell ambiente ed a quelle applicazioni nelle quali non possa venire in contatto con alimenti umani e per animali o prodotti farmaceutici

SOSTANZA NOCIVA PER INGESTIONE O PER CONTATTO PROLUNGATO CON LA PELLE
IRRITANTE PER LA PELLE E GLI OCCHI
DURANTE IL TRASPORTO EVITARE PERDITE E TRABOCCHI IN ACQUE INTERNE E NEL MARE
Mantenere lontano da prodotti farmaceutici e alimenti umani e per animali.
Mantenere il recipiente ben chiuso
Non mangiare o fumare durante l impiego
Evitare di respirare le emanazioni
[illegible] 25 gradi C
Lavare la pelle con acqua e sapone dopo il contatto
Lavare abbondantemente gli occhi con acqua

PORTUGUÊS IMPORTANTE **CLORODIFENILOS (42 % - 54 %) (ou 60 %) (PCB)**

Este produto contém POLICLOROIDIFENILOS (PCB s) que certos estudos mostraram serem persistentes e contagiosos para o meio ambiente e mesmo nefastos para certas aves animais e especies aquáticas
EVITAR QUALQUER INTRODUÇÃO NO MEIO AMBIENTE POR DERRAME ESCOAMENTO REJEIÇÃO VAPORIZAÇÃO UTILIZAÇÃO REPETIDA DE RECIPIENTES OU DE QUALQUER OUTRO MODO
OS PRODUTOS ENTORNADOS VERTIDOS OU REJEITADOS DEVEM SER RECUPERADOS
O emprego deste produto deve ser limitado a applicações que podem ser controladas de modo a que a introdução no meio amb ente não se produza e a aplicacoes em que não pode ter contacto com alimenti comida para animais ou com produtos farmacêuticos

SUBSTÂNCIA NOCIVA QUANDO ABSORVIDA OU SE EM CONTACTO PROLONGADO COM A PELE
CAUSA IRRITAÇÃO DE PELE E DOS OLHOS
DURANTE O TPANSPORTE MARITIMO EVITAR OS DERRAMES E ESCOAMENTOS NOS RIOS E NO MAR
Armazenar afastado dos alimentos comida para animais, ou produtos farmacêuticos.
Conservar os recipientes cuidadosamente fechados
Não comer nem fumar durante a sua utilização
Evitar respirar os vapores emanações ou fumos
Não vestir roupa contaminada
Lavar a pele com água e sabão
Lavar os olhos com água por asperção

ESPAÑOL IMPORTANTE **DIFENILOS CLORADOS (42 % - 54 %) (o 60 %) (PCB)**

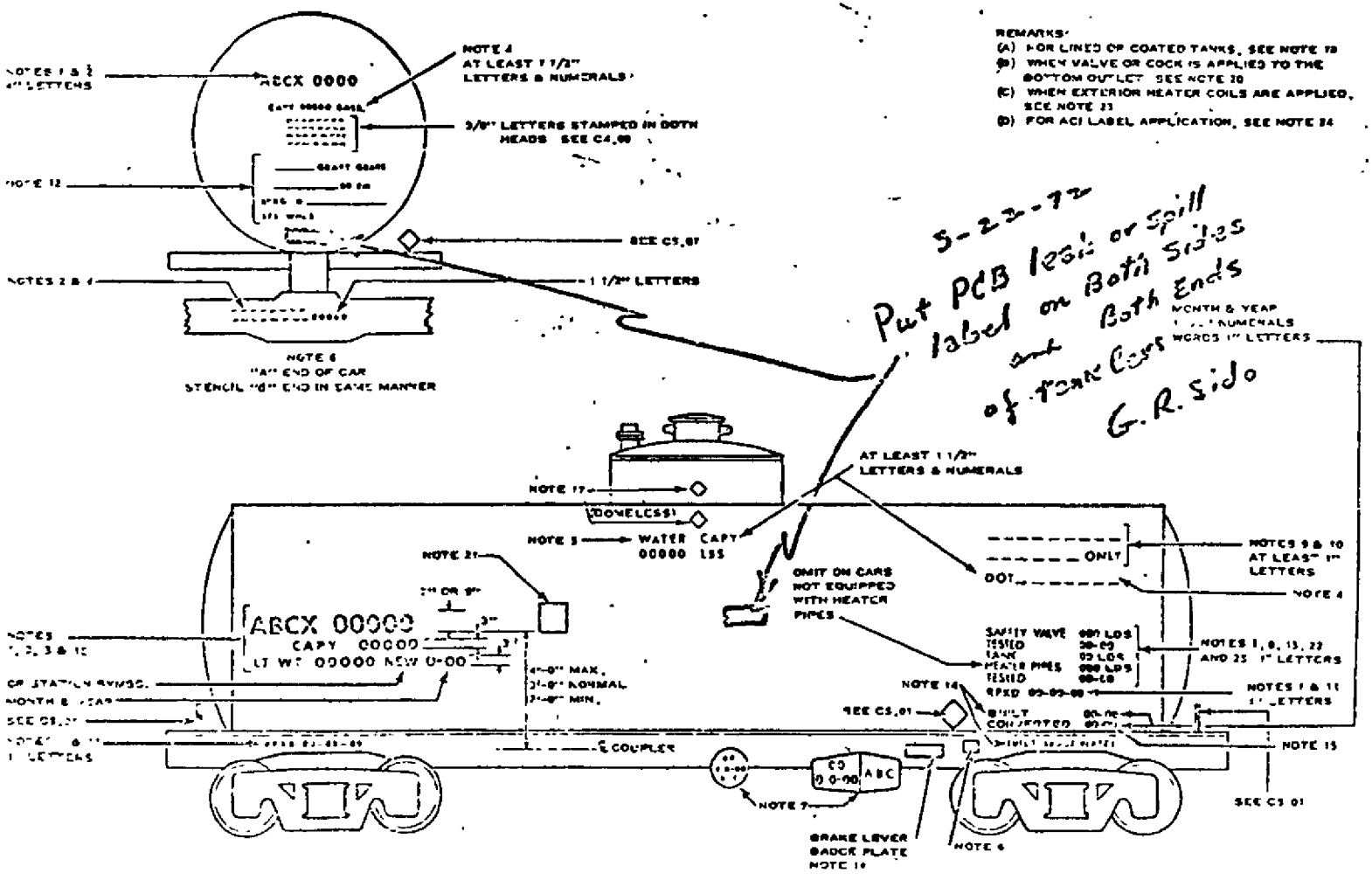
Este producto contiene BIFENILOS POLICLORADOS (PCB) que según ciertos estudios, han [illegible] contaminantes del medio ambiente y, posiblemente, [illegible] a determinadas clases de pájaros y vida acuática y animal

EVITAR QUE ENTRE EN CONTACTO CON EL MEDIO AMBIENTE POR DERRAMES, FUGAS, DESECHO, VAPORIZACION, DE UTILIZACION DE ENVASES, O POR CUALQUIER OTRA CAUSA.
DEBE RECOGERSE CUALQUIER DERRAME, FUGA O DESPERDICIO

La utilización de este producto debe restringirse a aplicaciones que pueden ser [illegible] para evitar su introduccion en el medio ambiente y a aplicaciones en las que no pueda entrar en contacto con alimentos piensos o productos farmacéuticos.

SUBSTANCIA NOCIVA SI SE INGIERE O SE ENCUENTRA EN CONTACTO PROLONGADO CON LA PIEL CAUSA IRRITACION A LA PIEL Y LOS AJOS
DURANTE EL TRANSPORTE EVITAR DERRAMES Y FUGAS A CANALES O RIOS NAVEGABLES Y AL MAR
Almacenar lejos de alimentos piensos y productos farmacéuticos
Mantener el envase herméticamente cerrado
Abstenerse de comer o fumar durante su utilización
[illegible] recipientes y envases
[illegible] con agua y jabon
[illegible]

MONS 219863



5-22-72
Put PCB leak or spill label on Both Sides and Both Ends of Tank Cars
G.R. Sido

FIGURE C1 – DOT AND AAR STENCIL REQUIREMENTS

MONS 219864

IN CASE OF LEAK OR SPILL, CALL COLLECT 618 271-5835

This product contains POLYCHLORINATED BIPHENYLS (PCB's) which some studies have shown may be persistent, an environmental contaminant and, possibly, injurious to certain forms of bird, aquatic and animal life.

PREVENT ANY ENTRY INTO THE ENVIRONMENT THROUGH SPILLS, LEAKAGE, DISPOSAL, VAPOURISATION, REUSE OF CONTAINERS OR OTHERWISE.

SPILLS, LEAKAGES AND WASTE PRODUCT MUST BE COLLECTED.

Use of this product must be restricted to applications which can be controlled so that entry into the environment does not occur and to applications in which it cannot come into contact with food, animal feedstuffs or pharmaceuticals.

HARMFUL SUBSTANCE IF TAKEN INTERNALLY OR IF IN PROLONGED CONTACT WITH THE SKIN.

CAUSES IRRITATION OF SKIN AND EYES.

DURING SHIPMENT AVOID SPILLS AND LEAKAGE INTO INLAND WATERWAYS AND THE SEA.

CAUTION!

CONTAINS CHLORINATED HYDROCARBONS

Store away from food, animal feedstuffs and pharmaceuticals.

Keep container tightly closed.

Do not eat or smoke when using.

Avoid breathing vapours, mist or fumes.

Do not wear contaminated clothing.

Wash product from skin with soap and water.

Wash eyes by flushing with water.

WASTE DISPOSAL

With prior Monsanto notification used polychlorinated biphenyl fluids may be returned freight prepaid for proper incineration at 3¢ per pound.

Ship to: Supervisor Dept. 831
MONSANTO COMPANY
SAUGET, ILLINOIS 62201

1249/53

LABEL ATTACHED ON ENDS AND SIDES OF TANK CARS

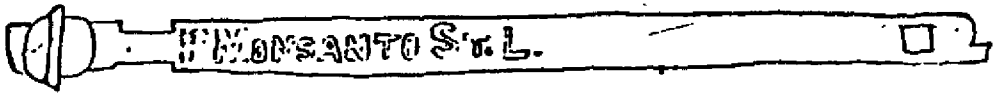
MONS 219865

BULK LOAD TAG

The bulk load tag is the standard drum label attached to a tough plastic sheet. A packing information envelope, if needed, is attached to the back of the same plastic sheet. The tag is folded and punched for easy hanging by the seal at the discharge outlet.

Monsanto

LABELING BULLETIN
Number 8

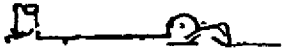


HANG THE TAG BY THE CAR SEAL, to the discharge outlet: bolt, valve or door latch.





