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ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย



APPENDICES

ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย

APPENDIX A

Physicochemical Properties of Drug and Substances

1. Carboxymethyl Cellulose Sodium (Kibbe, 2000)

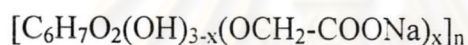
1.1 Synonyms

CMC sodium, SCMC, sodium CMC, Akucell, Cekol

1.2 Chemical name

Cellulose, carboxymethyl ether, sodium salt

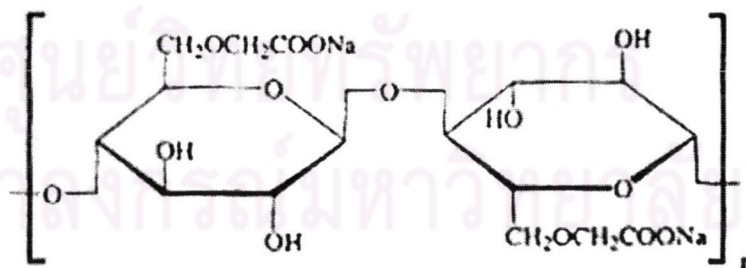
1.3 Molecular formulation



1.4 Molecular weight

Molecular weight range: 90,000-700,000

1.5 Chemical structure



1.6 Appearance

Carboxymethylcellulose sodium occurs as a white to almost white colored, odorless, granular powder

1.7 Solubility

Carboxymethylcellulose sodium is practically insoluble in acetone, ethanol, ether, and toluene. Easily dispersed in water at all temperatures, forming clear, colloidal solutions. The aqueous solubility varies with the degree of substitution.

1.8 Melting point

Carboxymethylcellulose sodium is brown at 252°C, chars at approximately 252°C.

1.9 Dissociation constant

The pKa of carboxymethylcellulose sodium is 4.30.

1.10 Safety

Carboxymethylcellulose sodium is used in oral, topical, and some parenteral formulations. It is also widely used in cosmetics, toiletries, and food products and is generally regarded as a nontoxic and nonirritant material. However, oral consumption of large amounts of carboxymethylcellulose sodium can have laxative effect; therapeutically, 4-10 g in daily divided doses of the medium and high viscosity grades of carboxymethylcellulose sodium have been used as bulk laxatives.

2. Hydroxypropyl Cellulose (Kibbe,2000)

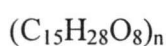
2.1 Synonyms

Cellulose, hydroxypropyl ether, Klucel, hypolose, Nisso HPC, oxypropylated cellulose

2.2 Chemical name

Cellulose, 2-hydroxypropyl ether

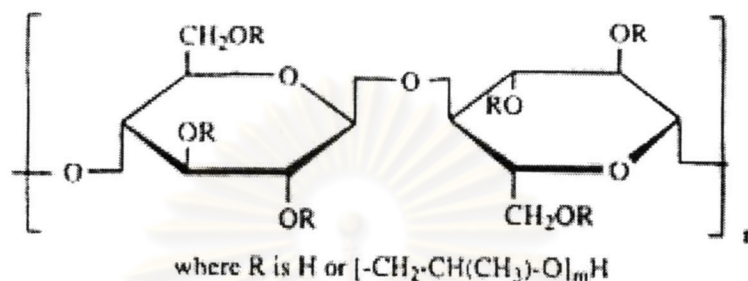
2.3 Molecular formulation



2.4 Molecular weight

Molecular weight range: 50,000-1,250,000

2.5 Chemical structure



2.6 Appearance

Hydroxypropyl cellulose is a white to slightly yellow-color, odorless and tasteless powder.

2.7 Solubility

Hydroxypropyl cellulose is freely soluble in water below 38°C, forming a smooth, clear, colloidal solution. In hot water is insoluble and is precipitated as a highly swollen floc at a temperature between 40-45°C. All types have excellent solubility in either hot or cold polar organic liquids.

2.8 Melting point

Hydroxypropyl cellulose is softens at 130°C, chars at 260-275°C.

2.9 Acidity/alkalinity

The pH of 1% w/v aqueous solution is 5.0-8.5.

2.10 Safety

Hydroxypropyl cellulose is widely used as an excipient in oral or topical pharmaceutical formulations. It is also extensively used in cosmetics and food products. Hydroxypropyl cellulose is generally regarded as an essentially nontoxic and nonirritant material. However, the use of hydroxypropyl cellulose as a solid

ocular insert has been associated with rare of discomfort or irritation, including hypersensitivity and edema of eyelids.

3. Hydroxypropyl Methylcellulose (Kibbe,2000)

3.1 Synonyms

Cellulose, hydroxypropyl methyl ether, Methocel, methylcellulose propylene glycol ether, methyl hydroxypropylcellulose

3.2 Chemical name

Cellulose, 2-Hydroxypropyl methyl ether

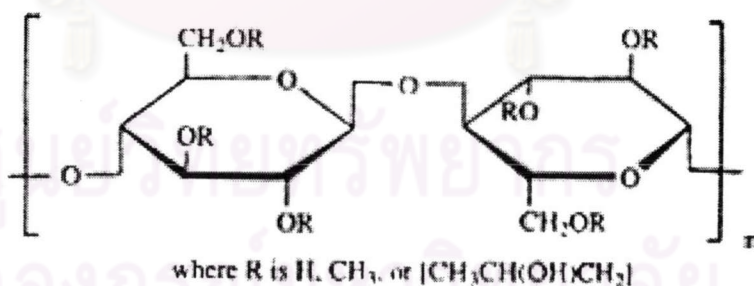
3.3 Molecular formulation



3.4 Molecular weight

Molecular weight range: 10,000-1,500,000

3.5 Chemical structure



3.6 Appearance

Hydroxypropyl methylcellulose is an odorless and tasteless, white or creamy-white colored fibrous or granular powder.

3.7 Solubility

Hydroxypropyl methylcellulose is soluble in cold water, forming a viscous colloidal solution, insoluble in alcohol, ether, chloroform, but soluble in mixtures of methyl alcohol and methylene chloride.

3.8 Melting point

Hydroxypropyl methylcellulose is brown at 190-200°C, chars at 225-230°C.

3.9 Acidity/alkalinity

The pH of 1% w/v aqueous solution is 5.5-8.0.

3.10 Safety

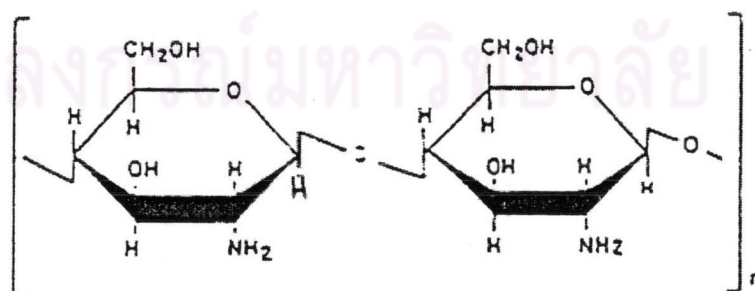
Hydroxypropyl methylcellulose is widely used as an excipient in oral or topical pharmaceutical formulations. It is also extensively used in cosmetics and food products. Hydroxypropyl cellulose is generally regarded as a nontoxic and nonirritant material although excessive oral consumption may have a laxative effect.

4. Chitosan

4.1 Molecular weight

Molecular weight range: 10,000-1,000,000

4.2 Chemical structure



4.3 Solubility

Chitosan requires the addition of acid to solubilized in water. Acetic acid is commonly used as a reference, but other organic acid such as citric acid, formic acid, lactic acid, tartaric acid etc., as well as mineral acids like hydrochloric acid, nitric acid and perchloric acid can be used. It is insoluble in sulphuric acid and phosphoric acid.

5. Citric Acid Anhydrous (Kibbe,2000)

5.1 Chemical name

USP: 1,2,3-Propanetricarboxylic acid, 2-hydroxy-monohydrate

BP: 2-hydroxypropane-1,2,3-tricarboxylic acid

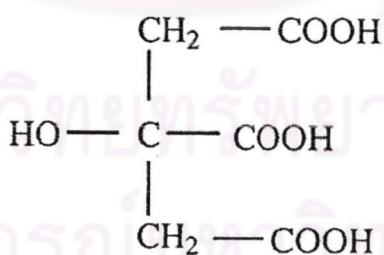
5.2 Molecular formulation



5.3 Molecular weight

192.12

5.4 Chemical structure



5.5 Appearance

Citric acid is colorless, translucent crystals, or white, granular to fine crystalline powder. It is odorless and has a strong acidic taste. It is effervescent in dry air.

