Monsanto

FROM (NAME & LOCATION) B2SC G. F. Fague

DATE March 15, 1973

SUBJECT Biphenyl Toxicity

REFERENCE Paton memo 2/27/73 MAR[illegible]ECT

TO → B2NA P. S. PARK
A2SA E. P. WHEELER

CC B2SC C. Paton
B2SL T. L. Gossage
B2NA W. B. Papageorge

In accordance with Cumming's 2/27/73 memo item #2, I am enclosing all known Biphenyl literature, SIBs, or customer handouts. I suggest that the Legal and Medical departments make suggestions for revisions in this literature in light of the recent toxicity scare on Biphenyl.

Regards,

George cs

G. F. Fague

cs
Enclosures

P.S. [redacted]

GFF

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IN-10 REV 11-65

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TOXICITY AND SAFE HANDLING OF BIPHENYL (DIPHENYL, PHENYL BENZENE)

I. Physical Properties

A. Formula: $C_{12}H_{10}$ (Mulecular Wt. = 154.20)

B. Chemical Family: Aromatic Hydrocarbon

C. Melting Point: 69°C

D. Boiling Point: 255°C

E. Specific Gravity (75°/4°C): 0.991
(20°/4°C): 1.04

F. Lbs./Gallon at 77°C: 8.23

G. Vapor Density (air=1): 5.31

H. Sol. in Water: negligible

I. % Volatile by Volume: 100%

J. Evaporation Rate (BuAc=1): <1

K. Appearance and Odor: Colorless leaflets, pleasant aromatic odor

L. Shipping Classification (U.S.): Diphenyl (phenyl benzene)

II. Flammability Characteristics

A. Flash Point: Closed Cup = 113°C (235°F)
Open Cup = 124°C

B. Extinguishing Media: CO_2 dry chemical

C. Special Fire Fighting Procedures: none

D. Unusual Fire and Explosion Hazards:

1. Minimum explosive concentration: 0.035 oz/ft^3
2. Explosive limits:
   Lower: 0.6% at 232°F
   Upper: 5.8% at 311°F

E. Hazardous Decomposition Products: smoke, soot, CO, CO_2
(Hazardous polymerization of straight biphenyl will not occur.)

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III. Emergency Procedures and Handling Precautions

A. Emergency and First Aid Procedures: move to fresh air, administer oxygen, pump stomach, if ingested.

B. If spilled, allow to solidify and scrape up.

C. Respiratory Protection: Bureau of Mines dust respirator

D. Protective gloves: leather

E. Eye Protection: chemical goggles

F. Local Exhaust: yes

G. Disposal: bury in chemical landfill in accordance with local and state regulations

H. Avoid Inhalation of Dust and Vapors

I. Avoid Skin and Eye Contact

J. Avoid Burns in Molten State

K. Handle as Flammable Material

IV. Toxicological Data

A. TLV (Threshold Limit Value): 0.2 ppm (1 mg/m^3) inhalation is recommended to prevent irritation and injury to the respiratory passage

B. LD_{50}= 2 g/Kg (values have been reported for rats in the range of 2.18-5.04 g/Kg and for rabbits at 2.41 g/Kg)

C. Skin Contact: little irritation, but prolonged contact could cause absorption

D. Odor Threshold: 0.06 - 0.29 mg/m^3

[redacted]

E. Recommended Maximal Atmospheric Concentrations (8 hours): no formal value established, but 5 mg/cubic meter is considered dangerous for continued exposure

F. Short Exposure Tolerance: unknown, but moderate air concentrations are irritating limiting voluntary exposure to less than hazardous levels.

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G. Inhalation: no cases of human acute or chronic intoxication atributed solely to biphenyl have been reported in the literature.

H. Eye Contact: mild to moderate irritation is reported by humans exposed to vapors

I. Thermal Burns: molten biphenyl can cause serious thermal burns

J. Saturated Air (25°C and 760 mm Hg):
66 mg/m^3 (10.5 ppm)
1 ppm = 0.00631 mg/liter
1 mg/liter = 158 ppm

K. For a complete discussion of hygienic standards and practices, toxic properties, medical information, and a complete reference list see the attached article from the Hygienic Guide Series published by the American Industrial Hygiene Association, 1964.

V. References

A. Ambrose, A.M., Booth, De Eds: A Toxicological Study of Biphenyl, a Citrus Fruit Fungistat.

B. American Conference of Governmental Industrial Hygienists: "Diphenyl (Biphenyl)". Documentation of Threshold Limit Values, 1966.

C. American Industrial Hygiene Association: "Diphenyl (Biphenyl, Phenylbenzene)". Hygienic Guide Series, September-October, 1964.

D. Booth, Ambrose, De Eds, et al: The Reversible Nephratoxic Effects of Biphenyl

E. Cornish, H.H., Babor, R.E., Ryan, R.C.: Toxicity and Metabolism of ortho-, meta-, and para-terphenyls.

F. Monsanto Medical Department

G. Monsanto Technical Bulletin O/C1-2

H. Neuell, G.W.: "A Toxicological Study of Diphenyl in Citrus Wraps". Stanford Research Institute (Report Prepared for Crown Zellerbach Corporation), 1953.

I. Petkan, A., Hoogstraten, J.: Chronic Toxicity of Polyphenyl Mixtures.

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J. West, H.D., Lawson, J.R., Miller, I.H., et al: The Fate of Diphenyl in the Rat.

K. Young, G., Petkan, A., Hoogstraten, J.: Chronic Toxic Effects of Polyphenyl Mixtures.

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