VALVE



MONS 219866

CO 233 WGK THIS MEMORANDUM

FROM MONSANTO COMPANY

DATE SHIPPED 12/17/73

MONSANTO COMPANY
Box 1430/
St Louis, Mo 63170

NOTICE TO CARRIER
IF FOR ANY REASON THIS SHIPMENT
IS DELAYED IN EXCESS OF 24 HOURS
NOTICE MUST BE GIVEN TO
MONSANTO SHIPPING LOCATION

G 137900
NT 41700
N 96200

NOTE FREIGHT

TERMS ABOVE

50 CENTS PER POUND

MONSANTO COMPANY Shipper,

Per

Agent, Per

EMERGENCY

In case of emergency concerning
the chemicals in this shipment

CALL COLLECT W G KRUMMRICH PLANT (618) 271-5835

Or

4

MONS 219867

CO 737

MONSANTO COMPANY

SHIPPER'S NO	DISTRICT	CUSTOMER'S ORDER NO	DATE SHIPPED	CAR OR VEHICLE
[illegible]		[illegible]	10/10/73	

PREPAID ON COLLECT ROUTING

TO INSURE PAYMENT THIS SHIPPER'S NUMBER MUST SHOW ON FREIGHT BILL

Your Statement must show Pro No. and Monsanto's Shipper's No. opposite each amount, also statement total

MONSANTO CO
Box 14307
St Louis Mo

SHIPPED FROM | WHSE CODE
[illegible] | 03

[illegible] CAPACITORS LTD
[illegible]
[illegible] INDIA

3955

SHIP TO

NOTICE TO CARRIER
IF FOR ANY REASON THIS SHIPMENT IS DELAYED IN EXCESS OF 21 HOURS NOTICE MUST BE GIVEN TO MONSANTO SHIPPING LOCATION

PURPOSES OF NOTIFICATION ONLY

NO. PACKAGES	KIND OF PACKAGE, DESCRIPTION OF ARTICLE, SPECIAL MARKS AND EXCEPTIONS	WEIGHT (Subsequent)	CLASS	CHECK
[illegible]	[illegible]			
	CHLORINATED DIPHENYL			
	[illegible]			
	[illegible]			
	[illegible]			
	[illegible]			
	PLASTICS LIQUID NOIBN			
	[illegible] 30			
	[illegible]			
	[illegible]			
	[illegible]			
	WEIGHTS LBS KILOS			
	[illegible]			
	[illegible]			
	[illegible]			
	TOTAL [illegible]			
	TOTAL [illegible]			

D. 12024 #
N. 10800 #

NOTE FREIGHT TERMS ABOVE

This product can [illegible] [illegible] spills and leakage into [illegible]

FOR EXPORT TO INDIA

CAR LOADED SHELL FULL | CAR LOADED SHELL NOT FULL | THE TANK CAR INDICATED ON THE BILL OF LADING IN TRIP LEASED TO

MONSANTO COMPANY Shipper,

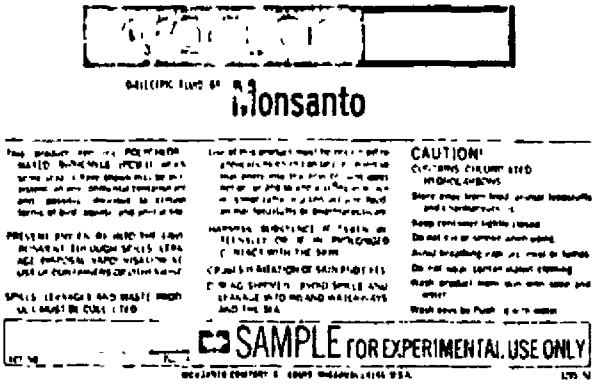
Per [illegible]
WRITTEN SIGNATURE ONLY

Per

Mr Side Stamps for Emergency is usually on #2 Copy of order

MONS 219868

MONSANTO COMPANY
Department 831
SAUGET, ILLINOIS 62201



LABEL FOR PCB SAMPLES

Aroclor 1016

DIELECTRIC FLUID BY **Monsanto**

"Classified by Underwriters' Laboratories, Inc.
as to Fire Hazard Only.
Aroclor 1016 Classed 2 to 3
Less hazardous than paraffin oil in respect
to fire hazard
See UL Index of Classified Products."



Substances nocives
Marmul substances
Gasunt [illegible] the Staffe
Schadelijke stoffen
Sostanze nocive

X_{rr}

CAUTION!

CONTAINS CHLORINATED
HYDROCARBONS

Read and follow all IMPORTANT safeguard instructions shown on this container.

WASTE DISPOSAL

With prior Monsanto notification used polychlorinated biphenyl fluids may be returned freight prepaid for proper incineration at 3¢ per pound.

Ship to: Supervisor Dept. 831
MONSANTO COMPANY
SAUGET, ILLINOIS 62201

LOT NO _____ PACKER _____

LEGAL NET 55 LB. 24.95 KG.

TARE 5 LB. 2.27 KG
GROSS 60 LB 27.22 KG

MONSANTO COMPANY ST LOUIS, MISSOURI 63166, U.S.A.

811 04 016 07/53

MONS 219871

AROCLOR 1016

DIELECTRIC FLUID BY **Monsanto**

"Classified by Underwriters' Laboratories, Inc.
as to Fire Hazard Only
Aroclor 1016 Classed 2 to 3
Less hazardous than paraffin oil in respect
to fire hazard
See UL Index of Classified Products"



Xn

CAUTION!

CONTAINS CHLORINATED HYDROCARBONS

Read and follow all IMPORTANT safeguard instructions shown on this container.

WASTE DISPOSAL

With prior Monsanto notification used polychlorinated biphenyl fluids may be returned freight prepaid for proper incineration at 3¢ per pound

Ship to: Supervisor Dept. 831
MONSANTO COMPANY
SAUGET, ILLINOIS 62201

LOT NO _____ PACKER _____

LEGAL NET 600 LB. 272.16 KG.

TARE 68 LB. 30.84 KG.
GROSS 668 LB. 303.00 KG

MONSANTO COMPANY ST LOUIS, MISSOURI 63166, U.S.A.

811.04 016 06/53

MONS 219872

AROCLOR 1221

DIELECTRIC FLUID BY Monsanto



Substances nocives
Harmful substances
Gesundheitsschädliche Stoffe
Sostanze nocive

Xn

CAUTION!

CONTAINS CHLORINATED HYDROCARBONS

Read and follow all IMPORTANT safeguard instructions shown on this container.

WASTE DISPOSAL

With prior Monsanto notification used polychlorinated biphenyl fluids may be returned freight prepaid for proper incineration at 3¢ per pound.

Ship to: Supervisor Dept. 831
MONSANTO COMPANY
SAUGET, ILLINOIS 62201

LOT NO _____ PACKER

LEGAL NET 520 LB. 235.87 KG.

TARE 68 LB 30 84 KG.
GROSS 668 LB 303 00 KG

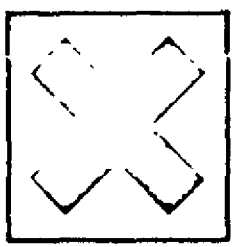
MONSANTO COMPANY, ST LOUIS, MISSOURI 63166 U S A

811 06-225 05/53

MONS 219873

AROCLOR 1232

DIELECTRIC FLUID BY Monsanto



Substances nocives
Harmful substances
Gesundheitsschädliche Stoffe
Schadelijke stoffen
Sostanze nocive

Xn

CAUTION!

CONTAINS CHLORINATED HYDROCARBONS

Read and follow all IMPORTANT safeguard instructions shown on this container.

WASTE DISPOSAL

With prior Monsanto notification used polychlorinated biphenyl fluids may be returned freight prepaid for proper incineration at 3¢ per pound.

Ship to: Supervisor Dept. 831
MONSANTO COMPANY
SAUGET, ILLINOIS 62201

LOT NO _____ PACKER _____

LEGAL NET 50 LB. 22.68 KG

TARE 5 LB. 2 27 KG
GROSS 55 LB 24 95 KG

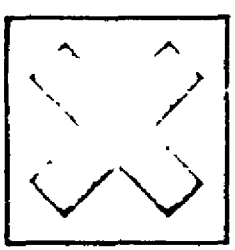
MONSANTO COMPANY, ST LOUIS, MISSOURI 63166, U S A

811 09 230 13 / 53

MONS 219874

ARCLOR 1242

DIELECTRIC FLUID BY **Monsanto**



Xn

CAUTION!

CONTAINS CHLORINATED HYDROCARBONS

Read and follow all IMPORTANT safeguard instructions shown on this container.

WASTE DISPOSAL

With prior Monsanto notification used polychlorinated biphenyl fluids may be returned freight pre paid for proper incineration at 3¢ per pound

Ship to: Supervisor Dept. 831
MONSANTO COMPANY
SAUGET, ILLINOIS 62201

LOT NO _____ PACKER

LEGAL NET 55 LB. 24.95 KG.

TARE 5 LB 2 27 KG
GROSS 60 LB 27 22 KG

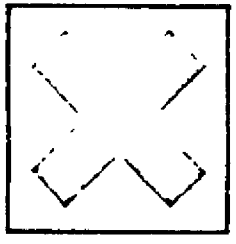
MONSANTO COMPANY ST LOUIS, MISSOURI 63166, U S A

811 01-240 17/53

MONS 219875

AROCLOR 1242

DIELECTRIC FLUID BY Monsanto



Substances nocives
Harmful substances
Gesundheitsschädliche Stoffe
Sostanze nocive

Xn

CAUTION!

CONTAINS CHLORINATED HYDROCARBONS

Read and follow all IMPORTANT safeguard instructions shown on this container.

WASTE DISPOSAL

With prior Monsanto notification used polychlorinated biphenyl fluids may be returned freight prepaid for proper incineration at 3¢ per pound

Ship to: Supervisor Dept. 831
MONSANTO COMPANY
SAUGET, ILLINOIS 62201

LOT NO PACKER

LEGAL NET 600 LB. 272.16 KG

TARE 68 LB 30 84 KG
GROSS 668 LB 303 00 KG.

MONSANTO COMPANY ST LOUIS, MISSOURI 63166, U S A

811 01 240 16/53

MONS 219876

AROCLOR 1248

DIELECTRIC FLUID BY Monsanto



Substances nocives
Harmful substances
Gesundheitsschädliche Stoffe
Schadelijke stoffen

Xn

CAUTION!

CONTAINS CHLORINATED HYDROCARBONS

Read and follow all IMPORTANT safeguard instructions shown on this container.

WASTE DISPOSAL

With prior Monsanto notification used polychlorinated biphenyl fluids may be returned freight prepaid for proper incineration at 3¢ per pound

Ship to: Supervisor Dept. 831
MONSANTO COMPANY
SAUGET, ILLINOIS 62201

LOT NO _____ PACKER _____

LEGAL NET 55 LB. 24.95 KG

TARE 5 LB. 2.27 KG
GROSS 60 LB 27.22 KG

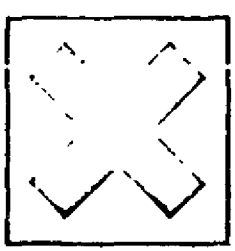
MONSANTO COMPANY, ST. LOUIS, MISSOURI 63166, U.S.A.

811 02 260 17/53

MONS 219877

AROCLOR 1248

DIELECTRIC FLUID BY **Monsanto**



Substances nocives
Harmful substances
Gesundheitsschädliche Stoffe
Sostanze nocive

Xn

CAUTION!

CONTAINS CHLORINATED HYDROCARBONS

Read and follow all IMPORTANT safeguard instructions shown on this container.

WASTE DISPOSAL

With prior Monsanto notification used polychlorinated biphenyl fluids may be returned freight prepaid for proper incineration at 3¢ per pound.

