Anal. Calcd. for $C_4H_3AsCl_2O$: Cl, 33.31. Found: Cl, 32.83.

Di-α-furylchloroarsine.—The compound is a colorless liquid and is relatively stable if stored cold and in the dark.

Anal. Calcd. for $C_8H_6AsClO_2$: Cl, 14.68. Found: Cl, 14.67.

Di-α-furylcyanoarsine.—A solution of II (82 g.) in benzene (100 ml.) was added slowly with stirring to a suspension of silver cyanide (59 g.) in benzene (150 ml.). The reaction was protected from moisture during the addition and a subsequent reflux period of ten hours. After cooling, the precipitated silver chloride was removed by filtration and washed with benzene. The filtrate and washings were distilled to yield 55 g. (70%) of a viscous, halogen-free liquid boiling at 142–143° (2.3 mm.).

Anal. Calcd. for $C_9H_6AsNO_2$: As, 31.87. Found: As, 31.47.

Summary

1. Mercuric chloride has been found to catalyze the disproportionation of furan arsenicals, arsenic trichloride and tri-α-furylarsine being formed at the expense of α-furyldichloroarsine and di-α-furylchloroarsine.

2. An improved method of synthesis for these three furan arsenicals is given. Better yields and stability of products result if mercuric chloride is absent.

3. The preparation of di-α-furylcyanoarsine is described.

LINCOLN 8, NEBRASKA RECEIVED AUGUST 3, 1946

The Reaction Products of Phenyldichloroarsine and Acetylene[1]

BY C. K. BANKS, F. H. KAHLER AND CLIFF S. HAMILTON[1a]

Hunt and Turner[2] and Das Gupta[3] have reported on the reaction of phenyldichloroarsine with acetylene. The products identified by the two investigators, and the properties assigned to them are markedly different. Since one of the compounds, phenyl-(β-chlorovinyl)-chloroarsine, was of possible interest as a toxic agent, the reaction was again studied in an effort to determine the product produced.

TABLE I

Fraction	Wt., g.	Identity	Arsenic,[a] % Calcd.	Arsenic,[a] % Found	B. p., °C. Exptl. (4 mm.)	B. p., °C. Hunt and Turner (10 mm.)	B. p., °C. Das Gupta	Mm.	Derivative
I		(β-Chlorovinyl)-dichloroarsine			30–35	Present	.....		Arsonic acid, m. p. 130°
II		Di-(β-chlorovinyl)-chloroarsine			35–107	Present	.....		Arsinic acid., m. p. 120°
III		Tri-(β-chlorovinyl)-arsine			107–108	Present	.....		M. p. 23°
IV		Phenyldichloroarsine			127	Present	.....		Arsonic acid, s. 160°
V	48	Phenyl-(β-chlorovinyl)-chloroarsine	30.08	29.91	165	140–145	135–140	4	Arsinic acid,[b] m. p. 170-171°
VI	50	Phenyldi-(β-chlorovinyl)-arsine	27.24	27.20	175–177	150–170	170–178	5	$HgCl_2$ salt, m. p. 156–157°
VII	49	Diphenyl-(β-chlorovinyl)-arsine	25.78	25.85	194–195	.....	190–195	5	$HgCl_2$, salt m. p. 247–249°
VIII	8	Triphenylarsine	24.46	24.60	205	.....	.....		M. p. 58°

[a] Arsenic was determined by a modification of the method of Cislak and Hamilton, THIS JOURNAL, 52, 635 (1930).
[b] Calcd.: As, 30.38. Found: As, 29.96.

Pure benzenearsonic acid was converted to phenyldichloroarsine, treated with aluminum chloride and acetylene and the reaction products carefully separated. A comparison of the products found with those reported by Hunt and Turner and Das Gupta is made in Table I. In general, our results agreed with those of Das Gupta rather than Hunt and Turner. In the case of phenyl-(β-chlorovinyl)-chloroarsine, our product differed considerably from both of the previous reports. Furthermore, it was demonstrated that the complete equilibrium involved not only the various possible acetylene addition products but also disproportionations involving the phenyl radical. Of all the possible products, only arsenic trichloride and diphenylchloroarsine were not identified. It is conceivable that they were present in quantities too minute for detection. Catalysts other than aluminum chloride. were tried without success.

Experimental

Reaction of Phenyldichloroarsine and Acetylene.—A dried 2-liter, 3-necked flask was equipped with a mercury-sealed stirrer, condenser and inlet tube. Anhydrous aluminum chloride (45 g.) and phenyldichloroarsine (325 g.) were added to the flask with cooling. After the heat of solution and reaction had been dissipated, the flask was placed in an ice-bath and dry, acetone-free acetylene passed into the solution stirring for two hours while maintaining a temperature of 0–5°. Stirring was continued for two hours and the product poured over ice (1 kg.) and concentrated hydrochloric acid (1.2 liters). The insoluble oil was separated, dried over sodium sulfate and fractionally distilled from a modified Vigreux-Claisen flask at 4 mm. pressure. Ten fractions were taken: 30–35, 35–107, 107–110, 110–124, 124–126, 126–150, 150–170, 170–180, 180–195° and the residue. On redistillation at 4 mm., eight fractions described in the table were separated.

LINCOLN 8. NEBRASKA RECEIVED AUGUST 3, 1946

---

[1] The work herein described was done under Contracts NDCrc-16 and OEMsr-85, recommended by the National Defense Research Committee and between the Office of Scientific Research and Development and the Board of Regents of the University of Nebraska.

[1a] Official investigator.

[2] Hunt and Turner, *J. Chem. Soc.*, **127**, 996 (1925).

[3] Das Gupta, *J. Indian Chem. Soc.*, **14**, 349 (1937).