5.6 Solubility

Citric acid is very soluble in water, freely soluble in alcohol, sparingly soluble in ether.

5.7 Melting point

The melting point of citric acid monohydrate is 100°C, and of citric acid anhydrous is 153°C.

5.8 Safety

LD₅₀ I.P. in rats: 975 mg/kg of body weight.

6. Menthol (Kibbe,2000)

6.1 Synonyms

Hexahydrothymol, peppermint camphor

6.2 Chemical name

(1*RS*,2*RS*,5*RS*)-(±)-5-Methyl-2-(1-methylethyl)cyclohexanol

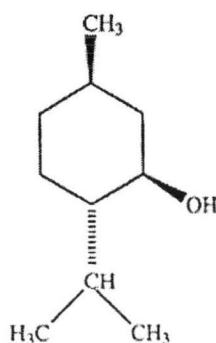
6.3 Molecular formulation

C₁₀H₂₀O

6.4 Molecular weight

156.27

6.5 Chemical structure



6.6 Appearance

Racemic menthol is a mixture of equal parts of the (1*R*,2*S*,5*R*)- and (1*S*,2*R*,5*S*)-isomers of menthol. It is a free-flowing or agglomerated crystalline powder or colorless, prismatic or acicular shiny crystals, with a strong characteristic odor and taste. The crystalline form may change with the time due to sublimation within a closed vessel.

6.7 Solubility

Menthol is very soluble in ethanol (95%), chloroform, and ether. It is very slightly soluble in glycerin, practically insoluble in water.

6.8 Melting point

The melting point of menthol is 34-36°C.

6.9 Safety

Almost all toxicological data for menthol relates to its use as the therapeutic agent rather than as an excipient. Inhalation or ingestion of large quantities can result in serious adverse reactions such as ataxia and CNS depression. Although menthol is essentially nonirritant there have been some reports of hypersensitivity following topical application.

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APPENDIX B

Analysis of Lidocaine Hydrochloride

1. Validation of HPLC method

1.1 Specificity

Figure b1 shows typical chromatograms of lidocaine HCl standard solutions. Lidocaine HCl and methylparaben were eluted at 4.00-5.00 min and 6.00-7.00 min, respectively. Figure b2 shows the chromatogram in the presence of phosphate buffer and non-active ingredients, including HPMC E15, HPMC E4M, HPC-H, chitosan, menthol and citric acid. It indicated that the other ingredients did not interfere with peaks of lidocaine HCl and methylparaben. Thus, this method having high specificity could be used for analysis of lidocaine HCl.

1.2 Accuracy

The accuracy of an analytical method is the closeness of the test results obtained by that method to the true value. It is usually calculated as percentage of recovery by the assay of the known added amount of analyte in the sample. The percentages of analytical recoveries of each concentration are shown in Table b1-b4. The mean of percentage of analytical recovered closely to 100 %, with a low %CV indicated the high accuracy of this method. Thus, it could be used for analysis of lidocaine HCl in all concentrations studied.

