Pakistan J. Sci. Ind. Res., Vol. 17, Nos. 4-5, August-October 1974

TOXICITY OF NEMOKIL, A PETROLEUM BY-PRODUCT AGAINST WHITE RATS

SHAHID H. ASHRAFI, RAEES A. KHAN and SAMI A. KHAN

PCSIR Laboratories, Karachi 39

(Received June 2, 1973; revised July 5, 1974)

Abstract. The toxicity of Nemokil to white albino rats was measured. The oral LD_{50} value was found to be 14,200 mg/kg body weight. It showed no toxic effects on dermal application at 20,000 mg/kg or subcutaneously at 50,000 mg/kg body weight.

The nematicidal activity of Nemokil in the laboratory was reported by Ashrafi *et al.*[1] Nemokil is a dark, viscous petroleum by-product which was obtained from National Refinery Limited, Karachi. It contains 81% aromatic and 14% aliphatic fractions. Its sp. gr. is 0.97 and viscosity is 75 Saybolt sec. It is soluble in kerosine, benzene, xylol and chloroform, but insoluble in water, alcohol and acetone. The nematicidal property led to the possibility of Nemokil to be used for the control of nematodes in agriculture. To ascertain its safety against mammals, experiments were conducted to find out dermal, oral and subcutaneous toxicities to white rats in the laboratory.

Material and Methods

For toxicity tests rats were kept in cages made of polythene with sliding perforated stainless-steel covers. The cages were 12 0×8 5 in at the top, 10.5×8.0 in at the bottom and 6.5 in high. The covers measured 13.4×9.5 in. Lever mice feed was placed at one side of the cover and water was supplied from an inverted bottle. To facilitate the movement of the rats in the cage, saw dust was spread on the floor. The cages were cleaned with the soap, dried and saw dust was changed on alternate days during the experiment. Ten-week old albino rats of PCSIR-strain and reared at room temperature were used in these experiments. One week before the experiment rats were released in cages to acclamatise them with the surroundings. Two rats were taken for each dose and the experiments were done three times. After the administration of Nemokil, animals were observed daily for six weeks in each experiment. The experiments were arranged as explained below.

Dermal Toxicity. Technical grade of Nemokil was used for dermal toxicity test on female rats. The hair of the rats were not removed. The doses used were 25,000; 50,000; 75,000; 100,000; 125,000; 150,000; 175,000 and 200,000 mg/kg of body weight. The material was pasted on the abdomen and back of the animal using a stainless-steel spatula.

Oral Toxicity. The oral toxicity of Nemokil (70% E.C.) was tested. The doses given to female rats were 1,000; 2,500; 5,000; 7,500; 10,000; 12,500; 15,000; 17,500 and 20,000 mg/kg of body weight. All the four legs of the rat were fastened to operation table, the mouth was held open with two strings, one to hold the upper and the other the lower jaw. The chemical was administered into the stomach through a cannula fitted to a syringe. The lower doses were given by tuberculin syringe and higher doses by 10-ml syringe. The mortality results have been presented in Table 1.

Subcutaneous Toxicity. Nemokil solution in xylol (1:1) was injected subcutaneously into male rats with 10-ml syringe. The doses were 1,000; 10,000; 20,000; 30,000; 40,000 and 50,000 mg/kg of body weight.

Results and Discussion

Dermal Toxicity. Nemokil did not show any mortality results in six weeks even by high doses as 200,000 mg/kg body weight. There was slight decrease in weight by the dermal application in dose of 100,000 mg/kg body weight and recovery was seen in two weeks. However, doses above 100,000 mg/kg made the animals sluggish and a sustained weight loss for the whole period of six weeks was observed.

Oral Toxicity. Doses of Nemokil less than 7,500 mg/kg did not show any mortality, while larger doses showed mortality (Table 1). Larger doses of Nemokil affected the nervous system of animals and 15,000 mg/kg dose produced giddiness in the animals. The dissection of dead rats showed congestion of lungs, liver, kidney and intestines. The oral toxicity of some insecticides can be presented here for comparison. Philips *et al.*[2] and Fitzhugh *et al.*[3] have reported oral LD_{50} of DDT and Heptachlor as 800 and 135 mg/kg respectively. According to Lehman[4] oral LD_{50} of Toxaphene and Dilan for rats was 69 and 4,000 mg/kg Metcalf[5] showed oral LD_{50} of Aldrin, Dieldrin and Chlordane as 67, 87 and

TABLE 1. MEAN PER CENT MORTALITY OF FEMALE WHITE RATS BY DIFFERENT ORAL DOSES OF NEMOKIL.

Doses mg/kg (a.i.)	Per cent mortality in hr		
	24	48	72
7,500	—	—	—
10,000	16.7	50 0	50.0
12,500	50.0	100	100
15,000	50 0	100	100
17,500	75.0	100	100
20,000	100.0	100	100

590 mg/kg Ashrafi *et al.*[6] found oral LD_{50} of Makrolin as 32,00 mg/kg.

Subcutaneous Toxicity. Nemokil did not produce mortality in white rats even in high doses as 50,000 mg/kg of body weight. The rats also did not show marked change in their weights in six weeks. Ashrafi *et al.*[7] reported LD_{50} value for Petkolin, Makrolin, DDT and BHC as 9000–11000, 9000, 1800 and 70 mg/kg of body weight of white rats respectively. Dallemagne and Phillipot[8] showed LD_{50} value for BHC to be 50 mg/kg. Cameron and Burgess[9] reported LD_{50} for DDT as 1500 mg/kg against white rats.

These experiments indicated that Nemokil has very low mammalian toxicity by all routes and is safe for use in the fields.

References

1. S.H. Ashrafi, M. Saeed and M. Ahmad, Pakistan J. Sci. Ind. Res., **13,** 401 (1970).
2. F.S. Philips, A. Gilman, J. Pharmacol. Exptl. Therap., **86,** 213 (1946).
3. O.G. Fitzhugh, reported by A.J. Cox at U.S. Food and Drug Administration Hearings of Week Ending, 9.12. 1950.
4. A.J. Lehman, Quart. J. Assoc. Food Drug, **15,** 122 (1931).
5. R.L. Metcalf, *Organic Insecticides* (Interscience, New York, 1955), 392.
6. S.H. Ashrafi, M. Tasnif and M.I. Khan, Pakistan J. Sci. Ind. Res., **6,** 198 (1963).
7. S.H. Ashrafi, M. Tasnif and R.I. Zuberi, Pakistan J. Sci. Ind. Res., **8,** 265 (1965).
8. M.J. Dallemagne and E. Phillipot, Arch. Inter. Pharm. Namie Therap. (Paris), **76,** 274 (1946).
9. G.R. Cameron and F. Burgess, Brit. Med. J., **1,** 865 (1945).