Ship to: Supervisor Dept. 831
MONSANTO COMPANY
SAUGET, ILLINOIS 62201

LOT NO _____ PACKER _____

LEGAL NET 600 LB. 272.16 KG

TARE 68 LB. 30 84 KG
GROSS 668 LB 303 00 KG

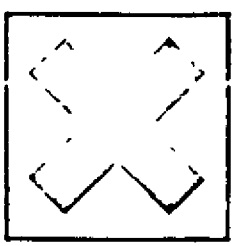
MONSANTO COMPANY, ST LOUIS, MISSOURI 63166, U S A

811 02-260 16/53

MONS 219878

AROCLOR 1254

DIELECTRIC FLUID BY Monsanto



Substances nocives
Harmful substances
Gesundheitsschädliche Stoffe
Schadelijke stoffen

Xn

CAUTION!

CONTAINS CHLORINATED HYDROCARBONS

Read and follow all IMPORTANT safeguard instructions shown on this container.

WASTE DISPOSAL

With prior Monsanto notification used polychlorinated biphenyl fluids may be returned freight pre paid for proper incineration at 3¢ per pound.

Ship to: Supervisor Dept. 831
MONSANTO COMPANY
SAUGET, ILLINOIS 62201

LOT NO _____ PACKER _____

LEGAL NET 60 LB. 27.22 KG.

TARE 5 LB. 2 27 KG
GROSS 65 LB 29 49 KG

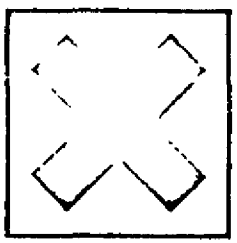
MONSANTO COMPANY, ST LOUIS, MISSOURI 63166, U S A

811 03 280 19753

MONS 219879

AROCLOR 1254

DIELECTRIC FLUID BY Monsanto



Substances nocives
Harmful substances
Gesundheitsschädliche Stoffe
Schadelijke stoffen

Xn

CAUTION!

CONTAINS CHLORINATED HYDROCARBONS

Read and follow all IMPORTANT safeguard instructions shown on this container.

WASTE DISPOSAL

With prior Monsanto notification used polychlorinated biphenyl fluids may be returned freight prepaid for proper incineration at 3¢ per pound

Ship to: Supervisor Dept. 831
MONSANTO COMPANY
SAUGET, ILLINOIS 62201

LOT NO _____ PACKER _____

LEGAL NET 600 LB 272.16 KG

TARE 68 LB 30 84 KG
GROSS 668 LB 303 00 KG

MONSANTO COMPANY, ST LOUIS, MISSOURI 63166, U S A

811 03 220 18/53

MONS 219880

CAPACITOR 21

DIELECTRIC FLUID BY Monsanto



Xn

CAUTION!

CONTAINS CHLORINATED HYDROCARBONS

Read and follow all IMPORTANT safeguard instructions shown on this container.

WASTE DISPOSAL

With prior Monsanto notification used polychlorinated biphenyl fluids may be returned freight prepaid for proper incineration at 3¢ per pound.

Ship to: Supervisor Dept. 831
MONSANTO COMPANY
SAUGET, ILLINOIS 62201

LOT NO PACKER

LEGAL NET 520 LB 235.87 KG

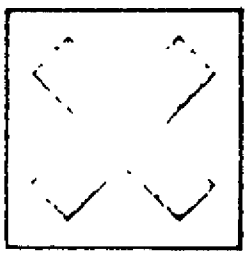
TARE 68 LB. 30 84 KG
GROSS 588 LB 266 71 KG

MONSANTO COMPANY ST LOUIS, MISSOURI 63166, U S A

811 06 225 04/53

MONS 219881

INERTEEN* 70-30



Substances nocives
Harmful substances
Gesundheitsschädliche Stoffe
Schadelijke stoffen
Sostanze nocive

Xn

CAUTION!

CONTAINS CHLORINATED HYDROCARBONS

Read and follow all IMPORTANT safeguard instructions shown on this container.

Made for WESTINGHOUSE ELECTRIC CORPORATION

*Trademark of WESTINGHOUSE ELECTRIC CORPORATION.

WASTE DISPOSAL

With prior Monsanto notification used polychlorinated biphenyl fluids may be returned freight prepaid for proper incineration at 3c per pound

Ship to: Supervisor Dept 831
MONSANTO COMPANY
SAUGET, ILLINOIS 62201

LOT NO _____ PACKER _____

LEGAL NET 60 LB 27.22 KG

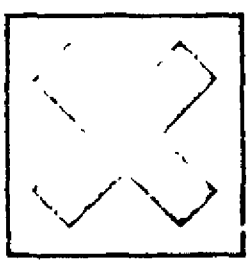
TARE 5 LB 2 27 KG
GROSS 65 LB 29 49 KG

MONSANTO COMPANY, ST. LOUIS, MISSOURI 63166, U S A

810 98-210 12 53

MONS 219882

INERTEEN* 70-30



Substances nocives
Harmful substances
Gesundheitsschädliche Stoffe
Sostanze nocive

X_n

CAUTION!

CONTAINS CHLORINATED HYDROCARBONS

Read and follow all IMPORTANT safeguard instructions shown on this container.

Made for WESTINGHOUSE ELECTRIC CORPORATION

*Trademark of WESTINGHOUSE ELECTRIC CORPORATION

WASTE DISPOSAL

With prior Monsanto notification used polychlorinated biphenyl fluids may be returned freight prepaid for proper incineration at 3¢ per pound.

Ship to: Supervisor Dept. 831
MONSANTO COMPANY
SAUGET, ILLINOIS 62201

LOT NO. _____ PACKER _____

Monsanto

LEGAL NET 360 LB 163.29 KG.

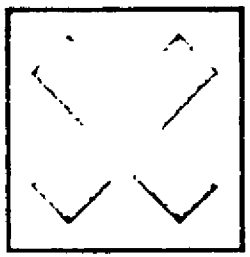
TARE 46 LB 20.87 KG
GROSS 406 LB. 184.16 KG

MONSANTO COMPANY, ST LOUIS, MISSOURI 63166, U.S.A.

810.98-210 11/53

MONS 219883

INERTEEN* 70-30



Substances nocives
Harmful substances
Gesundheitsschädliche Stoffe
Schadelijke stoffen
Sostanze nocive

Xn

CAUTION!

CONTAINS CHLORINATED HYDROCARBONS

Read and follow all IMPORTANT safeguard instructions shown on this container.

Made for WESTINGHOUSE ELECTRIC CORPORATION.

*Trademark of WESTINGHOUSE ELECTRIC CORPORATION.

WASTE DISPOSAL

With prior Monsanto notification used polychlorinated biphenyl fluids may be returned freight prepaid for proper incineration at 3¢ per pound

Ship to: Supervisor Dept. 831
MONSANTO COMPANY
SAUGET, ILLINOIS 62201

LOT NO _____ PACKER _____

LEGAL NET 674 LB 305.72 KG.

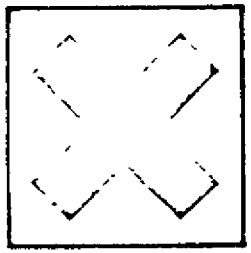
TARE 68 LB. 30 84 KG.
GROSS 742 LB 336 56 KG.

MONSANTO COMPANY, ST. LOUIS, MISSOURI 63166, U.S.A.

810 98-210.10 / 53

MONS 219884

INERTEEN* 60-42



Substances nocives
Harmful substances
Gesund e schadliche Stoffe
Schadelijke stoffen
Sostanze nocive

Xn

CAUTION!

CONTAINS CHLORINATED HYDROCARBONS

Read and follow all IMPORTANT safeguard instructions shown on this container.

Made for WESTINGHOUSE ELECTRIC CORPORATION.

*Trademark of WESTINGHOUSE ELECTRIC CORPORATION.

WASTE DISPOSAL

With prior Monsanto notification used polychlorinated biphenyl fluids may be returned freight prepaid for proper incineration at 3¢ per pound.

Ship to: Supervisor Dept. 831
MONSANTO COMPANY
SAUGET, ILLINOIS 62201

LOT NO. _____ PACKER _____

Monsanto

LEGAL NET 55 LB. 24.95 KG.

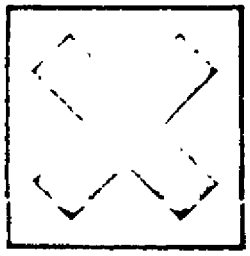
TARE 5 LB. 2.27 KG
GROSS 60 LB. 27.22 KG.

MONSANTO COMPANY, ST LOUIS, MISSOURI 63166, U.S.A.

811 10-215 07/53

MONS 219885

[INERTEEN]* [00-42]



Substances nocives
Harmful substances
Gesundheitsschädliche Stoffe
Schadelijke stoffen
Sostanze nocive

Xn

CAUTION!

CONTAINS CHLORINATED HYDROCARBONS

Read and follow all IMPORTANT safeguard instructions shown on this container

Made for WESTINGHOUSE ELECTRIC CORPORATION.

*Trademark of WESTINGHOUSE ELECTRIC CORPORATION.

WASTE DISPOSAL

With prior Monsanto notification used polychlorinated biphenyl fluids may be returned freight prepaid for proper incineration at 3¢ per pound

Ship to: Supervisor Dept. 831
MONSANTO COMPANY
SAUGET, ILLINOIS 62201

LOT NO. _____ PACKER _____

Monsanto

LEGAL NET 320 LB 145.15 KG

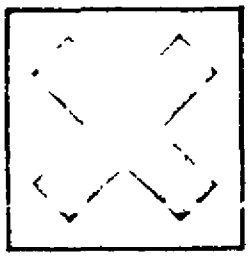
TARE 46 LB. 20 87 KG
GROSS 366 LB. 166 02 KG

MONSANTO COMPANY, ST. LOUIS, MISSOURI 63166, U S A

811 10 215 06/53

MONS 219886

INERTEEN* 60-42



Substances nocives
Harmful substances
Gesundheitsschädliche Stoffe
Sostanze nocive

Xn

CAUTION!

CONTAINS CHLORINATED HYDROCARBONS

Read and follow all IMPORTANT safeguard instructions shown on this container

Made for WESTINGHOUSE ELECTRIC CORPORATION

*Trademark of WESTINGHOUSE ELECTRIC CORPORATION

WASTE DISPOSAL

With prior Monsanto notification used polychlorinated biphenyl fluids may be returned freight prepaid for proper incineration at 3¢ per pound.

Ship to: Supervisor Dept. 831
MONSANTO COMPANY
SAUGET, ILLINOIS 62201

LOT NO _____ PACKER _____

Monsanto

LEGAL NET 600 LB. 272.16 KG

TARE 68 LB 30 84 KG.
GROSS 668 LB. 303 00 KG

MONSANTO COMPANY, ST LOUIS, MISSOURI 63166, U.S.A

811 10 215.05/53

MONS 219887

INERTEEN* 5420I CF



Substances nocives
Harmful substances
Gesundheitsschädliche Stoffe
Sostanze nocive

Xn

CAUTION!

CONTAINS CHLORINATED HYDROCARBONS

Read and follow all IMPORTANT safeguard instructions shown on this container.

Made for WESTINGHOUSE ELECTRIC CORPORATION.