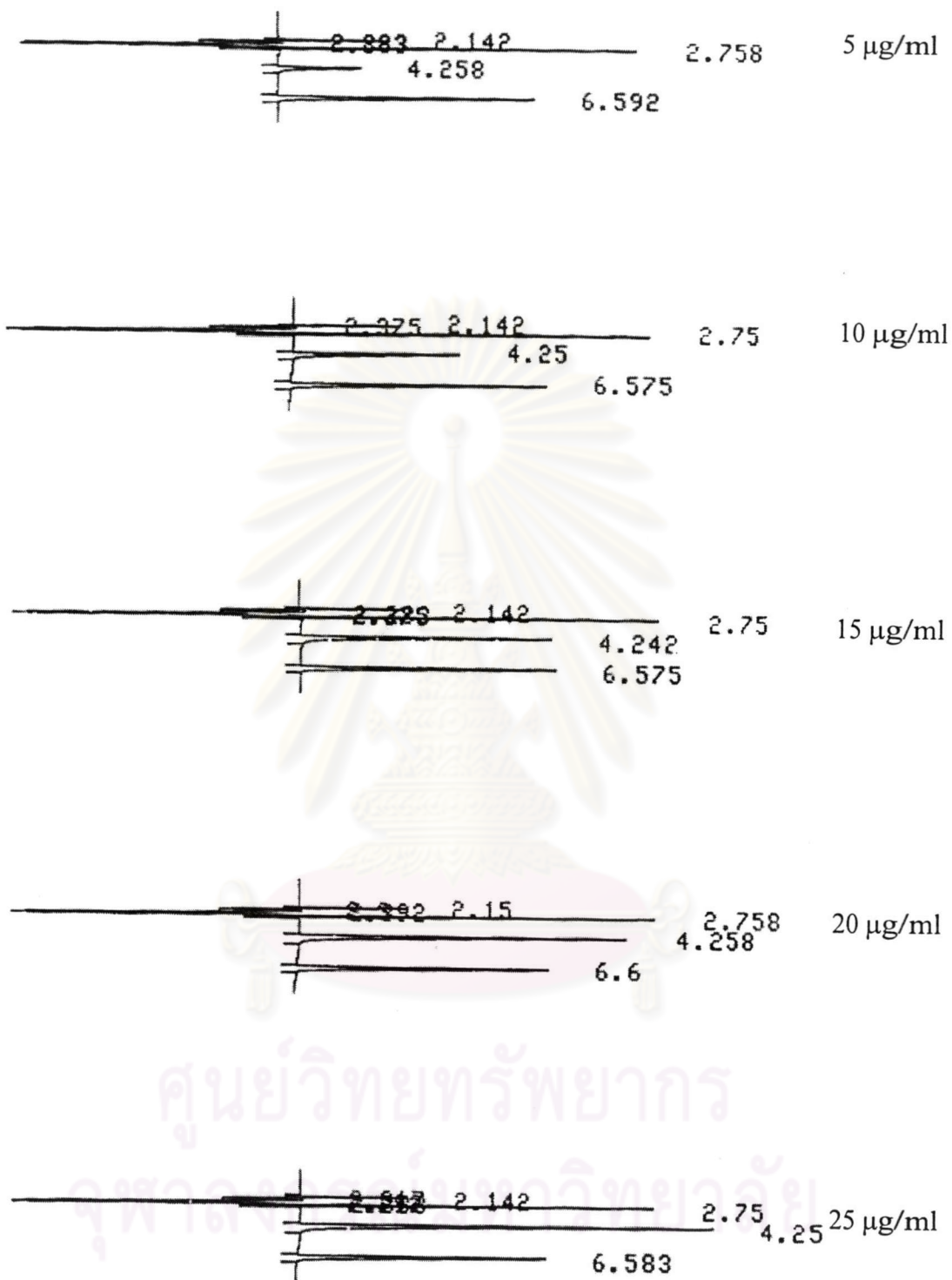


Figure b1 HPLC chromatograms of standard solutions of lidocaine HCl

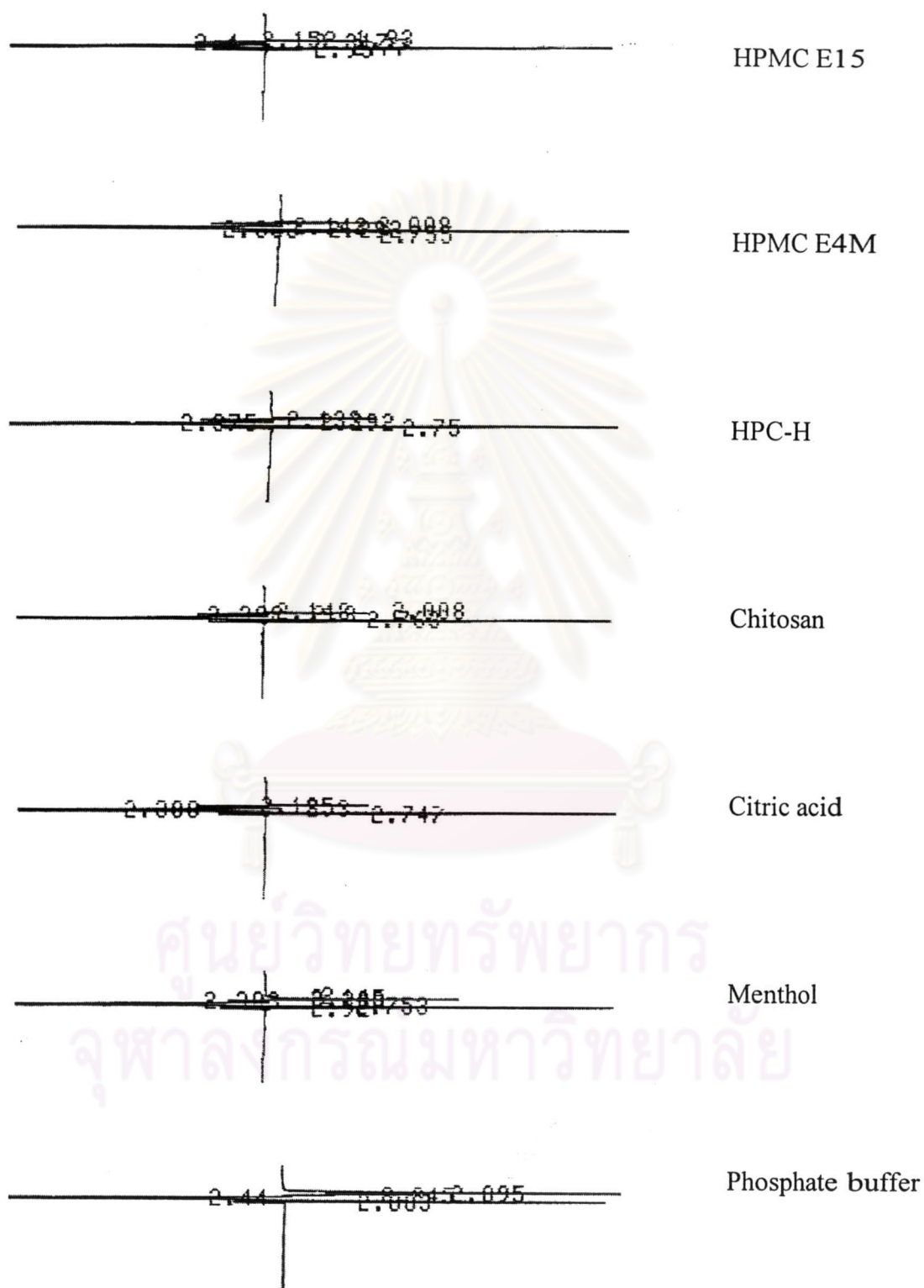


Figure b2 HPLC chromatograms of other ingredients in formulations

Table b1 Percentage of analytical recovery of Lidocaine HCl from the HPMC E15 films

Actual concentration of lidocaine HCl ($\mu\text{g/ml}$)	Calculated concentration of lidocaine HCl ($\mu\text{g/ml}$)	%Analytical recovery
5	5.1014	102.03
	5.0881	101.76
	4.9887	99.77
10	10.0069	100.07
	9.9425	99.43
	9.7864	97.86
15	15.1244	100.83
	14.7819	98.55
	15.1412	100.94
20	19.9761	99.88
	19.674	98.37
	19.7158	98.58
25	25.1311	100.52
	25.3208	101.28
	24.7286	98.91
mean		99.92
SD		1.30
%CV		1.30

Table b2 Percentage of analytical recovery of Lidocaine HCl from the HPMC E4M films

Actual concentration of lidocaine HCl (µg/ml)	Calculated concentration of lidocaine HCl (µg/ml)	%Analytical recovery
5	4.9983	99.97
	4.9866	99.73
	4.9602	99.20
10	9.8271	98.27
	9.8954	98.95
	9.9218	99.22
15	14.9755	99.84
	14.7862	98.57
	15.0997	100.66
20	20.2873	101.44
	20.0119	100.06
	19.9020	99.51
25	25.1541	100.62
	25.1179	100.47
	25.0122	100.05
mean		99.77
SD		0.85
%CV		0.85

Table b3 Percentage of analytical recovery of Lidocaine HCl from the HPC-H films

Actual concentration of lidocaine HCl ($\mu\text{g/ml}$)	Calculated concentration of lidocaine HCl ($\mu\text{g/ml}$)	%Analytical recovery
5	5.1106	102.21
	5.1093	102.19
	4.9981	99.96
10	9.9850	99.85
	9.9001	99.00
	9.9763	99.76
15	14.8027	98.68
	15.1291	100.86
	14.8733	99.16
20	20.0985	100.49
	19.8862	99.43
	19.8122	99.06
25	24.7899	99.16
	25.1009	100.40
	25.0067	100.03
mean		100.02
SD		1.08
%CV		1.08

Table b4 Percentage of analytical recovery of Lidocaine HCl from the chitosan films

Actual concentration of lidocaine HCl ($\mu\text{g/ml}$)	Calculated concentration of lidocaine HCl ($\mu\text{g/ml}$)	%Analytical recovery
5	5.0088	100.18
	4.9711	99.42
	4.9006	98.01
10	9.8903	98.90
	9.9227	99.23
	9.7741	97.74
15	15.0989	100.66
	14.8664	99.11
	15.0019	100.01
20	20.1427	100.71
	20.1699	100.85
	20.1090	100.55
25	24.8310	99.32
	24.7300	98.92
	25.1555	100.62
mean		99.62
SD		0.99
%CV		1.00

1.3 Precision

The precision of an analytical method is the degree of agreement among individual test results when the method is applied repeatedly to multiple samplings of a homogeneous sample. The precision of analytical method is usually expressed as the standard deviation or relative standard deviation (coefficient of variation). Tables b5 and b6 illustrates the data of within and between run precision, respectively. All coefficients of variation values were small so it indicated that the HPLC method used was precise for quantitative analysis of lidocaine HCl concentration in the range studied.

Table b5 Data within run precision

lidocaine HCl concentration ($\mu\text{g/ml}$)	peak area ratio					
	set no.1	set no.2	set no.3	mean	SD	%CV
5	0.3059	0.3054	0.3045	0.3053	0.0007	0.2264
10	0.6120	0.5964	0.6139	0.6074	0.0096	1.5760
15	0.9070	0.8939	0.8916	0.8975	0.0083	0.9226
20	1.1852	1.1869	1.1794	1.1838	0.0039	0.3308
25	1.5073	1.5047	1.4921	1.5014	0.0081	0.5409

Table b6 Data of between run precision

lidocaine HCl concentration ($\mu\text{g/ml}$)	peak area ratio					
	day1	day2	day3	mean	SD	%CV
5	0.3053	0.3000	0.3100	0.3051	0.0050	1.6318
10	0.6074	0.6147	0.6072	0.6098	0.0043	0.7009
15	0.8975	0.9285	0.9212	0.9157	0.0162	1.7698
20	1.1838	1.2133	1.2285	1.2086	0.0227	1.8806
25	1.5014	1.5117	1.5186	1.5106	0.0087	0.5730

1.4 Linearity

The linearity of analytical method is its ability to elicit test results that are directly, or by a well-defined mathematical transformation, proportional to the concentration of analyte in samples within a given range. Figure b3 shows that the relationship between peak area ratios and lidocaine HCl concentrations is linear with a correlation of determination (R^2) value of 0.9999. This result indicated that HPLC method was acceptable for qualitative analysis of lidocaine HCl in the range studied.

