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December 30th, 1970

Certificate of Analysis

SUBJECT -

Toxicological Investigation Of: Aroclor 6040 -- Chlorinated Polyphenyl
Monsanto Sample Number 129
Monsanto Project Number Y-70-123

STUDY CONDUCTED FOR -

Monsanto Company, St. Louis, Missouri

COPY

EXPERIMENTAL PROCEDURE -

A) Oral LD_{50} (Rats, Mixed Sex)

The undiluted compound was fed by stomach tube to Sprague-Dawley strain albino male and female rats.

After the approximate Minimum Lethal Dose was determined, groups of male and female rats were fed in increasing doses at increments of 0.1 fractional log intervals at four levels designed to blanket the toxicity range thereby supplying data for calculation of the LD_{50} which was done according to the method of E. J. de Beer.

Observations were made for toxic signs and the viscera of the test animals were examined macroscopically.

The data are shown in Table I.

B) Skin Absorption MLD (Rabbits, Mixed Sex)

The undiluted compound was applied in increasing doses at increments of 0.2 fractional log intervals to the closely clipped, intact skin of New Zealand white male and female rabbits.

The treated areas were covered with plastic strips and the animals held in wooden stocks for periods up to twenty-four hours, after which time they were assigned to individual cages.

Observations were made for toxic signs and the viscera of the test animals were examined macroscopically.

The data are shown in Table II.

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EXPERIMENTAL PROCEDURE - (Continued)

C) Skin Irritation (Rabbits, Mixed Sex)

0.5 Milliliter of undiluted sample was applied to the clipped, intact skin of New Zealand white male and female rabbits under a one inch by one inch square patch, two single layers thick. The patches were held in place with adhesive tape. The trunk of each animal was wrapped with plastic strips, to retard evaporation and avoid contamination, for the twenty-four hour exposure period.

Observations were made over a period of seven days for irritation.

The data, scored according to the method of Draize, Woodard and Calvery (Journal of Pharm. and Exp. Therapeutics, Volume 82, December, 1944) are shown in Table III.

D) Eye Irritation (Rabbits, Mixed Sex)

0.1 Milliliter of undiluted sample was placed in the conjunctival sac of the right eye of each of three albino male and female rabbits and observations made over a period of seven days for inflammation.

The eyes were rinsed with warm isotonic saline solution after twenty-four hours.

The data, scored according to the method of Draize, et al, are shown in Table IV.

E) Vapor Inhalation (Male Rats) - Ambient Temperature

Six mature male rats were placed in a stainless steel chamber of thirty-five liters capacity and exposed for six hours to a concentrated atmosphere of vapors produced by passing a stream of air through 174.5 grams of the compound contained in a 500-milliliter erlenmeyer flask.

Vapors from the flask passed into a one liter bottle to remove droplets and then into the chamber.

Air flow through the sample was four liters per minute as measured by a calibrated rotameter. This was sufficient to violently agitate the liquid. No supplementary air was introduced inasmuch as the above supply was ample for the animals oxygen requirements.

The animals were observed for behavior during exposure and for ten days following exposure. The viscera of the test animals were examined macroscopically.

The data are shown in Table V.

SUMMARY -

Aroclor 6040 — Chlorinated Polyphenyl

A) Oral LD_{50} (Rats, Mixed Sex)

The Oral LD_{50} for male and female rats was placed at 3290 milligrams per kilogram with lower and upper limits of 2940 to 3680 milligrams per kilogram.

The compound was classed as slightly toxic by oral ingestion in male and female rats.

SUMMARY - (Continued)

B) Skin Absorption MLD (Rabbits, Mixed Sex)

The Minimum Lethal Dose by Skin Absorption in male and female rabbits was found to be greater than 3160 milligrams per kilogram and less than 5010 milligrams per kilogram.

The compound was classed as slightly toxic by skin absorption in male and female rabbits.

C) Skin Irritation (Rabbits, Mixed Sex)

The compound was classed as a moderate to severe irritant when applied undiluted to intact skin of male and female rabbits.

The average maximum score was 4.3 out of a possible 8 in twenty-four hours.

D) Eye Irritation (Rabbits, Mixed Sex)

The compound was classed as a slight eye irritant in male and female rabbits.

The average maximum score was 13.3 out of a possible 110 in one hour.

E) Vapor Inhalation (Male Rats) - Ambient Temperature

All animals survived the six hour exposure as well as the following ten day observation period.

It was concluded that the vapors were practically non-toxic under conditions of the test.

YOUNGER LABORATORIES, INC.

BY: MELVIN D. BIRCH

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TABLE I

THE ORAL LD_{50} OF

'Aroclor 6040 -- Chlorinated Polyphenyl' FOR RATS

Sample Fed Undiluted

Animal No. - Sex	Weight Gm.	Dose Mg./Kg.	Fate
1- Female	200	2000	Survived
2- Male	210	2000	Survived
3- Female	195	2000	Survived
4- Male	220	2000	Survived
5- Female	205	2000	Survived
6- Male	200	2510	Survived
7- Female	205	2510	Survived
8- Male	240	2510	Died
9- Female	200	2510	Survived
10- Male	270	2510	Survived
11- Female	200	3160	Survived
12- Male	260	3160	Died
13- Female	205	3160	Survived
14- Male	210	3160	Died
15- Female	215	3160	Survived
16- Male	215	3980	Died
17- Female	200	3980	Died
18- Male	225	3980	Died
19- Female	205	3980	Died
20- Male	210	3980	Survived

DISCUSSION -

The Oral LD_{50} for male and female rats was placed at 3290 milligrams per kilogram with lower and upper limits of 2940 to 3680 milligrams per kilogram.