*Trademark of WESTINGHOUSE ELECTRIC CORPORATION

WASTE DISPOSAL

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Ship to: Supervisor Dept. 831
MONSANTO COMPANY
SAUGET, ILLINOIS 62201

LOT NO. _____ PACKER _____

Monsanto

LEGAL NET 600 LB. 272.16 KG.

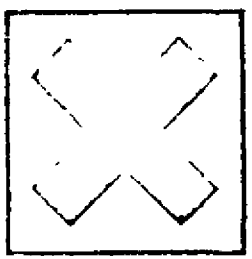
TARE 68 LB 30 84 KG
GROSS 668 LB 303 00 KG

MONSANTO COMPANY, ST LOUIS, MISSOURI 63166, U S A

811.10-219 02/53

MONS 219888

INERTEEN* 5420 CM



Substances nocives
Harmful substances
Gesundheitsschädliche Stoffe
Schadliche stoffen
Sostanze nocive

Xn

CAUTION!

CONTAINS CHLORINATED HYDROCARBONS

Read and follow all IMPORTANT safeguard instructions shown on this container.

Made for WESTINGHOUSE ELECTRIC CORPORATION.

*Trademark of WESTINGHOUSE ELECTRIC CORPORATION.

WASTE DISPOSAL

With prior Monsanto notification used polychlorinated biphenyl fluids may be returned freight prepaid for proper incineration at 3¢ per pound

Ship to: Supervisor Dept. 831
MONSANTO COMPANY
SAUGET, ILLINOIS 62201

LOT NO. _____ PACKER _____

Monsanto

LEGAL NET 55 LB. 24.95 KG.

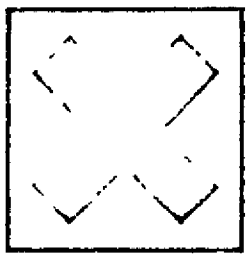
TARE 5 LB 2 27 KG
GROSS 60 LB 2722 KG

MONSANTO COMPANY, ST LOUIS, MISSOURI 63166, U S A

811 10 216 04/53

MONS 219889

INERTEEN* 5-1201 CM



Substances nocives
Harmful substances
Gesundheitsschädliche Stoffe
Schadelijke stoffen
Sostanze nocive

Xn

CAUTION!

CONTAINS CHLORINATED HYDROCARBONS

Read and follow all IMPORTANT safeguard instructions shown on this container.

Made for WESTINGHOUSE ELECTRIC CORPORATION.

*Trademark of WESTINGHOUSE ELECTRIC CORPORATION

WASTE DISPOSAL

With prior Monsanto notification used polychlorinated biphenyl fluids may be returned freight prepaid for proper incineration at 3¢ per pound

Ship to: Supervisor Dept. 831
MONSANTO COMPANY
SAUGET, ILLINOIS 62201

LOT NO _____ PACKER _____

Monsanto

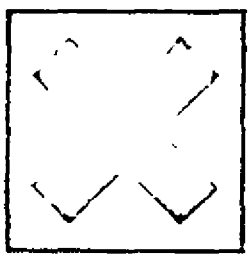
LEGAL NET 320 LB. 145.15 KG.

TARE 46 LB. 20 87 KG.
GROSS 366 LB 166 02 KG.

MONSANTO COMPANY, ST LOUIS, MISSOURI 63166, U.S.A.

811.10-216 03/53

MONS 219890



Substances nuisibles
Harmful substances
Gesundheitsschädliche Stoffe
Schadelijke stoffen
Sostanze nocive

Xn

CAUTION!

CONTAINS CHLORINATED HYDROCARBONS

Read and follow all IMPORTANT safeguard instructions shown on this container.

Made for WESTINGHOUSE ELECTRIC CORPORATION

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WASTE DISPOSAL

With prior Monsanto notification used polychlorinated biphenyl fluids may be returned freight prepaid for proper incineration at 3¢ per pound

Ship to: Supervisor Dept. 831
MONSANTO COMPANY
SAUGET, ILLINOIS 62201

LOT NO. PACKER

Monsanto

LEGAL NET 600 LB. 272.16 KG.

TARE 68 LB 30 84 KG
GROSS 668 LB 303 00 KG

MONSANTO COMPANY, ST. LOUIS, MISSOURI 63166, U S A

811 10 216 02 '53

MONS 219891

INERTEEN* 5420I KA



Substances nocives
Harmful substances
Gesundheitsschädliche Stoffe
Schadelijke stoffen
Sostanze nocive

Xn

CAUTION!

CONTAINS CHLORINATED HYDROCARBONS

Read and follow all IMPORTANT safeguard instructions shown on this container.

Made for WESTINGHOUSE ELECTRIC CORPORATION

*Trademark of WESTINGHOUSE ELECTRIC CORPORATION.

WASTE DISPOSAL

With prior Monsanto notification used polychlorinated biphenyl fluids may be returned freight prepaid for proper incineration at 3¢ per pound.

Ship to: Supervisor Dept. 831
MONSANTO COMPANY
SAUGET, ILLINOIS 62201

LOT NO. _____ PACKER _____

Monsanto

LEGAL NET 60 LB. 27.22 KG.

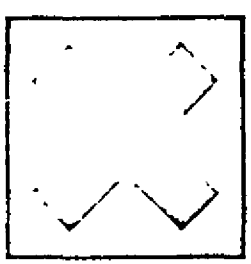
TARE 5 LB. 2.27 KG.
GROSS 65 LB. 29 49 KG.

MONSANTO COMPANY, ST. LOUIS, MISSOURI 63166, U.S.A.

810 98-217 05/53

MONS 219892

INERTEEN* 5420 LA



Substances nocives
Harmful substances
Gesundheitsschädliche Stoffe
Sostanze nocive

Xn

CAUTION!

CONTAINS CHLORINATED HYDROCARBONS

Read and follow all IMPORTANT safeguard instructions shown on this container.

Made for WESTINGHOUSE ELECTRIC CORPORATION

*Trademark of WESTINGHOUSE ELECTRIC CORPORATION

WASTE DISPOSAL

With prior Monsanto notification used polychlorinated biphenyl fluids may be returned freight prepaid for proper incineration at 3¢ per pound.

Ship to: Supervisor Dept 831
MONSANTO COMPANY
SAUGET, ILLINOIS 62201

LOT NO. _____ PACKER _____

Monsanto

LEGAL NET 360 LB 163.29 KG.

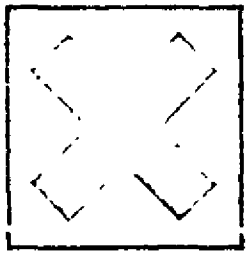
TARE 46 LB 20.87 KG
GROSS 406 LB 184.16 KG.

MONSANTO COMPANY, ST LOUIS, MISSOURI 63166, U.S.A

810 98 217 04/53

MONS 219893

INERTEEN* 54201 KA



Substances nocives
Harmful substances
Gesundheitsschädliche Stoffe
Schädelijke stoffen
Sostanze nocive

Xn

CAUTION!

CONTAINS CHLORINATED HYDROCARBONS

Read and follow all IMPORTANT safeguard instructions shown on this container.

Made for WESTINGHOUSE ELECTRIC CORPORATION.

*Trademark of WESTINGHOUSE ELECTRIC CORPORATION.

WASTE DISPOSAL

With prior Monsanto notification used polychlorinated biphenyl fluids may be returned freight prepaid for proper incineration at 3¢ per pound

Ship to: Supervisor Dept. 831
MONSANTO COMPANY
SAUGET, ILLINOIS 62201

LOT NO _____ PACKER _____

Monsanto

LEGAL NET 674 LB 305.72 KG

TARE 68 LB. 30 84 KG.
GROSS 742 LB 336 56 KG

MONSANTO COMPANY, ST LOUIS, MISSOURI 63166, U S A

810 98 217.03/53

MONS 219894

MCS 1489

DIELECTRIC FLUID BY Monsanto



Substances nocives
Harmful substances
Gesundheitsschädliche Stoffe
Schadelijke stoffen
Sostanze nocive

Xn

CAUTION!

CONTAINS CHLORINATED HYDROCARBONS

Read and follow all IMPORTANT safeguard instructions shown on this container.

WASTE DISPOSAL

With prior Monsanto notification used polychlorinated biphenyl fluids may be returned freight prepaid for proper incineration at 3¢ per pound

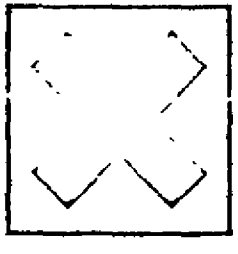
Ship to: Supervisor Dept. 831
MONSANTO COMPANY
SAUGET, ILLINOIS 62201

LOT NO _____ PACKER _____ Monsanto NET/LEGAL LB KG

MONSANTO COMPANY, ST LOUIS, MISSOURI 63166, U S A 800 02 017 01/53

MONS 219895

TRANSFORMER PYRANOL*
A 19 B-1



Substances nocives
Namely substances
Gesundheitsschädliche Stoffe
Schadelijke stoffen
Sostanze nocive

X_n

CAUTION!

CONTAINS CHLORINATED HYDROCARBONS

Read and follow all IMPORTANT safeguard instructions shown on this container.

Made for GENERAL ELECTRIC COMPANY

*Trademark of GENERAL ELECTRIC COMPANY.

WASTE DISPOSAL

With prior Monsanto notification used polychlorinated biphenyl fluids may be returned freight prepaid for proper incineration at 3¢ per pound

Ship to: Supervisor Dept. 831
MONSANTO COMPANY
SAUGET, ILLINOIS 62201

LOT NO. PACKER

NET LEGAL 60 LB. 27.22 KG

TARE 5 LB 2 27 KG
GROSS 65 LB 29 49 KG

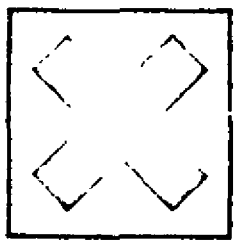
MONSANTO COMPANY ST LOUIS, MISSOURI 63166, U S A

811 03-281 02/53

MONS 219896

TRANSFORMER PYRALOL*

A 13 B-1



Substances nocives
Harmful substances
Gesundheitsschädliche Stoffe
Sostanze nocive

X_n

CAUTION!

CONTAINS CHLORINATED HYDROCARBONS

Read and follow all IMPORTANT safeguard instructions shown on this container.

Made for GENERAL ELECTRIC COMPANY

*Trademark of GENERAL ELECTRIC COMPANY.

WASTE DISPOSAL

With prior Monsanto notification used polychlorinated biphenyl fluids may be returned freight prepaid for proper incineration at 3¢ per pound

Ship to: Supervisor Dept. 831
MONSANTO COMPANY
SAUGET, ILLINOIS 62201

LOT NO _____ PACKER _____

NET LEGAL 600 LB. 272.16 KG

TARE 68 LB 30 84 KG
GROSS 668 LB 303 00 KG

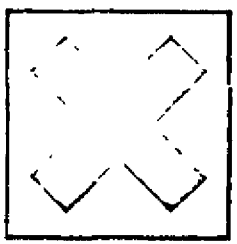
MONSANTO COMPANY, ST LOUIS, MISSOURI 63166, U S A

811 03 281 01 / 53

MONS 219897

TRANSFORMER PYRANOL*
A-13-B 3B-2

(REPLACES PYRANOL 1467 and PYRANOL 1470 and PYRANOL A-13-B 3B)



Substances nocives
Harmful substances
Gesundheitsschädliche Stoffe
Sostanze nocive

X_n

CAUTION!