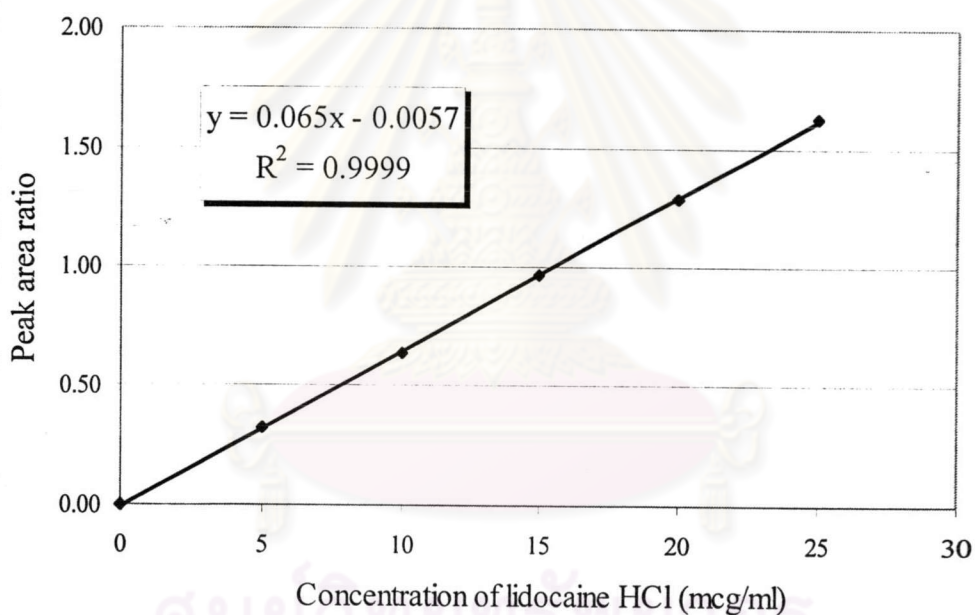


Figure b3 Standard curve of lidocaine HCl

2. System suitability

2.1 Resolution

Figure b3 shows typical chromatograms of lidocaine HCl standard solutions. The resolution values, which were calculated from a mean of the five replicated injections, of lidocaine HCl and its internal standard, methyl paraben, are presented in Table b7. All resolution values of lidocaine HCl and methyl paraben were more than 1.0. Therefore, these two peaks were separated from each other.

Table b7 Resolution values of lidocaine HCl and methyl paraben

Lidocaine HCl concentrations ($\mu\text{g/ml}$)	Resolution value
5	19.12
10	19.22
15	20.66
20	18.99
25	19.12

2.2 Tailing factors

The tailing factors, which were calculated from a mean of the five replicated injections of each concentration (5, 10, 15, 20 and 25 $\mu\text{g/ml}$) of lidocaine HCl and its internal standard, methyl paraben, are presented in Table b8.

Table b8 The tailing factors of lidocaine HCl and methyl paraben

Concentration of lidocaine HCl ($\mu\text{g/ml}$)	Tailing factor
5	1.12
10	1.10
15	1.09
20	1.12
25	1.19
Methyl paraben	1.17



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APPENDIX C

Results

Table c1 The thickness of the prepared lidocaine HCl mucoadhesive films

Formula	no.	Thickness (μm)			Formula	no.	Thickness (μm)		
		A	B	C			A	B	C
E15 1:1	1	119	122	115	E4M 1:1	1	121	122	121
	2	113	120	123		2	118	123	129
	3	129	118	118		3	120	120	129
	4	128	125	125		4	127	117	112
	5	120	125	124		5	120	113	116
	Mean	121.80	122.00	121.00		Mean	121.20	119.00	121.40
	SD	6.69	3.08	4.30		SD	3.42	4.06	7.64
E15 1:0.67	1	119	120	118	E4M 1:0.67	1	120	118	115
	2	111	113	113		2	106	100	115
	3	120	122	100		3	110	113	103
	4	117	122	113		4	112	115	112
	5	110	105	107		5	115	110	104
	Mean	115.40	116.40	110.20		Mean	112.60	111.20	109.80
	SD	4.62	7.37	6.91		SD	5.27	6.91	5.89
E15 1:0.5	1	100	109	97	E4M 1:0.5	1	105	101	109
	2	99	97	99		2	98	108	96
	3	104	115	109		3	99	102	109
	4	93	110	92		4	102	105	105
	5	98	102	95		5	98	94	105
	Mean	98.80	106.60	98.40		Mean	100.40	102.00	104.80
	SD	3.96	7.09	6.47		SD	3.05	5.24	5.31
				E4M 2:1	1	207	200	199	
					2	198	210	208	
					3	218	198	197	
					4	199	211	212	
					5	201	194	214	
					Mean	204.60	202.60	206.00	
					SD	8.26	7.54	7.65	

Table c1 The thickness of the prepared lidocaine HCl mucoadhesive films (Cont.)

Formula	no.	Thickness (μm)			Formula	no.	Thickness (μm)		
		A	B	C			A	B	C
HPC 1:1	1	125	124	127	CS 1:1	1	251	258	259
	2	113	122	121		2	253	255	260
	3	118	125	128		3	257	241	250
	4	126	121	116		4	266	257	250
	5	117	114	118		5	250	248	245
	Mean	119.80	121.20	122.00		Mean	255.40	251.80	252.80
	SD	5.54	4.32	5.34		SD	6.50	7.19	6.46
HPC 1:0.67	1	108	111	108	CS 1:0.67	1	216	215	220
	2	118	118	118		2	201	221	212
	3	116	108	106		3	206	208	210
	4	111	108	111		4	203	201	202
	5	111	112	110		5	215	208	200
	Mean	112.80	111.40	110.60		Mean	208.20	210.60	208.80
	SD	4.09	4.10	4.56		SD	6.91	7.64	8.07
HPC 1:0.5	1	103	100	98	CS 1:0.5	1	202	202	191
	2	97	101	101		2	189	191	210
	3	99	98	98		3	185	189	190
	4	100	94	100		4	192	201	200
	5	103	102	97		5	205	205	202
	Mean	100.40	99.00	98.80		Mean	194.60	197.60	198.60
	SD	2.61	3.16	1.64		SD	8.56	7.13	8.29

Table c1 The thickness of the prepared lidocaine HCl mucoadhesive films (Cont.)

Formula	no.	Thickness (μm)			Formula	no.	Thickness (μm)		
		A	B	C			A	B	C
E15HPC 1:3	1	126	129	126	E15HPC 3:2	1	125	129	135
	2	131	127	130		2	135	132	123
	3	136	129	135		3	133	130	131
	4	131	135	133		4	125	129	130
	5	129	129	131		5	130	120	125
	Mean	130.60	129.80	131.00		Mean	129.60	128.00	128.80
	SD	3.65	3.03	3.39		SD	4.56	4.64	4.82
E15HPC 2:3	1	130	131	132	E15HPC 3:1	1	122	135	125
	2	131	132	120		2	133	127	120
	3	129	132	126		3	130	134	127
	4	121	130	130		4	127	130	132
	5	127	122	130		5	132	121	128
	Mean	127.60	129.40	127.60		Mean	128.80	129.40	126.40
	SD	3.97	4.22	4.77		SD	4.44	5.68	4.39
E15HPC 3:3	1	125	128	123					
	2	130	130	135					
	3	134	136	138					
	4	135	131	131					
	5	128	131	135					
	Mean	130.40	131.20	132.40					
	SD	4.16	2.95	5.81					

Table c2 Content uniformity of mucoadhesive films

Sample no.	Content of drug (%)		
	E15 1:1	E15 1:0.67	E15 1:0.5
1	99.20	104.82	99.16
2	98.50	101.46	97.67
3	97.93	102.08	95.36
4	103.58	98.47	95.45
5	101.74	102.30	97.24
6	99.51	101.85	98.53
7	96.37	99.24	98.77
8	100.90	104.82	99.27
9	99.53	102.71	98.76
10	100.16	104.62	100.05
Mean	99.74	102.24	98.03
%CV	2.03	2.14	1.62

Table c2 Content uniformity of mucoadhesive films (Cont.)

Sample no.	Content of drug (%)			
	E4M 1:1	E4M 1:0.67	E4M 1:0.5	E4M 2:1
1	97.00	98.37	97.95	103.33
2	100.10	103.41	97.26	100.31
3	97.04	101.26	95.61	101.62
4	98.21	101.14	100.31	105.00
5	97.39	98.68	98.37	102.60
6	97.12	100.13	97.66	95.06
7	102.50	98.72	104.29	101.93
8	101.42	100.65	97.82	97.02
9	98.15	99.99	98.34	102.72
10	99.20	98.80	97.52	101.64
Mean	98.82	100.12	98.51	101.12
%CV	1.98	1.57	2.37	2.95

Table c2 Content uniformity of mucoadhesive films (Cont.)

