306. *β-iso**Propylnaphthacene.*

By J. W. Cook.

The simplest derivative of 1 : 2-benzanthracene in which cancer-producing activity is shown to a marked degree is 6-*iso*propyl-1 : 2-benzanthracene (Cook, J., 1932, 456). In order to make a comparison between the ring systems of 1 : 2- and 2 : 3-benzanthracene, the analogous 6-iso*propyl*-2 : 3-*benzanthracene* (β-*iso*propylnaphthacene) was synthesised. This hydrocarbon has been applied in benzene solution to the skin of a series of 10 mice, all of which were still alive after 1 year, and 4 of them after 2 years. No tumours were obtained. For these animal experiments I am indebted to Professor E. L. Kennaway, F.R.S. The method used for the synthesis of 6-*iso*propyl-2 : 3-benzanthracene was exactly analogous to that described for the preparation of 6- and 7-*iso*propyl-1 : 2-benzanthracenes (Cook, *loc. cit.*).

2-*Cuminoyl*-3-*naphthoic Acid*—Anhydrous aluminium chloride (18 g) was slowly added, with agitation, to a suspension of naphthalene-2 : 3-dicarboxylic anhydride (kindly presented by Imperial Chemical Industries, Ltd.), (12 g.) in cumene (40 c.c.). The resulting amber syrup was kept at room temperature for 6 hours with occasional shaking. The keto-acid was isolated in the usual way and recrystallised from benzene (yield, 8 g.). After recrystallisation from acetic acid, 2-*cuminoyl*-3-*naphthoic acid* formed colourless needles, m. p. 218—219°, giving a carmine solution in concentrated sulphuric acid (Found : C, 79·1; H, 5·65. $C_{21}H_{18}O_3$ requires C, 79·2; H, 5·7%)

2-p-iso*Propylbenzyl*-3-*naphthoic Acid.*—A solution of the keto-acid (6 g.) in *N*-potassium hydroxide solution (300 c.c.) was boiled with zinc dust (15 g.) for 24 hours and filtered hot. On cooling, the filtrate gave a colourless precipitate, which was collected, dissolved in water, and the solution acidified. The resulting 2-p-iso*propylbenzyl*-3-*naphthoic acid* was recrystallised from aqueous alcohol (yield, 4·6 g.) and then benzene, forming colourless needles, m. p. 183°, which gave an orange-red solution in concentrated sulphuric acid (Found : C, 82·8; H, 6·7. $C_{21}H_{20}O_2$ requires C, 82·85; H, 6·6%).

6-iso*Propyl*-2 : 3-*benz*-10-*anthrone.*—A mixture of the *iso*propylbenzylnaphthoic acid (2·5 g.) and anhydrous zinc chloride (7·5 g.) was stirred at 185—190° for ½ hour. After cooling, the brittle yellow mass was powdered, extracted with water and then dilute sodium carbonate solution, and the residual solid recrystallised from alcohol. Recrystallisation of the resulting 6-iso*propyl*-2 : 3-*benz*-10-*anthrone* (1·7 g.) from acetic acid gave almost colourless needles, m. p. 180°, which, like 2 : 3-benz-9-anthrone (Fieser, *J. Amer. Chem. Soc.*, 1931, **53**, 2331), gave a purple solution in alcoholic alkali, rapidly decolorised by air (Found : C, 88·0; H, 6·4. $C_{21}H_{18}O$ requires C, 88·1; H, 6·3%). This anthrone was also obtained by dehydration of the benzylnaphthoic acid with ice-cold concentrated sulphuric acid (2 hours).

6-iso*Propyl*-2 : 3-*benzanthraquinone* was obtained by oxidising the anthrone with sodium dichromate in boiling acetic acid. It crystallised from alcohol in small yellow needles, m. p. 131—132°, and gave a purple solution in concentrated sulphuric acid (Found : C, 83·9; H, 5·4. $C_{21}H_{16}O_2$ requires C, 84·0; H, 5·4%).

6-iso*Propyl*-2 : 3-*benzanthracene.*—The anthrone (1 g.) was heated on the water-bath for 15 minutes with zinc dust (2 g.), alcohol (50 c.c.), and 25% alcoholic sodium hydroxide (5 c.c.). The yellow solution was filtered from zinc, and treated with concentrated hydrochloric acid (10 c.c.) in order to dehydrate the dihydroanthranol. 6-iso*Propyl*-2 : 3-*benzanthracene* then crystallised, and was recrystallised from xylene, forming golden-orange leaflets (0·4 g.), m. p. 273—274°, very sparingly soluble in the usual media (Found : C, 93·2; H, 6·6. $C_{21}H_{18}$ requires C, 93·3; H, 6·7%).

The Research Institute of the Cancer Hospital (Free), London, S.W.3.

[*Received, July 7th,* 1934.]