CONTAINS CHLORINATED HYDROCARBONS

Read and follow all IMPORTANT safeguard instructions shown on this container.

Made for GENERAL ELECTRIC COMPANY

*Trademark of GENERAL ELECTRIC COMPANY.

WASTE DISPOSAL

With prior Monsanto notification used polychlorinated biphenyl fluids may be returned freight prepaid for proper incineration at 3¢ per pound

Ship to: Supervisor Dept. 831
MONSANTO COMPANY
SAUGET, ILLINOIS 62201

ECT NO. _____ PACKER _____

NET LEGAL 60 LB. 27.22 KG

TARE 5 LB 2.27 KG
GROSS 65 LB 29.49 KG

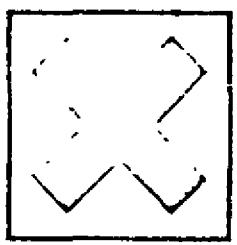
MONSANTO COMPANY, ST. LOUIS, MISSOURI 63166, U.S.A.

RTN 07 301 03/53

MONS 219898

TRANSFORMER PYRANOL*
A-13-B 3B-2

(REPLACES PYRANOL 1467 and PYRANOL 1470 and PYRANOL A-13-B 3B)



Substances nocives
Harmful substances
Gesundheitsschädliche Stoffe
Schadelijke stoffen
Sostanze nocive

Xn

CAUTION!

CONTAINS CHLORINATED HYDROCARBONS

Read and follow all IMPORTANT safeguard instructions shown on this container.

Made for GENERAL ELECTRIC COMPANY

*Trademark of GENERAL ELECTRIC COMPANY

WASTE DISPOSAL

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Ship to: Supervisor Dept. 831
MONSANTO COMPANY
SAUGET, ILLINOIS 62201

LOT NO PACKER

NET LEGAL 360 LB. 163.29 KG

TARE 46 LB 20.87 KG
GROSS 406 LB 184.16 KG

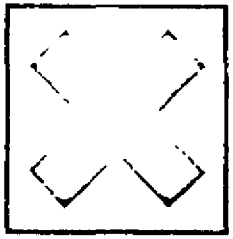
MONSANTO COMPANY, ST. LOUIS, MISSOURI 63166, U.S.A.

810 97-301 02/53

MONS 219899

TRANSFORMER PYRANOL*
A-13-B 3B-2

(REPLACES PYRANOL 1467 and PYRANOL 1470 and PYRANOL A-13-B 3B)



Substances nocives
Harmful substances
Gesundheitsschädliche Stoffe
Schadelijke stoffen
Sostanze nocive

Xn

CAUTION!

CONTAINS CHLORINATED HYDROCARBONS

Read and follow all IMPORTANT safeguard instructions shown on this container.

Made for GENERAL ELECTRIC COMPANY

*Trademark of GENERAL ELECTRIC COMPANY.

WASTE DISPOSAL

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Ship to: Supervisor Dept. 831
MONSANTO COMPANY
SAUGET, ILLINOIS 62201

LOT NO. PACKER

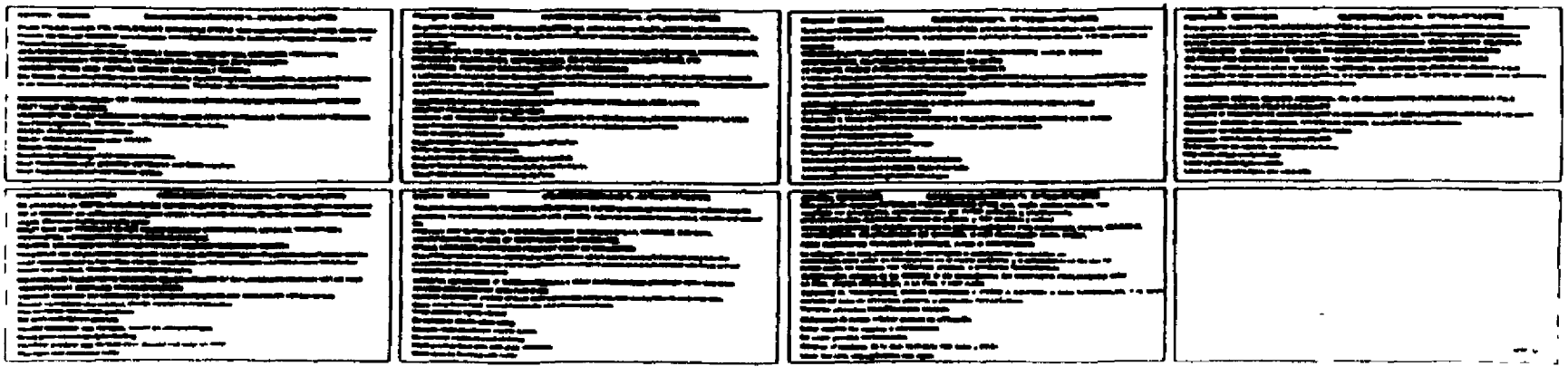
NET LEGAL 675 LB. 306.17 KG

TARE 68 LB. 30 84 KG
GROSS 743 LB 337 01 KG

MONSANTO COMPANY, ST LOUIS, MISSOURI 63166, U S A

81007 301 01/53

MONS 219900



MONS 219901

Attachment 5-10

ANSI/ASTM D 2283 - 75

Standard Specification for CHLORINATED AROMATIC HYDROCARBONS (ASKARELS) FOR TRANSFORMERS[1]

This Standard is issued under the fixed designation D 2283; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval.

1. Scope

1.1 This specification covers bulk shipments in tank cars or drums of new synthetic nonflammable electrical insulating liquids of the chlorinated aromatic hydrocarbon type, known as askarels which are used as an insulating and cooling medium in liquid filled transformers. This specification also includes liquids that were previously available and are still in use in apparatus.

1.2 Askarels covered by this specification are of various type having components in weight percent in accordance with Table 1.

NOTE 1—The components and the respective percentages given are descriptive of the materials currently in voltmation use and are not intended as part of this specification, which is based on physical and chemical properties.

NOTE 2—Askarels of 1970 to 1972 Types A, B, C, and I have been replaced by Types D and I. Materials previously available are still in use in the field.

NOTE 3—Methods for handling and disposal of askarels and askarel-impregnated materials are given in a recent ANSI Committee C107 Guide.

2. Applicable Documents

2.1 *ASTM Standards*

D 923 Sampling Electrical Insulating Liquids[2]

D 924 Test for Power Factor and Dielectric Constant of Electrical Insulating Liquids[2]

2.2 *Other Document*

ANSI C107 Guidelines for Handling and Disposal of Capacitor and Transformer Grade Askarels Containing Polychlorinated Biphenyls[3]

3. Definition

3.1 *askarel*—a generic term for a group of nonflammable synthetic chlorinated aromatic hydrocarbons used as electrical insulating media. Askarels of various composition types are used. Under arcing conditions the gases produced, while containing predominantly of noncombustible hydrogen chloride, can include varying amounts of combustible gases depending upon the askarel type.

4. Detail Requirements

4.1 Askarels for use in transformers shall conform to the requirements prescribed in Table 2.

NOTE 4—If more convenient, measurement of power factor may be made by Method D 924 in place of the resistivity measurement. Theoretical considerations indicate and experiment confirms that a strong statistical correlation exists between the power factor and resistivity; however, other factors modify in practice the precise relationship predicted by theory. A power factor at 60 Hz and 100 C that is not in excess of 15 percent shall be considered satisfactory.

5. Sampling and Test Methods

5.1 The material shall be sampled in accordance with Method D 923 and tests shall be conducted in accordance with the methods of test listed in Table 2.

This specification is under the jurisdiction of ASTM Committee D-27 on Electrical Insulating Liquids and Gases.

Current edition approved July 28, 1975. Published August 1975. Originally published as D 2283 - 64 T. Last previous edition D 2283 - 73.

[2] *Annual Book of ASTM Standards*, Part 30.

[3] Available from the American National Standards Institute, 1430 Broadway, New York, N.Y. 10018.

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TABLE 1 Askarels Components in Weight Percent

Components	Type A	Type B	Type C	Type D	Type E	Type F	Type G
Hexachlorobiphenyl	60	45					60
Pentachlorobiphenyl[a]				70		45	
Trichlorobiphenyl			80		100		40
Trichlorobenzene[b]	40			30			
Tricarbonyl		55	70			55	
Phenoxypropene oxide[c]	0.18 to 0.22			0.18 to 0.22	0.18 to 0.22		
Diepoxide type compound[d]		0.115 to 0.135	0.115 to 0.135			0.115 to 0.135	0.115 to 0.135

[a] Biphenyl chlorinated to a chlorine content of 60 weight percent
[b] Biphenyl chlorinated to a chlorine content of 54 weight percent
[c] Biphenyl chlorinated to a chlorine content of 42 weight percent
[d] A mixture of isomers of trichlorobenzene
[e] A mixture of isomers of trichlorobenzene and tetrachlorobenzene
[f] Glycidyl phenylether
[g] 3,4 Epoxycyclohexylmethyl 3,4 epoxycyclohexane carboxylate

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TABLE 2 Detail Requirements for Askarels for Transformers

Property	Type A	Type B		Type C	Type E	Type F	Type G	ASTM Test Method[a]
Acid, mg KOH/g, max	0.014	0.014	0.014	0.014	0.014	0.014	0.014	D 974, D 664
Color, APHA, max	150	150	150	150	150	150	150	D 2129
Condition	clear	clear	clear	clear	clear	clear		(visual)
Chlorides, inorganic, ppm, max	0.1	0.1	0.1	0.1	0.1	0.1	0.1	D 1821
Dielectric constant at 100°C and 1 kHz	3.7 to 4.0	3.8 to 4.3	4.4 to 4.9	4.3 to 4.6	4.7 to 4.9	4.5 to 4.9	4.3 to 4.6	D 924
Dielectric breakdown voltage, kV, min	35	35	35	35	35	35	35	D 877
Fire point[b]	none to boiling	none to boiling	none to boiling	none to boiling	none to boiling	none to boiling	none to boiling	D 92
Pour point, deg C, max	−32	−44	−30	−30	−14	−42	35	D 97
Refractive index, 25°C	1.6130 to 1.6154	1.6088 to 1.6088	1.6160 to 1.6166	1.6161 to 1.6193	1.6240 to 1.6260	1.6060 to 1.6070	1.6110 to 1.6120	D 1218
Resistivity at 100°C, 5 V, mil d c Ω cm, min	100 × 10⁶	100 × 10⁶	100 × 10⁶	100 × 10⁶	100 × 10⁶	100 × 10⁶	100 × 10⁶	D 1169
Scavenger content, percent								
Phenotyp opene oxide	0.18 to 0.22			0.18 to 0.22	0.18 to 0.22			D 1701
Diepoxide type compound		0.115 to 0.135	0.115 to 0.135			0.115 to 0.135	0.115 to 0.135	
Specific gravity, 15.5/15.5°C	1.560 to 1.568	1.560 to 1.571	1.412 to 1.425	1.518 to 1.528	1.380 to 1.392	1.515 to 1.525	1.502 to 1.517	D 1810
Viscosity, Saybolt Universal, s at 37.8°C (100°F)	52 to 56	41 to 45	50 to 55	56 to 61	82 to 92	39 to 43	44 to 48	D 88
							5.5 to 6.8	
Coefficient of thermal expansion, cm³/cm³/deg C	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	D 1903
Water content, ppm, max	30	30	30	30	30	30	30	D 1533

