2. The hydrogenation of 1,3-pentadiene is highly selective, with the predominant formation of trans-2-pentene. The reaction probably proceeds via the intermediate step of the hydride.

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ALKYL (ARYL) ALKOXYHYDROXYSILANES AND POLYFUNCTIONAL

SILOXANES DERIVED FROM THEM

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a spirocyclic structure of the chain [4].

UDC 542.91:547.1'128

It is known that the organoalkoxy- and organohydroxysilanes differ in their reactivity in the heterofunctional condensation reactions with chlorosilanes [1, 2]. Organosilicon compounds with three alkoxy groups and one OH group on the silicon atom are known [3], but data are lacking on the synthesis of compounds that contain two hydrocarbon radicals, and

both an alkoxyl and hydroxyl group on the silicon atom. The purpose of the present paper was to synthesize alkyl(aryl)alkoxyhydroxysilanes (AS) in which the different reactivity of the hydroxyl and ethoxyl groups could be utilized to discover paths for obtaining cross-shaped tetrafunctional organosilicon compounds. The latter could then be used as potential starting compounds for the synthesis of polymers with

AS with different hydrocarbon radicals on the silicon atom, and with an alkoxyl group where the hydrocarbon radical is unbranched, were obtained by the hydrolysis of alkyl (aryl)-alkoxychlorosilanes with water in the presence of a HCl accepter.

The AS are clear, mobile, odorless liquids. It should be mentioned that the OH group in AS resembles the organohydroxysilanes with small hydrocarbon radicals on the silicon atom [5], and easily enters into the homofunctional condensation reaction at 7 < pH < 7 or when heated. This explains why the yield of the AS drops from 63.4% for $(CH_3)_2Si(OC_2H_5)OH$ to 38.5% for $CH_3(C_6H_5)Si(OC_2H_5)OH$ during fractional distillation as the boiling point increases.

The AS have two functional groups, which react with SiCl₄ under different conditions. The presence of a HCl acceptor and a low temperature are favorable conditions for reaction of the Ξ Si-OH groups, whereas the presence of a catalyst (FeCl₃, AlC₃) and heat are necessary for the reaction of the Ξ Si-OC₂H₅ groups. The reaction of the AS with SiCl₄ in the presence

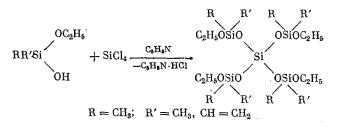
Institute of Heteroorganic Compounds, Academy of Sciences of the USSR, Moscow. Translated from Izvestiya Akademii Nauk SSSR, Seriya Khimicheskaya, No. 9, pp. 2115-2116, September, 1977. Original article submitted December 6, 1976.

TABLE 1

Compound	Yield, 🌾	^{bp} , °C (1 mm)	d ²⁰ 4	n20 D	H _{CH} , :H [•] _{OH} (found/ calcd.)	MR (found/ calcd.)	Found			
							Calculated' %			
							С	н	Si	он
(CH ₅) ₂ Si(OC ₂ H ₅)OH (I)	63,4	23,0	0,9312	1,4115	$\frac{2,00:1,00}{1,86:1,00}$	$\left[\begin{array}{c} 31,90\\ \hline 31,73\end{array}\right]$		-	-	14.03
$CH_{\delta}(CH_2=CH)Si(OC_2H_{\delta})OH$ (II)	60,3	29,0	0,9469	1,4379	$\frac{2,00:1,00}{1,80:1,00}$			-		12,80 12,86
$(C_2H_5)_2Si(OC_2H_5)OH$ (III)	53,4	32,0	0,9305	1,4321	$\frac{2,00:1,00}{2,20:1,00}$	<u>41,34</u> 40,90		-	-	<u>11,59</u> 11,47
$CH_3C_8H_5Si(OC_2H_5)OH$ (IV) $\Gamma CH_3 CH_3 $	38,5	76,0	1,0405	1,4998	2,00:1,00 1,94:1,00					$9.17 \\ \overline{9,30}$
$SI_O SI - OC_2H_5 \int_4 (V)$	22,2	107,0	0,9688	1,3989	$\frac{2,00:1,00}{2,03:1,00}$					-
$ \begin{bmatrix} CH_{3} & CH=CH_{2} \\ O & SiOC_{2}H_{5} \end{bmatrix}_{4}^{2} (VI) $	16,3	123,0	0,9927	1,4279	1,00:1,00 1,00:1,03					-
$C_{2}H_{5}OSI \begin{bmatrix} CH_{3} & CH_{3} \\ O & SI - OC_{2}H_{5} \end{bmatrix}, (VII)$	2,3	108,0	0,9648	1,4000	$\begin{array}{r} 1,40:1,00\\\hline 1,53:1,00 \end{array}$					-

*For compounds (V)-(VII): H_{Si:-CH₃}:H_{CH₃}(OEt).

of pyridine at -5 to 0°C gave the previously unknown tetrafunctional organosilicon compounds with one silicon atom in each branch.