Sample no.	Content of drug (%)		
	HPC 1:1	HPC 1:0.67	HPC 1:0.5
1	96.52	96.35	100.22
2	97.04	102.22	103.64
3	101.13	97.04	98.76
4	96.33	98.52	102.22
5	98.66	100.00	101.79
6	99.58	99.58	99.14
7	100.84	96.86	96.57
8	96.43	97.49	102.08
9	98.23	99.61	102.75
10	104.85	99.34	104.77
Mean	98.96	98.70	101.19
%CV	2.75	1.83	2.46

Table c2 Content uniformity of mucoadhesive films (Cont.)

Sample no.	Content of drug (%)		
	CS 1:1	CS 1:0.67	CS 1:0.5
1	97.18	103.66	98.37
2	96.77	103.23	98.45
3	104.91	101.58	103.08
4	98.98	102.25	100.84
5	99.51	100.36	102.71
6	98.33	100.93	103.54
7	100.31	104.29	103.67
8	100.05	104.68	102.70
9	95.27	100.80	100.68
10	98.97	101.37	99.97
Mean	99.03	102.32	101.40
%CV	2.62	1.52	1.99

Table c2 Content uniformity of mucoadhesive films (Cont.)

Sample no.	Content of drug (%)				
	E15HPC 1:3	E15HPC 2:3	E15HPC 3:3	E15HPC 3:2	E15HPC 3:1
1	102.40	100.89	102.96	97.39	102.52
2	101.81	98.03	103.84	102.15	101.98
3	103.58	100.87	103.50	102.70	98.27
4	104.51	99.25	96.83	101.69	103.58
5	103.05	96.60	102.76	99.77	100.63
6	96.77	96.24	104.47	101.90	102.35
7	100.55	95.93	103.62	101.74	101.81
8	102.77	100.68	97.99	103.02	102.70
9	104.21	98.18	101.59	98.06	97.62
10	99.99	100.05	103.14	98.27	102.74
Mean	101.96	98.67	101.89	100.89	101.13
%CV	2.29	1.98	2.48	2.11	2.09

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Table c3 Percentage of moisture sorption of lidocaine HCl mucoadhesive films at various %RH after 1 day

Formula	53%RH					75%RH				
	no.1	no.2	no.3	Mean	SD	no.1	no.2	no.3	Mean	SD
E15 1:1	2.21	2.93	2.46	2.53	0.37	13.92	13.57	13.70	13.73	0.18
E15 1:0.67	2.62	2.62	3.00	2.75	0.22	12.92	13.78	14.12	13.61	0.62
E15 1:0.5	3.03	2.61	2.63	2.76	0.24	12.26	11.15	11.64	11.69	0.56
E4M 1:1	3.15	3.58	3.67	3.47	0.28	13.15	13.44	13.58	13.39	0.22
E4M 1:0.67	5.00	4.33	3.95	4.43	0.53	13.92	15.24	14.33	14.50	0.68
E4M 1:0.5	3.13	3.53	3.68	3.45	0.29	11.93	14.16	14.41	13.50	1.37
HPC 1:1	2.45	2.51	2.86	2.61	0.22	10.05	11.17	11.11	10.78	0.63
HPC 1:0.67	3.39	3.30	3.37	3.36	0.05	11.64	12.01	11.76	11.81	0.19
HPC 1:0.5	2.94	3.40	3.94	3.43	0.50	11.42	12.00	9.58	11.00	1.26
CS 1:1	7.21	7.89	7.30	7.46	0.37	18.48	17.97	18.66	18.37	0.36
CS 1:0.67	8.20	8.12	8.18	8.17	0.04	18.77	18.46	18.83	18.68	0.20
CS 1:0.5	6.18	6.61	6.75	6.52	0.30	15.76	16.50	16.67	16.31	0.48
E15HPC 1:3	1.52	2.87	3.24	2.54	0.91	8.13	6.09	8.62	7.61	1.34
E15HPC 2:3	2.47	2.11	3.11	2.56	0.51	6.35	7.91	7.73	7.33	0.85
E15HPC 3:3	2.25	2.74	2.76	2.58	0.29	6.80	5.25	6.69	6.24	0.86
E15HPC 3:2	3.17	1.75	2.53	2.49	0.71	7.07	6.47	5.61	6.38	0.73
E15HPC 3:1	2.46	3.06	3.27	2.93	0.42	7.58	6.83	7.03	7.15	0.39

Table c3 Percentage of moisture sorption of lidocaine HCl mucoadhesive films at various %RH after 1 day (Cont.)

Formula	84%RH					94%RH				
	no.1	no.2	no.3	Mean	SD	no.1	no.2	no.3	Mean	SD
E15 1:1	16.15	16.54	17.54	16.74	0.72	33.76	35.27	35.07	34.70	0.82
E15 1:0.67	19.94	19.13	19.29	19.45	0.43	31.82	33.84	31.70	32.45	1.20
E15 1:0.5	18.79	16.99	18.93	18.24	1.08	34.03	32.63	33.25	33.30	0.70
E4M 1:1	14.90	15.75	16.32	15.66	0.71	30.85	37.57	35.46	34.63	3.43
E4M 1:0.67	16.93	15.75	17.68	16.79	0.97	37.73	37.39	37.64	37.59	0.18
E4M 1:0.5	19.50	17.34	22.02	19.62	2.34	37.20	40.13	38.31	38.54	1.48
HPC 1:1	13.18	13.51	11.53	12.74	1.06	20.65	26.94	28.69	25.43	4.23
HPC 1:0.67	11.86	13.50	11.17	12.18	1.19	29.67	23.39	29.55	27.54	3.59
HPC 1:0.5	14.38	13.48	12.50	13.45	0.94	24.03	20.06	22.06	22.05	1.98
CS 1:1	20.02	20.99	20.99	20.67	0.56	41.91	39.11	38.94	39.99	1.67
CS 1:0.67	21.47	20.31	19.74	20.51	0.88	35.54	39.52	37.69	37.58	1.99
CS 1:0.5	17.55	18.91	17.25	17.90	0.89	31.68	33.13	35.78	33.53	2.08
E15HPC 1:3	8.06	12.11	11.11	10.43	2.11	25.43	25.43	24.66	25.17	0.45
E15HPC 2:3	11.35	9.66	10.17	10.39	0.86	25.40	24.59	24.70	24.90	0.44
E15HPC 3:3	12.79	11.35	9.70	11.28	1.54	23.87	22.61	24.27	23.58	0.87
E15HPC 3:2	7.65	10.43	10.64	9.57	1.67	25.52	26.53	27.06	26.37	0.78
E15HPC 3:1	6.85	10.72	10.91	9.49	2.29	25.20	26.34	27.54	26.36	1.17

Table c4 Percentage of moisture sorption of lidocaine HCl mucoadhesive films at various %RH after 3 days

Formula	53%RH					75%RH				
	no.1	no.2	no.3	Mean	SD	no.1	no.2	no.3	Mean	SD
E15 1:1	1.84	3.14	2.11	2.36	0.69	13.00	13.54	14.73	13.76	0.88
E15 1:0.67	2.30	3.00	3.44	2.91	0.58	13.23	13.78	13.28	13.43	0.31
E15 1:0.5	3.25	2.34	2.03	2.54	0.63	13.75	11.64	12.34	12.58	1.08
E4M 1:1	2.89	3.15	3.67	3.24	0.40	10.79	13.75	16.67	13.74	2.94
E4M 1:0.67	2.48	3.38	2.26	2.71	0.60	14.89	10.67	11.47	12.34	2.24
E4M 1:0.5	2.50	1.77	4.01	2.76	1.14	16.51	13.48	10.95	13.65	2.78
HPC 1:1	3.19	3.56	2.74	3.16	0.41	10.66	9.21	10.07	9.98	0.73
HPC 1:0.67	2.87	1.80	3.28	2.65	0.76	11.44	8.41	9.09	9.65	1.59
HPC 1:0.5	2.65	2.58	3.12	2.78	0.29	10.80	8.68	5.87	8.45	2.48
CS 1:1	6.61	6.22	7.00	6.61	0.39	17.95	17.65	17.28	17.63	0.34
CS 1:0.67	7.08	6.28	6.80	6.72	0.41	15.93	15.73	15.19	15.62	0.38
CS 1:0.5	5.37	5.70	5.45	5.51	0.17	14.49	15.06	13.89	14.48	0.59
E15HPC 1:3	1.83	2.56	2.43	2.27	0.39	8.45	8.87	8.87	8.73	0.24
E15HPC 2:3	2.37	3.33	3.55	3.08	0.63	7.67	9.89	7.89	8.48	1.22
E15HPC 3:3	1.97	2.48	2.05	2.17	0.28	7.12	5.57	6.96	6.55	0.85
E15HPC 3:2	2.53	2.25	2.67	2.48	0.21	5.93	8.42	8.97	7.77	1.62
E15HPC 3:1	2.84	3.68	3.33	3.29	0.42	8.23	9.02	8.98	8.74	0.45

Table c4 Percentage of moisture sorption of lidocaine HCl mucoadhesive films at various %RH after 3 days (Cont.)