[a] When testing for fire point, a pseudo-flash may be observed; it differs noticeably from the flash obtained on combustible materials and is not indicative of a fire hazard.
[b] See Note 4.
[c] These are approximate values included for information only.
[d] These designations refer to the following methods of the American Society for Testing and Materials:
D 88 Test for Saybolt Viscosity[1]
D 92 Test for Flash and Fire Points by Cleveland Open Cup[2]
D 97 Test for Pour Point of Petroleum Oils[3]
D 445 Test for Kinematic Viscosity of Transparent and Opaque Liquids (and the Calculation of Dynamic Viscosity)[4]
D 664 Test for Neutralization Number by Potentiometric Titration[5]
D 877 Test for Dielectric Breakdown Voltage of Insulating Liquids Using Disk Electrodes[6]
D 924 Test for Power Factor and Dielectric Constant of Electrical Insulating Liquids[7]
D 974 Test for Neutralization Number by Color-Indicator Titration[8]
D 1169 Test for Specific Resistance (Resistivity) of Electrical Insulating Liquids[9]
D 1218 Test for Refractive Index and Refractive Dispersion of Hydrocarbon Liquids[10]
D 1533 Test for Water in Insulating Liquids (Karl Fischer Method)[11]
D 1701 Test for Scavenger Content of Askarels[12]

D 1810 Test for Specific Gravity of Askarels[13]
D 1903 Test for Inorganic Chlorides in Askarels[14]
D 2129 Test for [illegible] Origin and Askarels[15]
D 2162 Test for [illegible] Hydrocarbons in Askarels[16]

[illegible] takes no position respecting the validity of any patent rights asserted in [illegible] expressly advised that determination of the [illegible] the risk of infringement of such rights is entirely their own responsibility.

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ASTM D 2283

D [illegible] Test [illegible] Organics in Askarels[1]
D [illegible] Test [illegible] Chlorides in Askarels[1]
D [illegible] Test [illegible] Coefficient of Thermal Expansion of Electrical Insulating Liquids of Petroleum Origin and Askarels[1]
D [illegible] Test [illegible] Chlorinated Aromatic Hydrocarbons in Askarels[1]

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Designation D 3304 - 74

AMERICAN SOCIETY FOR TESTING AND MATERIALS
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If not listed in the current combined index, will appear in the next edition.

Standard Method for
ANALYSIS OF ENVIRONMENTAL MATERIALS POLYCHLORINATED BIPHENYLS[1]

This Standard is issued under the fixed designation D 3304; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval.

1. Scope

1.1 This method covers the determination of the amount and type of polychlorinated biphenyls (PCB's) in environmental materials, specifically air, water, soils, and sediments. Absolute confirmation of PCB structures is not obtained with this method. Structure proof can be obtained using additional techniques such as mass spectrometry.

2. Applicable Documents

2.1 *ASTM Standards*:

D 510 Sampling Industrial Water[2]

D 1587 Thin-Walled Tube Sampling of Soils[3]

D 1605 Recommended Practices for Sampling Atmospheres for Analysis of Gases and Vapors[2]

D 2928 Sampling Stacks for Particulate Matter[2]

3. Significance

3.1 Since it is possible for minute quantities of PCB's to find their way into the environment, it is desirable to have a method to identify and measure the quantity of such trace amounts.

4. Sampling

4.1 *Water Sampling*—Environmental sampling of natural bodies of water and effluents are covered in many methods under the jurisdiction of Committee D 19 on Water. Method D 510 is recommended with the following stipulations:

4.1.1 Under 26.1 a final rinse with Nanograde[4] hexane should be added.

4.1.2 The sample collected should be at least 250 ml.

4.2 *Sediment and Soil Sampling*—A sediment or soil sample of at least 1000 g should be taken according to Method D 1587[3] or any other acceptable procedure, taking due precautions to minimize contamination.

4.3 *Air Sampling*.

4.3.1 Environmental sampling of ambient air or source sampling is under the jurisdiction of ASTM Committee D-22 on Methods of Sampling and Analysis of Atmospheres. There are various methods of sampling from stacks or ambient air available. See Method D 1605 or Method D 2928, or both.

4.3.2 For the measurements of airborne PCB's the air sample is drawn through one or more fritted bubbler absorbers filled with nanograde toluene. The PCB's are absorbed in the toluene.

5. Principle

5.1 The PCBs present in environmental samples are isolated from the bulk of the sample matrix by solvent extraction. Interfering matrix components and endogenous residues are then removed from the sample.

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[1] This method is under the jurisdiction of ASTM Committee D-27 on Electrical Insulating Liquids and Gases.

Current edition approved Feb. 27, 1974. Published April 1974.

[2] 1973 *Annual Book of ASTM Standards*, Part 23.

[3] 1974 *Annual Book of ASTM Standards*, Part 19.

[4] "Reagent Chemicals, American Chemical Society Specifications," Am. Chemical Soc., Washington, D. C. For suggestions on the testing of reagents not listed by the American Chemical Society, see "Reagent Chemicals and Standards," by Joseph Rosin, D. Van Nostrand Co., Inc., New York, N.Y., and the "United States Pharmacopeia."

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extracts by a suitable combination of clean-up procedures and the amount and type of PCB s present determined by electron capture gas chromatography (EC/GC)

6. Apparatus

6 1 *Separatory Funnels*, equipped with ground-glass stoppers and TFE-fluorocarbon stopcocks 125, 250, 500, 1000, and 2000 ml capacities

6 2 *Kunderna-Danish Evaporative Concentrators*, 500-ml capacity equipped with 3-ball Snyder columns and graduated 5-ml capacity vials

6.3 *Chromatographic Columns*, glass, 10 in. (254 mm) long by 20 mm in outside diameter with a reservoir 5 in (127 mm) long by 50-mm in outside diameter at the top, equipped with TFE-fluorocarbon stopcocks

6.4 *Buchner Filter Funnels*, borosilicate glass, fritted, 90 mm in inside diameter, 600-ml capacity, medium porosity

6.5 *Boiling Flasks*, flat-bottomed, 125-ml capacity.

6.6 *Liebig Condensers*, 200 mm in length.

6.7 *Hot Plates*.

6.8 *Water Bath*.

6.9 *Reciprocating Variable-Speed Shaker*.

6.10 *Syringes*, 10-µl

6.11 *Mortar and Pestle*, all glass, 32-oz (or 1-litre)

6 12 *Baking Dishes*, borosilicate, 2¼-qt (2 4-l tre), 8 by 12 by 2-in (203 by 305 by 50-mm)

6.13 *Sieve*—U.S. Standard sieve No. 30 (600-µm).

6 14 *Gas Scrubbing Bottles*, high-form, ground-glass joint, fritted-coarse disks, 250-ml capacity.

6.15 *Dry Test Meter*, 0 1 ft³ per revolution.

6.16 *Laboratory Vacuum Pump*.

6.17 *Rotary Vacuum Evaporator*.

6.18 For the apparatus used in the Electron Capture Gas Chromatographic Procedure, see Section 10.

7. Reagents

7.1 *Purity of Reagents*—Reagent grade chemicals shall be used in all tests Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available [4] Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination

7 2 *Acetonitrile*, Nanograde [5]

NOTE —Nanograde designates impurities of no more than 10 parts per trillion

7 3 *Alcoholic Potassium Hydroxide Solution (2 5 % weight per volume)*—Dissolve 12 5 g of potassium hydroxide in 500 ml of ethanol

7 4 *Alumina* (for chromatographic adsorption), 80/200 mesh. Heat at 400°C for a minimum period of 4 h and deactivate with 5 % (w/w) distilled water

7.4 1 *Alumina Column Preparation*—Fill a chromatographic column (6 3) with hexane up to the point where the reservoir joins the column and push a glass wool plug to the bottom with a glass rod In a 50-ml beaker measure 35 ml of deactivated alumina (30 g), and pour this slowly into the column Tap or vibrate the column to settle the alumina and top the alumina with 2 to 3 cm of anhydrous sodium sulfate. Wash the column with 50 to 100 ml of hexane prior to the addition of the sample

7.5 *Distilled Water*, extracted with hexane to remove hexane-soluble electron-capturing impurities

7.6 *Ethanol*—Formula 2B

7.7 *Hexane*, Nanograde [5]

7.8 *PCB Standards*, production grade PCB Standards Aroclor 1221,[6] Aroclor 1242, and Aroclor 1254

7.9 *Potassium Hydroxide* (KOH)

7 10 *Sodium Sulfate*, anydrous, granular Heat the sodium sulfate (Na_2SO_4) at 400°C for 1 h prior to use

7 11 *Sulfuric Acid (sp gr 1 84)*—Concentrated sulfuric acid (H_2SO_4)

7.12 *Toluene*, Nanograde [5]

8. Sample Preparation and Extraction

8.1 *Water*

8.1 1 Where possible, the entire water

[4] Registered trademark of Mallinckrodt Chemical Works

[5] Registered trademark of Monsanto Co

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sample is extracted with hexane With larger samples, where this is not physically possible, the containers are simply agitated and a 250-ml portion used for analysis

8.1.2 *Extraction of Water Samples*— After agitating, transfer the entire aqueous sample or a 250-ml aliquot into a graduated glass cylinder Record the volume of the sample and quantitatively transfer it to a separatory funnel with distilled water

8.1.3 Rinse the sample container and graduate cylinder with two 50-ml portions of hexane, adding each to the separatory funnel. If the entire sample is not consumed, rinse only the graduate cylinder

8.1.4 Stopper the separatory funnel and hand shake vigorously for at least 1 min Allow the layers to separate and transfer the lower aqueous phase to a second separatory funnel.

8.1.5 Extract the water sample a second time with a 50-ml portion of hexane After the layers have separated, add the first hexane extract to the second separatory funnel and transfer the aqueous layer to the original separatory funnel.

8.1.6 Repeat the extraction with a third 50-ml portion of hexane Discard the aqueous layer and combine the hexane extracts

8.1.7 Filter the combined extracts through a 4-in. (100-mm) funnel plugged with glass wool that is covered with sodium sulfate Collect the filtrate in a Kuderna-Danish evaporative concentrator, add a small boiling chip. Put the Snyder column in place, and reduce the hexane volume to less than 5 ml by heating the apparatus in an 80 to 90°C water bath CAUTION—*Solvent vapors must be vented into a hood.* Remove the evaporative concentrator from the water bath and after cooling to room temperature adjust the volume to 5.0 ml.