The physicochemical characteristics of the obtained compounds are given in Table 1. The number of OH groups, the elemental analysis, and the IR and NMR spectral data confirm the structure of the obtained compounds. The IR spectra of the alkyl(aryl)ethoxyhydroxysilanes have the absorption bands of the following bonds: Si-CH3 (2980, 1263, 795 cm⁻¹), Si-C₆H₅ (1590, 1430, 1130 cm⁻¹), Si_CH=CH₂ (1600, 1410 cm⁻¹), Si_OH (3400-3380 cm⁻¹), and Si_OC₂H₅ (2930, 1085 cm⁻¹). In the IR spectrum, for example of $Si[OSiMeVi(OC_6H_5)]_4$, are observed absorption bands in the 1600 and 1410 cm⁻¹ regions (Si-CH₂), and intense bands in the 1980, 1264, and 780 cm⁻¹ regions (Si-CH₃). The absorption bands of the asymmetric vibrations of the C-H bond of the methylene unit of the EtO group in the 2930 cm⁻¹ region, and of the symmetric vibrations in the 2890 $\rm cm^{-1}$ region, are observed in all of the IR spectra of the obtained compounds.

The yield of the tetrafunctional pentasiloxanes does not exceed 22.2%. From the reaction products of (CH₃)₂Si(OC₂H₅)OH with SiCl₄ we isolated, besides Si[OSi(CH₃)₂OC₂H₅]₄, also 2.3% of $C_2H_5OSi[OSi(CH_3)_2OC_2H_5]_3$, when based on the starting SiCl₄. This shows that under the selected synthesis conditions the reaction between the Si-OH and Si-Cl groups is not dominant.

EXPERIMENTAL

<u>Methylphenylethoxyhydroxysilane.</u> With vigorous stirring, to a mixture of 300 ml of ether, 1.8 g of distilled water, 5 ml of acetone, and 9.3 g of aniline at -5 to 0° was added 21.4 g of methylphenylethoxychlorosilane in 100 ml of ether. The mixture was stirred for 10 min, the precipitate was filtered, the ether was removed in vacuo, and the residue was distilled at 76° (1 mm) to give 7.0 g (38.5%) of methylphenylethoxyhydroxysilane. The other AS were isolated in a similar manner.

Tetrakis(dimethylethoxysiloxy)silane. With stirring, to 7.91 g of pyridine, 300 ml of ether, and 12.0 g of dimethylethoxyhydroxysilane at -5 to 0° was added 4.2 g of SiCl4 in 100 ml of ether; the mixture was stirred for 4 h, filtered, the ether was removed in vacuo, and the residue was distilled at 107° (1 mm) to give 2.8 g (22.2%) of tetrakis(dimethylethoxysiloxy)silane. Tetrakis(methylvinylethoxysiloxy)silane was obtained in a similar manner.

CONCLUSIONS

1. The hydrolysis of alkyl(aryl)ethoxychlorosilanes under mild conditions gave alkyl-(aryl)ethoxyhydroxysilanes.

2. Tetrafunctional pentasiloxanes were obtained by the heterofunctional condensation of alkylethoxyhydroxysilanes with SiCl₄.

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DECOMPOSITION OF HYDROGEN TELLURIDE THAT PROCEEDS AS

DEFLAGRATION COMBUSTION

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UDC 541.124:541.126:546.241.1

Hydrogen telluride is a thermodynamically unstable compound [1]; its decomposition is accompanied by the liberation of a large amount of heat (23.83 kcal/mole) [2], and it assumes the character of an explosion under conditions where this heat cannot escape. In the present paper are reported the results of studying the principal characteristics of the decomposition of H_2 Te in the gas phase, which proceeds as deflagration combustion.

EXPERIMENTAL

The study was run as described in [3-5]. See [6] for a description of the experimental procedure and the equipment used to make the measurements. In the experiments we used H_2Te that was obtained by the electrolysis of 80% orthophosphoric acid solution using a tellurium cathode [7]. Based on the mass spectral data the amount of oxygen was <0.4 vol. %, H_2S 0.04%, H_2Se 0.2%, and hydrocarbons 0.2%. All of the experiments were run at $\sim 20^{\circ}C$. The experimental values were processed by the method of least squares. The obtained data are plotted in Figs. 1-3.

While measuring the minimum ignition energy we determined the lower ignition limit of H_2 Te based on a pressure equal to 23 mm (see Fig. 2). The formation and propagation of a stable flame front failed to occur at this pressure after a high-voltage discharge with an energy of some 20-30 joules.

To determine the normal combustion rate we use the "constant volume bomb" method [3, 8]. The magnitude of this value was calculated from the oscillograph recording of the pressure vs time curve [3]. As can be seen from Fig. 3, the normal combustion rate of H_2 Te has a small value and is slightly dependent on the pressure. It is known that the rates of slow flame propagation processes fluctuate greatly. This apparently explains the quite large scattering of the experimental data.

DISCUSSION OF RESULTS

A comparison of the obtained data with the analogous values, determined in [6] for

Institute of Chemistry, Academy of Sciences of the USSR, Gorki. Translated from Izvestiya Akademii Nauk SSSR, Seriya Khimicheskaya, No. 9, pp. 2117-2119, September, 1977. Original article submitted December 6, 1976.

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