The compound was classed as slightly toxic by oral ingestion in male and female rats.

Survival time was one to four days with most deaths occurring within two days.

Toxic signs included reduced appetite and activity, lethargy (two to five days in survivors), increasing weakness, collapse, and death.

At autopsy there was hemorrhagic lungs, slight liver discoloration, and gastrointestinal inflammation (acute in most cases).

Surviving animals were sacrificed seven days after dosing. Macroscopic examination revealed slight lung congestion in some cases.

TABLE II

THE MINIMUM LETHAL DOSE OF 'Aroclor 6040 - Chlorinated Polyphenyl'
BY SKIN ABSORPTION IN RABBITS

Sample Applied Undiluted

Animal No. - Sex	Weight Kg.	Dose Mg./Kg.	Weight Change 5 Days Later Kg.	Fate
1 - Female	1.9	1260	0.0	Survived
2 - Male	1.8	2000	- 0.1	Survived
3 - Female	2.0	3160	- 0.2	Survived
4 - Male	2.4	5010	-----	Died -- 3 Days
5 - Female	2.2	7940	-----	Died -- 3 Days

DISCUSSION -

The Minimum Lethal Dose by Skin Absorption in male and female rabbits was found to be greater than 3160 milligrams per kilogram and less than 5010 milligrams per kilogram.

The compound was classed as slightly toxic by skin absorption in male and female rabbits.

Survival time was three days.

Toxic signs included reduced appetite and activity (two to four days in survivors), increasing weakness, collapse, and death.

At autopsy there was lung hyperemia, jaundiced liver, and gastrointestinal inflammation.

Surviving animals were sacrificed fourteen days after dosing. Macroscopic examination revealed slight lung congestion in animal #3; the viscera of animals #1 and #2 appeared normal.

T A B L E III

SKIN IRRITATION IN RABBITS AFTER APPLICATION OF 'Aroclor 6040 -- Chlorinated Polyphenyl'

Sample (0.5 Milliliter) Applied Undiluted

Animal No. - Sex	Numerical Evaluation At The End Of 1 Hour	24 Hours	48 Hours	72 Hours	120 Hours	168 Hours
1 - Female	0	5	3	1	0	0
2 - Male	0	4	2	1	0	0
3 - Male	0	4	2	0	0	0
Average	0.0	4.3	2.3	0.6	0.0	0.0

DISCUSSION -

The compound was classed as a moderate to severe irritant when applied undiluted to intact skin of male and female rabbits.

The average maximum score was 4.3 out of a possible 8 in twenty-four hours.

Observations following application -

1-Hour:	No skin changes; zero readings
24-Hours:	Well defined to moderate erythema, slight edema
48-Hours:	Well defined erythema, barely perceptible edema in one instance
72-Hours:	Very slight erythema in two instances; no edema
120-Hours:	No erythema or edema; zero readings
168-Hours:	No erythema or edema; zero readings

T A B L E IV

EYE IRRITATION IN RABBITS AFTER APPLICATION OF

'Aroclor 6040 --Chlorinated Polyphenyl'

Sample (0.1 Milliliter) Applied Undiluted

	Numerical Evaluation At The End Of					
Animal No. - Sex	1 Hour	24 Hours	48 Hours	72 Hours	120 Hours	168 Hours
1 - Male	12	6	2	0	0	0
2 - Female	14	4	0	0	0	0
3 - Female	14	4	2	0	0	0
Average	13.3	4.6	1.3	0.0	0.0	0.0

DISCUSSION -

The compound was classed as a slight eye irritant in male and female rabbits. The average maximum score was 13.3 out of a possible 110 in one hour.

Observations following application -

Immediate:	Discomfort was mild
10-Minutes:	Slight erythema and edema, copious discharge
1-Hour:	Slight to moderate erythema, slight edema, copious discharge
24-Hours:	Slight erythema and discharge, barely perceptible edema in one instance
48-Hours:	Slight erythema in two instances; no edema or discharge
72-Hours:	Eyes normal; zero readings
120- 168-Hours:	Eyes normal; zero readings

TABLE V

INHALATION OF

'Aroclor 6040 -- Chlorinated Polyphenyl' VAPORS BY RATS

Average Temperature Inside Chamber ..... 74° F.
Average Relative Humidity Inside Chamber ..... 68 %

Amount of Sample -- To start ..... 174.5 Grams
Recovered ..... 174.5 Grams
Vaporised or left in equipment ..... 0.0 Gram (0.0%)

Animal No. - Sex	Fate	Observations During Exposure
1 - Male	Survived	No nasal or ocular discharge ...
2 - Male	Survived	No weakness or drowsiness of consequence ...
3 - Male	Survived	
4 - Male	Survived	Normal respiration.
5 - Male	Survived	
6 - Male	Survived	

DISCUSSION -

All animals survived the six hour exposure as well as the following ten day observation period.

It was concluded that the vapors were practically non-toxic under conditions of the test.

Observations following exposure -

The animals appeared normal when removed from the chamber. There were no bronchial rales or other evidence of respiratory complications. The ten day observation period was uneventful. Weight gain was normal.

Surviving animals were sacrificed ten days following exposure. The viscera appeared normal by macroscopic examination.

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