8.1.8 Inject a fraction of a microlitre of the concentrate into the gas chromatograph to check for interferences and determine the approximate level of PCB's present If no interferences are present, dilute or concentrate the sample to a known volume, as determined by the electron capture chromatogram, and proceed with the gas chromatographic analysis

8.1.9 If interferences are present, proceed with the chemical treatment and column chromatographic cleanup procedures

8.2 *Sediment and Soil*

8.2.1 Any excess water is decanted and the entire sediment or soil sample transferred to a glass baking dish to air dry at room temperature The dried material is transferred from the dish into a mortar and pestle and ground The ground sediment is sieved remixed, and a 250 g portion taken for analysis

8.2.2 Weigh 250 g (to the nearest 0.01 g) into a 16-oz (or 500-ml) narrow-neck screw-cap glass bottle (with an aluminum foil liner)

8.2.3 Moisten the soil with water (10 ml) and add 150 ml of acetonitrile Cap the bottle tightly, and mechanically shake for a minimum period of 1 h.

8.2.4 Quantitatively transfer the acetonitrile extract into a sintered-glass filter funnel containing a ¼-in. (6.4-mm) layer of anhydrous Na_2SO_4 Collect the filtrate in a 600-ml beaker (vacuum filtration may be necessary).

8.2.5 After the acetonitrile has completely drained into the beaker, wash the bottle twice with 50-ml portions of acetonitrile, adding each wash to the funnel after the previous has completely percolated through the sediment

8.2.6 Quantitatively transfer the extract to a Kuderna-Danish evaporative concentrator, add a small boiling chip Put the Snyder column in place, and reduce the solvent volume to less than 5 ml by heating the apparatus in a 80 to 90°C water bath CAUTION—*Solvent vapors must be vented into a hood.*

8.2.7 Carefully evaporate the acetonitrile extracts to dryness with the aid of a gentle stream of dry nitrogen Redissolve the residue in maximum of 5 ml of hexane

8.2.8 Inject a fraction of a microlitre of the concentrate into the gas chromatograph to check for interferences and determine the approximate level of PCB's present If no interferences are present, dilute or concentrate the sample to a known volume as determined by the electron capture chromatogram, and proceed with the gas chromatographic analysis

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8.2.9 If interferences are present, proceed with the chemical treatment and column chromatographic cleanup procedures.

8.3 *Airborne PCB's*

8.3.1 After scrubbing the desired amount of air, record the metered volume, pressure, and temperature.

8.3.2 Quantitatively transfer the scrubbing solvent to a round-bottom flask and reduce the volume to approximately 2 ml by rotary vacuum evaporation.

8.3.3 Quantitatively transfer the concentrate to a 30-ml beaker with the aid of several small portions of toluene.

8.3.4 Inject a fraction of a microlitre of the concentrate into the gas chromatograph to check for interferences and determine the approximate level of PCB's present. If no interferences are present dilute or concentrate the sample to a known volume, as determined by the electron capture chromatogram, and proceed with the gas chromatographic analysis.

8.3.5 If interferences are present, proceed with the chemical treatment and column chromatographic cleanup procedures.

9. Supporting Procedures—Sample Clean Up

9.1 *Saponification with Alcoholic Potassium Hydroxide and Extraction with Sulfuric Acid*

9.1.1 Quantitatively transfer the concentrated extracts to a 125-ml extraction flask with the aid of several small portions of solvent.

9.1.2 Evaporate the extract just to dryness with a gentle steam of dry filtered air (5A molecular sieve of equivalent to remove oil, water, and particles above 12 μm) and add 25 ml of 2.5% alcoholic KOH.

9.1.3 Add a boiling chip, put a water condenser in place, and allow the solution to reflux on a hot plate for 45 min.

9.1.4 After cooling, transfer the solution to a 250-ml separatory funnel with the aid of 25 ml of distilled water.

9.1.5 Rinse the extraction flask with 25 ml of hexane and add it to the separatory funnel.

9.1.6 Stopper the separatory funnel and shake vigorously for at least 1 min. Allow the layers to separate and transfer the lower aqueous phase to a second separatory funnel.

9.1.7 Extract the saponification solution with a second 25 ml portion of hexane. After the layers have separated, add the first hexane extract to the second separatory funnel and transfer the aqueous alcohol layer to the original separatory funnel.

9.1.8 Repeat the extraction with a third 25-ml portion of hexane. Discard the saponification solution and combine the hexane extracts.

9.1.9 *Carefully* add 25 ml of concentrated H_2SO_4, in small portions, to the hexane extracts.

9.1.10 Stopper the separatory funnel and shake vigorously for at least 1 min, venting the funnel as necessary. Allow the layers to separate and discard the lower aqueous-acid layer. Repeat this until the acid layer is colorless.

9.1.11 Wash the hexane with a 25-ml portion of water. Discard the water wash.

9.1.12 Filter the hexane extract through a 4-in. (100-mm) funnel plugged with glass wool that is covered with a layer of anhydrous Na_2SO_4. Collect the filtrate in a Kunderna Danish evaporative concentrator, add a small boiling chip, put the Snyder column in place, and reduce the hexane volume to less than 5 ml by heating the apparatus in an 80 to 90°C water bath. CAUTION—*Solvent vapor must be vented into a hood.* Remove the evaporative concentrator from the water bath and after cooling to room temperature adjust the volume to 5.0 ml.

9.2 *Liquid-Solid Chromatographic Clean-Up With Alumina*

9.2.1 After preparation of the alumina column, as described in Section 7, quantitatively transfer the hexane extracts (5 ml or less) on to the column with the aid of several 5-ml portions of hexane (lowering the solvent level to the adsorbant level after each addition of solvent. Do not allow the top of the column to become dry.)

9.2.2 Carefully add 125 ml of hexane to the column reservoir and collect the total eluent in a Kunderna Danish evaporative concentrator.

9.2.3 Add a small boiling chip to the Kunderna-Danish evaporative concentrator.

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out the Snyder column in place and reduce the hexane volume to less than 5 ml by heating the apparatus in an 80 to 90°C water bath. CAUTION—*Solvent vapors must be vented into a hood.* Remove the evaporative concentrator from the water bath and after cooling to room temperature adjust the volume to 5.0 ml.

10. Electron Capture Gas Chromatographic Procedure

10.1 *Instruments*—A gas chromatograph equipped with isothermal oven temperature control.

10.2 *Detector*—High-temperature ^{63}Ni Electron Capture Cell.

10.3 *Column*—A 6-mm by 6-ft (1.8-m) glass column, 4% XE-60 on 80/100 mesh Chromosorb W, high-performance.

10.4 *Column Temperature*—The column temperature shall be as follows for the various Aroclors. Aroclor 1221, 170°C. Aroclor 1242, 190°C. Aroclor 1254, 205°C.

10.5 *Detector Temperature*—The detector temperature shall be 250 to 300°C.

10.6 *Injection Port Temperature*—The injection port temperature shall be 220°C.

10.7 *Pulse*—The pulse rate shall be 50 μs.

10.8 *Flow Rates*—The flow rates shall be as follows:

10.8.1 *Helium Carrier*—60 ml/min.

10.8.2 *90% Argon-10% Methane Purge*—20 ml/min.

10.9 Using EC/GC as the determinative step, inject in duplicate 2 to 8 μl of each sample solution into the chromatograph. By comparison with standard solutions injected, under the same operating conditions, determine the amount and type of Aroclor using the total area method.

11. Quantitative Determination

11.1 Quantitative determinations employing the electron capture detector are non-stoichiometric measurements made by comparing the total areas for known concentrations with those for unknown concentrations. Four variations of the area quantification procedure have been employed, as follows:

11.1.1 *Case I*—EC gas chromatogram of PCB unknown unchanged with respect to standard PCB with no evidence of interferences.

11.1.2 *Case II*—EC gas chromatogram of PCB unknown altered with respect to standard PCB with no evidence of interference.

11.1.3 *Case III*—EC gas chromatogram of PCB unknown unchanged with respect to standard PCB with evidence of interference.

11.1.4 *Case IV*—EC gas chromatogram of PCB unknown altered with respect to standard PCB with evidence of interference.

11.2 Determine the PCB level in Case I and II samples by comparison of the total area of the peaks in the unknown with a calibration curve prepared by plotting the total area of the peaks in the electron capture chromatogram of the corresponding standard versus the number of nanograms of the standard injected. Initially subject Case III and IV samples to the chemical cleanup procedure and follow by chromatography on alumina. If the interferences are removed by this treatment, calculate the PCB levels for Cases III and IV in the same manner as Cases I and II. If dominant interference(s) is (are) still present, estimate the maximum PCB level in accordance with Cases I and II after correcting the total area for that of the interfering peak(s). In all cases, the response of the electron capture must be linear for quantitative analysis.

12. Calculations

12.1 Assume that the calibration curve is prepared by plotting the electron capture response (total peak area) versus nanograms of the PCB standard injected, calculate the PCB level present in the air, water, or sediment-soil sample as follows:

12.1.1 *Water and Sediment-Soil Samples*

$$C = [(A/B) \times D \times (10^3\ \mu l)/ml]\,[10^{-6}\ mg/ng]\,[1/E]$$

12.1.2 *Air Samples*

$$F = \frac{[(A/B)(1 \times 10^3\ \mu l)/ml]\,(10^{-6}\ mg/ng)}{G\,(28.32\ litre/ft^3)(m^3/10^3\ litre)\,(P_o - P_s/P_o)(T_o/273 + T_s)}$$

where:

A = PCB in unknown from calibration curve, ng,

B = final concentrate injected into the instrument, μl,

C = concentration of PCB's in water, and sediment-soil sample, mg/kg (or ppm),

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D = volume of final concentrate, ml
E = sample weight, kg
F = concentration of PCB's in air sample, mg/m³, at one atmosphere and 25°C,
G = air sampled from meter, ft³,
P_s = standard pressure, 760 mm Hg,
P_i = differential pressure of gas stream, mm Hg,
T_s = standard temperature 298 K, and
T_i = temperature of sampled gas, °C

12.2 The corrections for the pressure drop through the scrubbers and for the gas temperature are necessary to get an accurate measurement of the gas volume sampled

13. Precision and Accuracy

13.1 In order to establish the precision and accuracy of the method used for estimating PCB content in the environment, a round-robin testing experiment was set up. Samples were prepared by spiking water with PCB's at the level of about 500 ppb. Individual preparations included blanks (no PCB), Aroclor 1242 only, Aroclor 1254 only, Aroclor 1260 only, all 50-50 two-component mixtures, and a 1:1:1 preparation containing all three Aroclors. Six samples of each mixture were prepared, and tested by two analytical laboratories. Each result, expressed in ppb of the individual components was converted to percent of the total PCB added. Analysis of variance was run on all the data taken together and on each laboratory independently. Two obviously defective samples were deleted from the data.

