Table 1: Photochemical and photosonochemical reactions of 1a-f catalyzed by 2 in methanol solution.[I]

| Compound	Irradiation time (h)	Yield (%)[II]	3/4[III]	3 %	4 %
1a + $h\nu$	11	88	1 : 2.0	33.3	66.7
1a + $h\nu$ +)))	7	90	1 : 2.1	32.3	67.7
1b + $h\nu$	2.5	99	1.2 : 1	54.5	45.5
1b + $h\nu$ +)))	1.5	99	1.2 : 1	54.5	45.5
1c + $h\nu$	10	85	1 : 3.7	21.3	78.7
1c + $h\nu$ +)))	9	87	1 : 3.4	22.7	77.3
1d + $h\nu$	2.15	98	1.1 : 1	52.4	47.6
1d + $h\nu$ +)))	1.10	100	1.1 : 1	52.4	47.6
1e + $h\nu$	9	89	1 : 4.8	17.2	82.8
1e + $h\nu$ +)))	5	90	1 : 4.8	17.2	82.8
1f + $h\nu$	2	99	1 : 1.1	47.6	52.4
1f + $h\nu$ +)))	1.05	99	1 : 1.2	45.5	54.5

[I] [**1a-f**] = 0.04 M, [**2**] = 0.004 M, corresponding to a molar ratio of 10:1. [II]Based on consumed **1a-f**. [III]The ratios have been determined by comparison of the integral ratios of the hydrogen on C-2.

molar ratio of **1a-f** : NBTPT (10 : 1) – NBTPT is excited selectively. Therefore, the same intermediates should be involved in our study.

The interesting point in the present work is that in contrast to the results obtained by reaction of **1a-f** and **2** in acetone solution, which leads to the highly diastereoselective formation of 1,3-dioxolanes, diasteroselective formations of α-hydroxy-β-methoxyether derivatives **3** and **4** have been only observed in some cases of photocatalytic ring opening of **1a-f** and **2** in methanol solution. The observed high distereoselectivity by reaction of **1a-f** and **2** in acetone solution has been explained by the involvement of a complex (**1a-f**... NBTPT*) instead of the inter-

mediates **5–7** for the nucleophilic attack of acetone (Scheme 3). [19]

Due to the polar nature of methanol compared with acetone, we should expect a complete electron transfer from **1a-f** to photoexcited **2** under the formation of one of the intermediates **5–7**, depending on the location of the additional substituent on the parent molecule **1a**. This argument is supported by the effect of the nature of substituents on the rate of reaction and the diastereomeric ratios of products. This leads us to assume that the inductive effect of the *p*-methyl group and the resonance effect of the *p*-methoxy group on the phenyl ring directly attached to the epoxide ring increase the contribution of
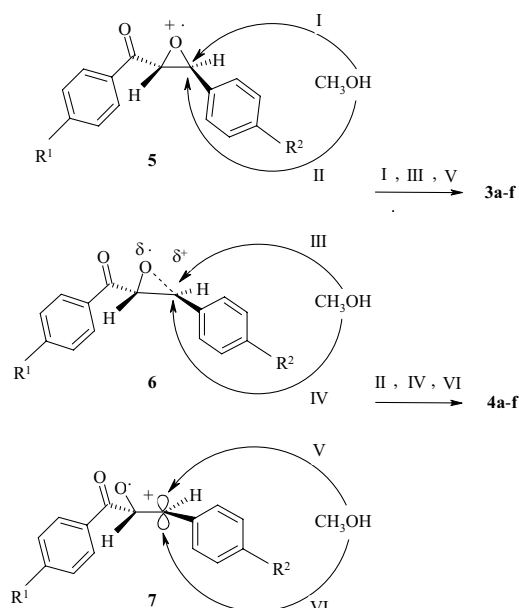
Scheme 2: Possible intermediates involved in the ring opening of α-epoxyketones.