

Table: Yields and Physical Constants of (3) and (4)

Compound	Yield %	Mp (°C)	MS	NMR**			IR(cm ⁻¹)
				Nucleus	δ(ppm)	J(Hz)	
(3a)	85	187-188	397, 328,	¹⁹ F	-3.7(s)		2200(s), 1618(s),
			183, 77	¹ H	7.52-7.60(m)		1130(s), 1200(s)
(3b)	82	151-152	447, 328,	¹⁹ F	4.5(t) (3F)	J, 1.2	2200(s), 1610(s),
			183, 77	¹ H	40.2(q) (2F)		1140(s), 1210(s)
(3c)	90	164-165	497, 328,	¹⁹ F	37.6(q) (COCF ₂)	⁴ J, 7.5	2200(s), 1608(s),
			183, 77		47.4(s) (CF ₂ CF ₃)		1100(s), 1200(s)
				¹ H	3.0(t) (CF ₂ CF ₃)		
					7.55-7.69(m)		

Compound	Yield %	Bp (°C)	MS	¹⁹ F NMR		IR(cm ⁻¹)****
				δ(ppm)	J(Hz)	
(4a)	50	-6 ~ -5	*** 119, 100	-21.3(s)		2340(s), 2175(s), 1936(w), 1160(s), 1235(s)
(4b)	82	37-38	169, 150,	9.7(t) (3F)	J, 3.3	2340(s), 2175(s), 1960(w),
			100, 69	29.0(q) (2F)		1175(s), 1200(s)
(4c)	80	57.5-58	219, 200,	5.0(t) (CF ₃)	⁴ J, 7.5	2340(s), 2180(s), 1960(w),
			100, 69	50.0(t) (CF ₃ CF ₂)	³ J _{CF₂CF₂} , 3.1	1130(s), 1200(s)
				26.3(tq) (CF ₂ C≡C)		

* All elemental analyses were consistent with the calculated values.

** For ¹⁹F NMR, TFA was used as external reference, and for ¹H NMR, TMS was used as internal reference.

*** MS data were obtained by chemical ionization method.

**** Gas sample.

References and Notes

1. This paper is the 20th report on the studies of the application of elemento-organic compounds of the fifth and sixth groups in organic syntheses.
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