TABLE 11

No.	Buffer	pH	% of cisatracurium besylate at T = 0	% of cisatracurium besylate after 24 hours	% degradation
1	$NH_4^+CH_3COO^-/CH_3COOH$	3.5	54.7	52.9	3.3
2	$NH_4^+CH_3COO^-/HCOOH$	3.5	54.6	54.3	0.5
3	$Na^+CH_3COO^-/CH_3COOH$	3.5	54.5	52.5	3.7
4	$Na^+NO_3^-/HNO_3$	3.0	54.5	54.5	0
5	$K^+H_2PO_4$	3.0	54.7	53.7	1.8
6	$CaBr_2/HBr$	3.5	54.4	54.4	0
7	diethylamine/CH_3COOH	3.5	54.7	53.2	2.7
8	triethylamine/CH_3COOH	3.5	54.4	52.1	4.2
9	$Na^+ClO_4/HClO_4$		Atracurium besylate is precipitated in the presence of a ClO_4 ion		

A graph depicting the stability of the 1R-cis, 1R'-trans isomer at different pH values is provided in FIG. **7**, which demonstrates that at pH 3, after 20 hours the % area of the 1R-cis, 1'R-cis isomer is only slightly reduced while at pH 5.5 the % area of the 1R-cis,1'R-cis isomer is significantly reduced.

[0076] The degradation (D) according to the data presented in Table 12 was calculated as follows:

$$D = \frac{X_0 - X_{21}}{X_0} \times 100$$

wherein, X_0=% of cisatracurium at T_0, and X_{21}=% of cisatracurium at after 24 hours.

TABLE 12

	pH					
Time, hours	3.0	3.5	4.0	4.5	5.0	5.5
0.0	53.4	53.6	53.4	53.9	53.6	53.6
10.0	51.3	51.0	50.5	49.9	46.1	40.8
21.0	50.0	49.2	47.9	46.2	38.4	27.8
% degradation*	6.4	8.2	10.3	14.3	28.4	48.1

*The buffer used was the $Na^+CH_3COO^-/CH_3COOH$ buffer at 3 different pH values, that is pH values of 3.0, 4.6 and 5.5. The values in the table are represented as % of cisatracurium besylate.

A sample solution of (1R,1'R)-atracurium besylate (10 mg/ml) was prepared using two buffer solutions at pH values of 1.0 and 2.0 and analyzed on the C18 stationary phase by gradient elution [20 mM KNO_3 buffer (at pH corresponding to sample preparation)—methanol]. The stability of the sample solution at the mentioned pH values was demonstrated at room temperature and at 4° C., as depicted in Table 13.

TABLE 13

	% area of the cis-cis isomer							
Time	pH = 1				pH = 2			
(hours)	RT	D, %	4° C.	D, %	RT	D, %	4° C.	D, %
0	54.9		54.9		54.8		54.8	
6	50.2	8.6	53.9	1.8	54.5	0.5	54.8	0
26	38.8	29.3	52.8	3.8	53.8	1.8	54.7	0.2

RT = room temperature, D = degradation

$$D = \frac{X_0 - X_{6/26}}{X_0} \times 100$$

wherein, X_0=% of cisatracurium at T_0, and $X_{6/26}$=% of cisatracurium at after 6 or 26 hours.

Example 7

[0077] This example demonstrates a method for purification of the cisatracurium solution from the buffer's mixture by Solid Phase Extraction (SPE).

[0078] A series of the sample solutions of (1R,1'R)-atracurium besylate isomer mixture (55% cis-cis; 35% cis-trans and 6% trans-trans isomer) was prepared in diluents containing different buffers (varying by the nature of the cation and the anion). The diluents consisted of a mixture of 90% buffer and 10% methanol. The sample solutions were purified using SPE C18 cartridge.

[0079] The evaluation of the buffer anions was carried out by HPLC. The cations were evaluated indirectly. The recovery of the isolate (1R cis,1'R-cis isomer) and anions was checked after each step of the SPE method, which comprises the steps of:

[0080] 1) successive transferring of the sample solution and water through the sorbent;

[0081] 2) elution of the sample with methanol; and

[0082] 3) washing the sorbent with methanol.

The results of this study are summarized in the Table 14.

TABLE 14

		Anion removal (%)			Cis-cis isomer recovery (%)		
No.	Buffer	Step 1	Step 2	Step 3	Step 1	Step 2	Step 3
1	20 mM $NH_4^+CH_3COO^-$/ CH_3COOH, pH = 3.5	91.5	11.5	2.9	0.2	66.35	0.1