Formula	84%RH					94%RH				
	no.1	no.2	no.3	Mean	SD	no.1	no.2	no.3	Mean	SD
E15 1:1	22.46	17.97	17.79	19.41	2.65	39.75	39.62	42.23	40.53	1.47
E15 1:0.67	19.71	21.65	21.64	21.00	1.12	34.55	39.66	42.07	38.76	3.84
E15 1:0.5	20.81	18.91	21.36	20.36	1.28	40.15	37.40	35.81	37.79	2.19
E4M 1:1	21.20	22.05	22.65	21.97	0.72	44.92	39.24	38.52	40.89	3.51
E4M 1:0.67	19.78	24.41	18.23	20.81	3.21	38.08	41.45	43.10	40.88	2.56
E4M 1:0.5	21.05	18.13	23.24	20.81	2.56	45.73	36.36	38.98	40.36	4.83
HPC 1:1	14.24	14.29	16.14	14.89	1.08	34.08	32.65	30.05	32.26	2.04
HPC 1:0.67	17.00	14.33	15.20	15.51	1.36	32.05	33.87	28.36	31.43	2.81
HPC 1:0.5	15.45	17.50	16.76	16.57	1.04	32.79	33.13	31.76	32.56	0.71
CS 1:1	26.28	27.45	26.26	26.67	0.68	49.52	45.35	44.11	46.33	2.83
CS 1:0.67	25.68	23.97	25.22	24.95	0.88	43.98	44.96	42.31	43.75	1.34
CS 1:0.5	23.48	25.30	25.38	24.72	1.07	37.70	35.84	45.89	39.81	5.35
E15HPC 1:3	10.58	13.24	12.50	12.11	1.37	24.94	30.14	31.70	28.93	3.54
E15HPC 2:3	12.93	14.29	10.70	12.64	1.81	29.65	28.65	24.04	27.45	2.99
E15HPC 3:3	11.95	13.15	13.00	12.70	0.65	28.65	27.06	28.19	27.97	0.81
E15HPC 3:2	9.72	10.37	9.71	9.93	0.38	26.04	29.24	25.36	26.88	2.07
E15HPC 3:1	13.99	11.97	12.21	12.72	1.10	22.83	31.61	35.44	29.96	6.46

Table c5 Percentage of moisture sorption of lidocaine HCl mucoadhesive films at various %RH after 5 days

Formula	53%RH					75%RH				
	no.1	no.2	no.3	Mean	SD	no.1	no.2	no.3	Mean	SD
E15 1:1	2.57	2.72	1.75	2.35	0.52	14.19	11.89	14.47	13.52	1.42
E15 1:0.67	3.21	2.70	2.87	2.93	0.26	12.03	12.31	15.25	13.20	1.79
E15 1:0.5	2.60	2.59	2.32	2.50	0.16	12.64	14.13	13.01	13.26	0.77
E4M 1:1	2.48	2.62	3.15	2.75	0.35	12.89	11.56	14.20	12.88	1.32
E4M 1:0.67	3.13	2.48	3.39	3.00	0.47	9.73	11.28	13.06	11.36	1.66
E4M 1:0.5	2.51	3.44	3.24	3.06	0.49	13.15	11.21	15.19	13.18	1.99
HPC 1:1	3.77	2.23	2.28	2.76	0.87	9.39	10.84	10.42	10.22	0.75
HPC 1:0.67	2.40	2.76	2.62	2.60	0.18	7.94	8.41	9.04	8.46	0.56
HPC 1:0.5	2.94	1.98	2.25	2.39	0.49	8.64	7.78	8.98	8.47	0.62
CS 1:1	6.80	7.08	6.88	6.92	0.14	17.67	17.86	17.74	17.76	0.09
CS 1:0.67	7.08	7.00	7.42	7.17	0.22	15.76	16.67	16.46	16.29	0.47
CS 1:0.5	5.69	6.00	5.77	5.82	0.16	14.13	13.73	14.81	14.22	0.55
E15HPC 1:3	2.61	1.99	2.43	2.35	0.32	6.10	8.37	6.79	7.09	1.16
E15HPC 2:3	3.30	2.89	2.73	2.97	0.29	6.08	5.85	6.04	5.99	0.12
E15HPC 3:3	3.11	1.84	3.42	2.79	0.84	6.47	6.30	4.59	5.79	1.04
E15HPC 3:2	2.22	1.75	1.40	1.79	0.41	5.18	5.10	4.89	5.06	0.15
E15HPC 3:1	2.71	3.06	3.27	3.01	0.28	5.81	6.94	5.47	6.07	0.77

Table c5 Percentage of moisture sorption of lidocaine HCl mucoadhesive films at various %RH after 5 days (Cont.)

Formula	84%RH					94%RH				
	no.1	no.2	no.3	Mean	SD	no.1	no.2	no.3	Mean	SD
E15 1:1	19.01	19.67	16.17	18.28	1.86	37.75	37.16	46.88	40.59	5.45
E15 1:0.67	22.03	24.44	17.16	21.21	3.71	42.68	41.52	36.89	40.36	3.06
E15 1:0.5	18.11	22.57	15.11	18.60	3.75	43.72	38.46	34.24	38.81	4.75
E4M 1:1	16.17	22.05	18.07	18.76	3.00	40.62	45.45	43.62	43.23	2.44
E4M 1:0.67	15.66	20.73	17.68	18.02	2.56	38.95	37.39	45.11	40.49	4.08
E4M 1:0.5	18.50	17.58	17.74	17.94	0.49	38.87	42.44	40.34	40.55	1.80
HPC 1:1	15.47	12.88	14.70	14.35	1.33	31.34	33.33	28.14	30.94	2.62
HPC 1:0.67	11.55	14.90	16.00	14.15	2.32	26.71	26.63	37.31	30.22	6.15
HPC 1:0.5	13.20	13.44	13.03	13.22	0.20	27.27	31.07	30.03	29.46	1.96
CS 1:1	26.49	26.00	26.49	26.32	0.28	48.68	50.22	48.70	49.20	0.88
CS 1:0.67	22.67	24.50	24.02	23.73	0.95	47.89	50.79	43.97	47.55	3.42
CS 1:0.5	23.88	21.47	24.10	23.15	1.46	53.08	40.21	45.51	46.27	6.47
E15HPC 1:3	14.11	12.78	15.15	14.01	1.19	32.27	27.95	31.44	30.55	2.30
E15HPC 2:3	15.30	12.27	11.93	13.17	1.86	29.72	32.43	32.62	31.59	1.62
E15HPC 3:3	15.37	12.50	12.40	13.42	1.68	33.66	25.47	25.60	28.24	4.69
E15HPC 3:2	10.66	14.41	10.64	11.90	2.17	31.25	24.25	34.69	30.07	5.32
E15HPC 3:1	11.01	14.96	16.36	14.11	2.78	28.08	30.70	36.27	31.68	4.18

Table c6 Percentage of moisture sorption of lidocaine HCl mucoadhesive films at various %RH after 7 days

