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POLYMERIZATION AND COPOLYMERIZATION OF PHOSPHORUS-CONTAINING METHACRYLIC ESTERS*

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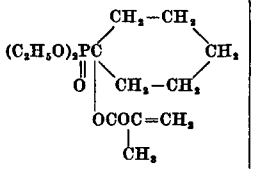
IN A PREVIOUS report a number of phosphorus-containing esters of acrylic and methacrylic acids were described and some preliminary data regarding their polymerization were given. It was shown that they could be used as the basis for the production of hard, vitreous polymers with low inflamability [1].

The aim of the present work was to make a detailed study of the polymerization of phosphorus-containing esters of methacrylic acid and to ascertain the effect of temperature, nature of the initiator and structures of the esters on the polymerization rate and properties of the product polymers. We also wished to find out whether it was possible to produce copolymers based on phosphorus-containing methacrylate. With these aims in mind, in addition to the previous ones, we synthesized a number of the phosphorus-containing esters of methacrylic acid with different substituents in the ether radical. Their characteristics are set out in Table 1.

TABLE 1. PHOSPHORUS-CONTAINING METHACRYLIC ESTERS

Material	B.p., °C/mm	d_4^{20}	n_D^{20}	MR_D		P content, %		Yield, %
				Experiment	Theoretical	Experiment	Theoretical	
$(C_2H_5O)_2P(O)COCOC(CH_3)_2CH_3$	106–106·5/1·5	1·0758	1·4424	65·0	65·05	12·08 12·11	11·74	70·5
$(C_2H_5O)_2P(O)CH(CH_3)OCOC(CH_3)=CH_2$	118/2	1·0590	1·4430	69·61	69·67	11·44 11·47	11·15	69
$(C_2H_5O)_2P(O)CH(C_6H_5)OCOC(CH_3)=CH_2$	172/3	1·1303	1·4973	80·79	79·92	9·72 10·12	9·9	60
	142/2 M.p. 60–61°	—	—	—	—	10·35 10·59	10·2	50

* Vysokomol. soyed. 5: No. 9, 1376–1381, 1963.