13.2 The precision and accuracy of this method on standard air and soil-sediment samples have not been established.

13.3 *Conclusions*

13.3.1 The 95% confidence limits for individual results were as follows:

Either laboratory	81.5 ± 55.2%
Laboratory A	81.3 ± 46.4%
Laboratory B	93.7 ± 19.2%

13.3.2 The repeatability for the individual laboratories, based on repeat tests of samples having identical prepared compositions is as follows:

Laboratory A	±42.0%
Laboratory B	±11.6%

13.3.3 In general, Laboratory B comes closer to properly identifying the individual Aroclors with one exception, Aroclor 1254 found in a mixture of Aroclor 1242 and Aroclor 1260, as follows:

Mixture	Present	Laboratory A	Laboratory B
1	1242	1242 (1254)	1242
2	1242, 1254	1242 1254 (1260)	1242, 1254
3	1242, 1254, 1260	1242 ( ), 1260	1242 1254, 1260
4	1254	1254, (1260)	1254, (1260)
5	1242, 1260	1242 1260	1242 (1254) 1260
6	1260	(1248) 1260	1260
7	1254, 1260	(1248) 1254 1260	1254, 1260

Numbers in parentheses indicate misidentifications

14. Contamination

14.1 In determining PCB's by electron capture gas chromatography, laboratory sources of contamination can be a major problem. The samples and extracts should never be allowed to come in contact with materials other than glass, TFE-fluorocarbon, or metal. Laboratory glassware and sampling gear should be thoroughly washed with hot, soapy water, rinsed with distilled water, acetone, and then hexane. All equipment should also be rinsed again with hexane just prior to use and blanks should be frequently carried through all steps of the procedure to insure against the possibility of contamination.

APPENDIX

ELECTRON CAPTURE CHROMATOGRAMS OF COMMERICAL PCB MIXTURES

MONS 219912

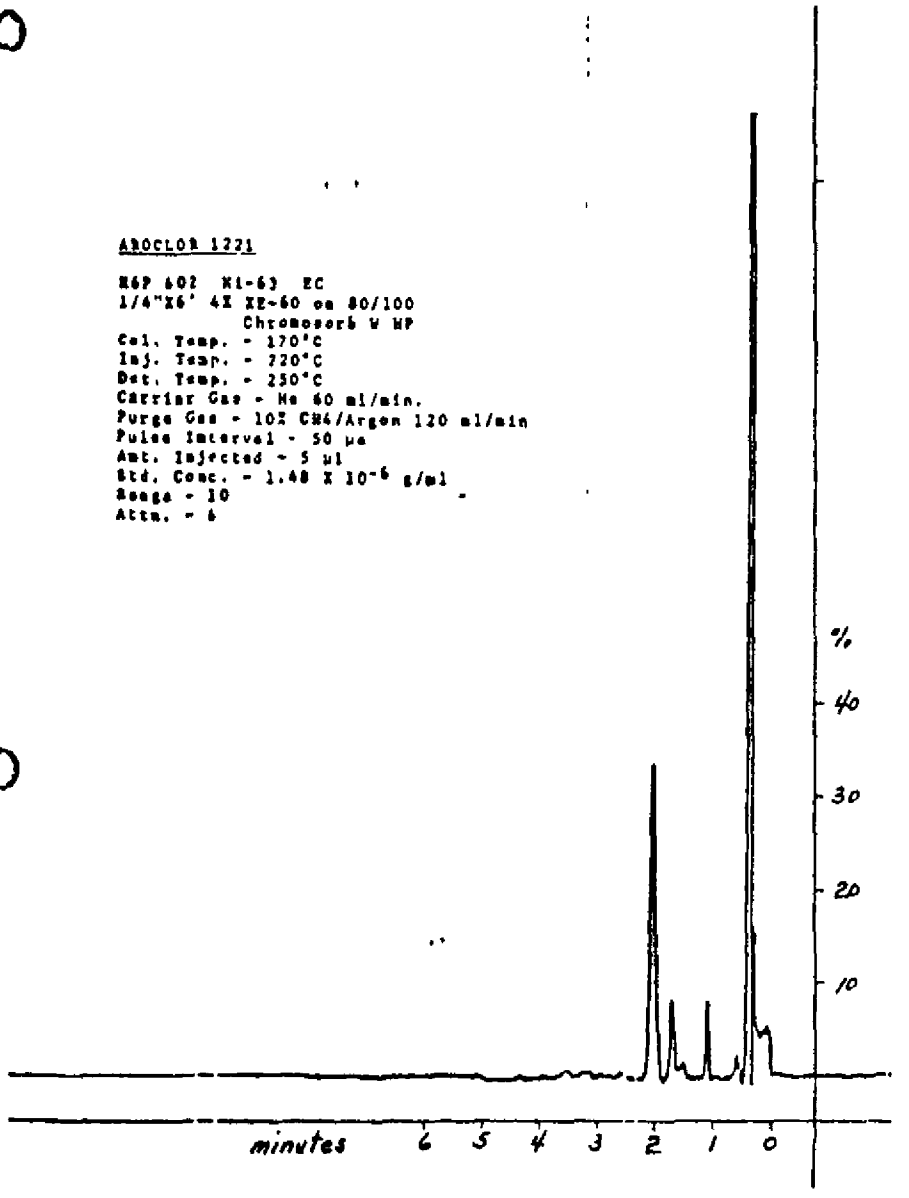

FIG. A1 Aroclor 1221 Electron Capture Chromatogram.

MONS 219913

AROCLOR 1242

N&P 402 W1-63 EC
1/8"X6' 4% XE-60 on 80/100
Chromosorb W HP
Col. Temp. - 190°C
Inj. Temp. - 220°C
Det. Temp. - 250°C
Carrier Gas - N2 60 ml/min.
Purge Gas - 10% CH4/Argon 120 ml/min
Pulse Interval - 50 µs
Amt. Injected - 5 µl
Std. Conc. - 1.03 X 10^{-6} g/ml
Range - 10
Atten. - 8

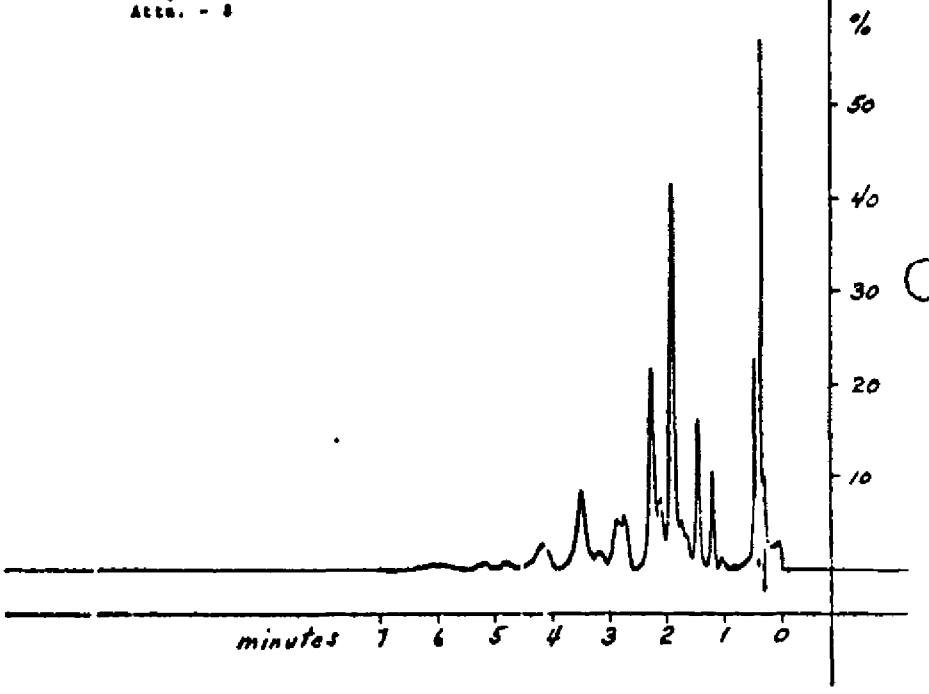

FIG. A1 Aroclor 1242 Electron Capture Chromatogram.

MONS 219914

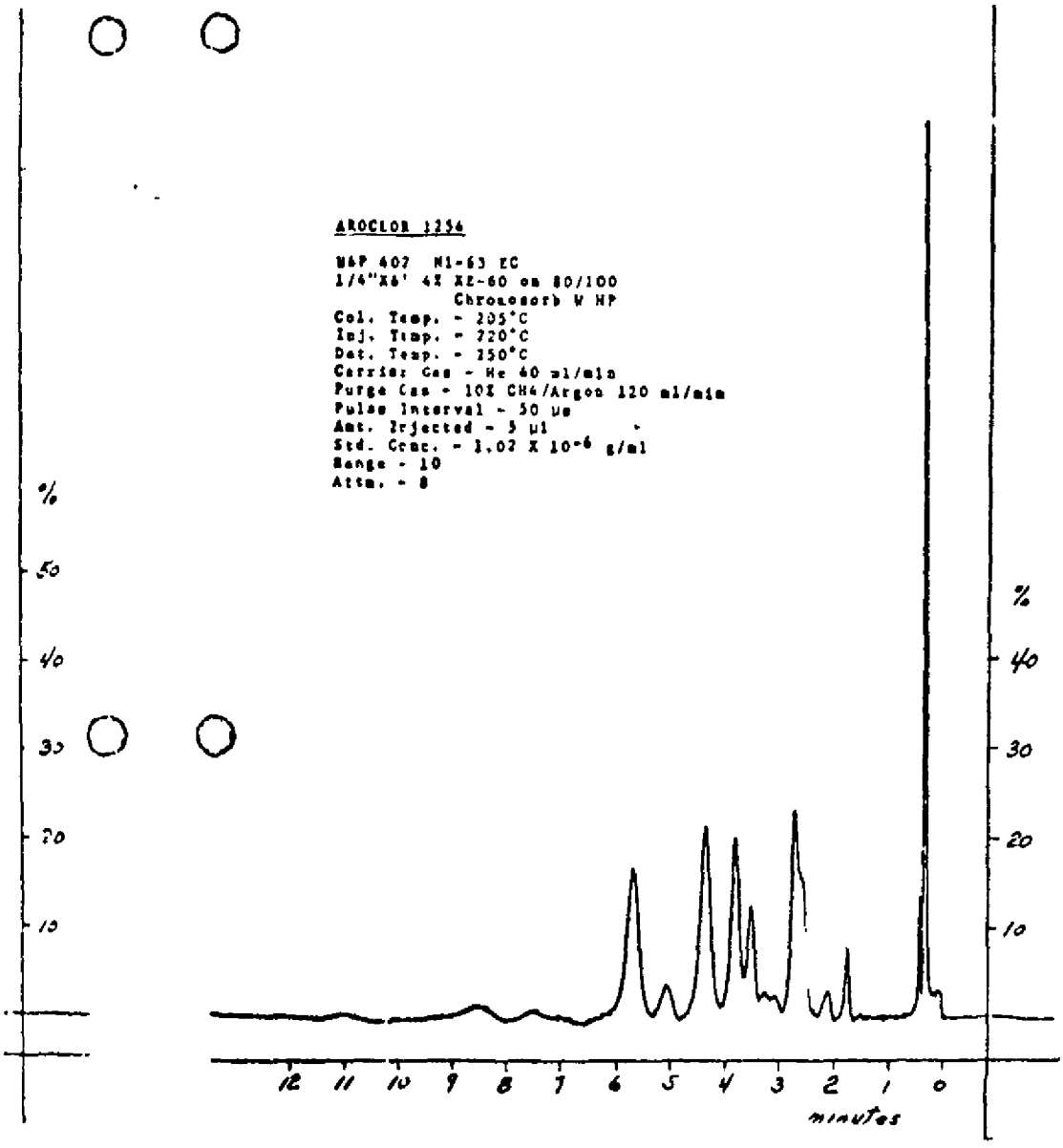

FIG. A3 Aroclor 1254 Electron Capture Chromatogram

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