Formula	53%RH					75%RH				
	no.1	no.2	no.3	Mean	SD	no.1	no.2	no.3	Mean	SD
E15 1:1	3.31	2.51	1.40	2.41	0.96	12.82	11.37	11.58	11.92	0.79
E15 1:0.67	2.62	3.21	3.15	2.99	0.32	12.03	12.31	13.14	12.49	0.58
E15 1:0.5	3.03	2.05	2.03	2.37	0.57	12.64	12.64	12.34	12.54	0.17
E4M 1:1	2.62	2.48	3.67	2.93	0.65	12.37	11.01	14.20	12.53	1.60
E4M 1:0.67	2.50	3.39	2.77	2.89	0.46	10.62	14.33	13.38	12.77	1.93
E4M 1:0.5	2.51	2.81	2.95	2.76	0.23	10.70	13.86	14.42	13.00	2.00
HPC 1:1	2.90	2.67	2.62	2.73	0.15	10.05	9.39	9.76	9.73	0.33
HPC 1:0.67	2.61	2.45	1.97	2.34	0.34	9.52	11.41	6.15	9.03	2.67
HPC 1:0.5	2.65	2.27	2.25	2.39	0.22	8.38	5.07	7.49	6.98	1.72
CS 1:1	6.84	6.65	7.12	6.87	0.23	18.68	19.29	17.97	18.65	0.66
CS 1:0.67	6.34	6.80	6.57	6.57	0.23	18.73	18.15	18.04	18.31	0.37
CS 1:0.5	5.37	5.70	5.93	5.66	0.28	16.49	16.59	16.50	16.53	0.06
E15HPC 1:3	3.13	2.61	2.97	2.91	0.27	7.88	7.96	7.64	7.83	0.17
E15HPC 2:3	3.57	2.37	2.22	2.72	0.74	7.24	7.63	7.49	7.45	0.20
E15HPC 3:3	1.55	2.40	1.84	1.93	0.43	6.80	6.13	6.24	6.39	0.36
E15HPC 3:2	1.90	2.05	1.69	1.88	0.18	6.82	7.14	7.61	7.19	0.39
E15HPC 3:1	2.84	2.66	2.62	2.71	0.12	8.33	7.20	7.42	7.65	0.60

Table c6 Percentage of moisture sorption of lidocaine HCl mucoadhesive films at various %RH after 7 days (Cont.)

Formula	84%RH					94%RH				
	no.1	no.2	no.3	Mean	SD	no.1	no.2	no.3	Mean	SD
E15 1:1	21.09	23.23	23.18	22.50	1.22	43.01	41.80	43.75	42.86	0.98
E15 1:0.67	20.24	23.19	23.51	22.31	1.80	44.24	43.93	47.87	45.34	2.19
E15 1:0.5	20.83	20.15	22.52	21.17	1.22	39.79	40.39	38.18	39.45	1.15
E4M 1:1	20.92	21.00	22.90	21.61	1.12	37.30	45.45	42.78	41.85	4.16
E4M 1:0.67	19.81	17.31	24.15	20.42	3.46	44.19	38.96	40.26	41.14	2.72
E4M 1:0.5	16.19	21.10	22.60	19.96	3.36	42.32	39.19	35.59	39.03	3.37
HPC 1:1	17.05	15.07	17.00	16.37	1.13	43.61	36.76	38.80	39.72	3.52
HPC 1:0.67	16.75	16.05	17.02	16.61	0.50	37.09	44.62	37.15	39.62	4.33
HPC 1:0.5	16.67	15.31	15.69	15.89	0.70	37.34	39.32	38.24	38.30	0.99
CS 1:1	29.30	29.60	28.73	29.21	0.44	56.82	54.22	53.97	55.00	1.58
CS 1:0.67	27.63	27.23	24.63	26.50	1.63	54.37	54.56	45.91	51.61	4.94
CS 1:0.5	25.73	22.09	24.19	24.00	1.83	54.17	45.78	49.30	49.75	4.21
E15HPC 1:3	13.85	11.27	15.98	13.70	2.36	36.43	29.14	31.44	32.34	3.73
E15HPC 2:3	13.98	13.64	15.93	14.52	1.23	33.96	35.06	34.34	34.45	0.56
E15HPC 3:3	17.82	18.32	17.02	17.72	0.65	29.00	36.17	28.87	31.35	4.18
E15HPC 3:2	14.93	13.82	15.56	14.77	0.88	36.72	39.55	29.15	35.14	5.37
E15HPC 3:1	14.88	15.71	12.21	14.27	1.83	39.65	34.72	35.67	36.68	2.61

Table c7 Percentage swelling of lidocaine HCl mucoadhesive films at various %RH after 1 day.

Formula	53%RH					75%RH				
	no.1	no.2	no.3	Mean	SD	no.1	no.2	no.3	Mean	SD
E15 1:1	8.46	7.44	3.14	6.35	2.82	9.64	8.26	7.63	8.51	1.03
E15 1:0.67	4.49	5.77	6.12	5.46	0.86	8.33	8.55	6.73	7.87	0.99
E15 1:0.5	1.60	1.37	1.22	1.40	0.19	1.78	4.12	0.50	2.13	1.84
E4M 1:1	5.62	3.67	3.08	4.12	1.33	7.06	9.73	9.17	8.66	1.41
E4M 1:0.67	4.67	1.75	3.60	3.34	1.48	9.42	5.79	6.44	7.21	1.94
E4M 1:0.5	2.74	1.42	0.89	1.68	0.95	6.60	7.83	2.04	5.49	3.05
HPC 1:1	2.34	3.14	3.40	2.96	0.55	6.20	1.71	6.20	4.70	2.60
HPC 1:0.67	1.57	2.50	0.44	1.51	1.03	4.18	2.17	6.94	4.43	2.39
HPC 1:0.5	0.85	1.03	0.80	0.89	0.12	5.96	2.98	1.74	3.56	2.17
CS 1:1	3.52	4.97	5.67	4.72	1.09	9.37	3.34	6.43	6.38	3.01
CS 1:0.67	3.08	3.17	4.51	3.59	0.80	5.04	3.49	8.41	5.65	2.51
CS 1:0.5	1.66	0.69	0.46	0.93	0.63	5.82	3.33	6.55	5.23	1.69
E15HPC 1:3	0.36	0.36	0.81	0.51	0.26	6.58	3.09	3.07	4.25	2.02
E15HPC 2:3	0.00	0.38	1.19	0.52	0.61	6.56	7.41	4.96	6.31	1.24
E15HPC 3:3	2.96	3.96	0.49	2.47	1.79	2.15	4.29	2.20	2.88	1.22
E15HPC 3:2	0.85	1.28	2.46	1.53	0.84	3.59	3.81	5.23	4.21	0.89
E15HPC 3:1	6.32	4.75	1.18	4.08	2.63	6.90	5.76	2.70	5.12	2.17

Table c7 Percentage swelling of lidocaine HCl mucoadhesive films at various %RH after 1 day (Cont.)

Formula	84%RH					94%RH				
	no.1	no.2	no.3	Mean	SD	no.1	no.2	no.3	Mean	SD
E15 1:1	6.94	9.36	10.30	8.87	1.74	25.13	19.68	19.49	21.43	3.20
E15 1:0.67	13.16	6.50	5.08	8.25	4.31	21.88	17.55	20.16	19.86	2.18
E15 1:0.5	12.87	5.71	4.88	7.82	4.39	16.79	19.39	19.27	18.49	1.47
E4M 1:1	11.91	8.07	9.22	9.73	1.97	13.39	18.07	19.01	16.82	3.01
E4M 1:0.67	7.27	7.45	9.22	7.98	1.08	10.94	16.67	15.35	14.32	3.00
E4M 1:0.5	6.91	6.44	5.56	6.30	0.69	12.24	13.66	14.29	13.40	1.05
HPC 1:1	7.53	3.47	9.70	6.90	3.16	19.10	23.84	18.25	20.40	3.01
HPC 1:0.67	9.22	1.90	4.96	5.36	3.68	11.26	16.60	18.66	15.50	3.82
HPC 1:0.5	5.53	4.24	2.70	4.16	1.42	10.70	10.53	8.77	10.00	1.07
CS 1:1	7.21	7.38	6.93	7.17	0.23	14.12	11.96	15.48	13.86	1.77
CS 1:0.67	4.15	7.97	5.86	5.99	1.92	8.07	13.87	18.16	13.37	5.06
CS 1:0.5	6.24	6.62	5.03	5.96	0.83	22.18	9.57	5.29	12.35	8.78
E15HPC 1:3	5.84	7.83	3.56	5.74	2.14	15.22	7.58	9.38	10.72	3.99
E15HPC 2:3	7.64	7.30	2.55	5.83	2.85	11.61	10.62	10.10	10.78	0.77
E15HPC 3:3	3.12	3.85	6.27	4.41	1.65	5.63	9.24	8.36	7.75	1.89
E15HPC 3:2	3.05	3.97	6.81	4.61	1.96	16.60	12.20	10.25	13.01	3.26
E15HPC 3:1	9.52	9.03	8.42	8.99	0.55	23.64	23.20	15.00	20.61	4.87

Table c8 Percentage swelling of lidocaine HCl mucoadhesive films at various %RH after 3 days

Formula	53%RH					75%RH				
	no.1	no.2	no.3	Mean	SD	no.1	no.2	no.3	Mean	SD
E15 1:1	8.96	8.09	3.14	6.73	3.14	11.29	10.70	12.21	11.40	0.76
E15 1:0.67	4.90	6.73	5.31	5.64	0.96	8.33	8.55	11.54	9.47	1.79
E15 1:0.5	7.99	5.48	2.04	5.17	2.99	8.28	12.37	5.47	8.71	3.47
E4M 1:1	3.37	5.31	5.38	4.69	1.14	12.16	10.62	9.17	10.65	1.49
E4M 1:0.67	7.01	2.63	2.70	4.11	2.51	7.17	8.26	9.87	8.44	1.36
E4M 1:0.5	4.11	4.27	3.54	3.97	0.38	8.62	10.14	4.08	7.61	3.15
HPC 1:1	5.08	6.29	4.76	5.38	0.81	6.20	5.12	7.75	6.36	1.32
HPC 1:0.67	3.15	4.17	1.32	2.88	1.44	7.22	4.35	6.94	6.17	1.58
HPC 1:0.5	2.13	2.41	1.60	2.04	0.41	7.34	5.53	3.48	5.45	1.93
CS 1:1	7.05	8.95	3.00	6.33	3.04	13.80	6.35	6.43	8.86	4.28
CS 1:0.67	3.66	4.02	4.99	4.22	0.69	6.93	9.17	7.94	8.02	1.12
CS 1:0.5	2.10	1.60	0.93	1.54	0.59	5.82	5.24	10.04	7.03	2.62
E15HPC 1:3	0.00	1.09	1.21	0.77	0.67	7.89	2.41	4.91	5.07	2.75
E15HPC 2:3	0.35	0.38	1.98	0.90	0.93	7.54	8.89	4.96	7.13	2.00
E15HPC 3:3	8.89	0.42	2.44	3.92	4.42	7.30	7.86	3.96	6.37	2.10
E15HPC 3:2	10.58	1.69	3.83	5.37	4.64	7.62	8.10	7.32	7.68	0.39
E15HPC 3:1	8.07	8.31	4.77	7.05	1.98	11.11	8.63	10.42	10.06	1.28

Table c8 Percentage swelling of lidocaine HCl mucoadhesive films at various %RH after 3 days (Cont.)

Formula	84%RH					94%RH				
	no.1	no.2	no.3	Mean	SD	no.1	no.2	no.3	Mean	SD
E15 1:1	11.02	6.37	17.58	11.65	5.63	26.13	18.07	17.57	20.59	4.80
E15 1:0.67	7.02	15.45	7.63	10.03	4.70	15.18	21.22	21.77	19.39	3.66
E15 1:0.5	10.89	10.48	7.32	9.56	1.95	14.50	23.19	19.27	18.99	4.35
E4M 1:1	11.90	8.07	12.77	10.91	2.50	14.44	20.08	24.79	19.77	5.18
E4M 1:0.67	10.00	10.59	9.22	9.94	0.69	13.28	19.05	19.50	17.28	3.47
E4M 1:0.5	9.68	10.73	8.73	9.71	1.00	11.22	15.42	20.74	15.79	4.77
HPC 1:1	8.37	10.04	8.96	9.12	0.85	19.10	27.40	19.05	21.85	4.81
HPC 1:0.67	12.77	5.70	8.26	8.91	3.58	8.44	20.24	20.57	16.42	6.91
HPC 1:0.5	13.19	6.78	6.31	8.76	3.85	11.63	11.40	13.16	12.06	0.95
CS 1:1	10.97	17.71	17.41	15.37	3.81	24.05	12.56	26.41	21.00	7.41
CS 1:0.67	7.68	9.34	14.53	10.52	3.58	8.70	15.57	19.61	14.63	5.51
CS 1:0.5	14.69	12.30	7.54	11.51	3.64	23.35	9.98	6.61	13.31	8.85
E15HPC 1:3	8.76	14.78	5.14	9.56	4.87	14.86	9.75	10.16	11.59	2.84
E15HPC 2:3	8.36	8.39	4.73	7.16	2.11	11.61	11.36	11.40	11.46	0.14
E15HPC 3:3	6.80	7.14	10.89	8.28	2.27	3.90	11.34	12.00	9.08	4.50
E15HPC 3:2	6.44	6.35	13.98	8.92	4.38	16.23	14.15	9.84	13.40	3.26
E15HPC 3:1	7.36	10.42	10.62	9.47	1.83	21.71	24.74	18.13	21.52	3.31

Table c9 Percentage swelling of lidocaine HCl mucoadhesive films at various %RH after 5 days

Formula	53%RH					75%RH				
	no.1	no.2	no.3	Mean	SD	no.1	no.2	no.3	Mean	SD
E15 1:1	9.45	8.74	5.03	7.74	2.37	17.36	20.49	19.47	19.10	1.60
E15 1:0.67	6.53	9.13	6.12	7.26	1.63	13.54	17.52	20.67	17.25	3.57
E15 1:0.5	6.71	10.96	3.27	6.98	3.85	11.83	22.68	15.42	16.65	5.53
E4M 1:1	8.99	13.33	7.69	10.00	2.95	9.80	13.27	13.30	12.13	2.01
E4M 1:0.67	11.68	10.09	6.76	9.51	2.51	15.25	12.81	9.44	12.50	2.91
E4M 1:0.5	5.48	9.00	8.85	7.78	1.99	14.15	17.05	4.08	11.76	6.81
HPC 1:1	6.25	3.77	9.52	6.52	2.88	10.85	13.99	10.08	11.64	2.07
HPC 1:0.67	9.45	4.17	0.44	4.69	4.53	14.07	8.70	11.02	11.26	2.69
HPC 1:0.5	2.98	6.53	3.20	4.24	1.99	11.49	7.83	14.04	11.12	3.12
CS 1:1	5.03	10.14	4.67	6.61	3.06	12.36	14.15	14.05	13.52	1.00
CS 1:0.67	5.01	2.54	4.04	3.86	1.25	9.24	10.92	8.18	9.45	1.38
CS 1:0.5	0.93	6.87	1.62	3.14	3.24	9.52	5.24	12.66	9.14	3.73
E15HPC 1:3	2.85	0.36	1.61	1.61	1.24	14.14	1.72	5.83	7.23	6.33
E15HPC 2:3	4.21	3.45	3.56	3.74	0.41	10.49	15.19	13.64	13.10	2.39
E15HPC 3:3	14.81	0.42	5.37	6.87	7.31	7.73	10.00	7.15	8.29	1.51
E15HPC 3:2	12.98	3.81	9.36	8.72	4.62	11.66	13.33	12.20	12.40	0.85
E15HPC 3:1	7.37	9.55	6.21	7.71	1.69	11.88	8.27	10.81	10.32	1.85

Table c9 Percentage swelling of lidocaine HCl mucoadhesive films at various %RH after 5 days (Cont.)

Formula	84%RH					94%RH				
	no.1	no.2	no.3	Mean	SD	no.1	no.2	no.3	Mean	SD
E15 1:1	20.00	13.84	24.85	19.56	5.52	17.59	18.88	23.96	20.14	3.37
E15 1:0.67	13.16	17.07	21.93	17.39	4.39	16.07	23.27	19.35	19.56	3.60
E15 1:0.5	20.79	12.38	18.29	17.16	4.32	19.47	16.73	17.82	18.00	1.38
E4M 1:1	14.29	11.58	16.31	14.06	2.37	17.33	16.87	27.69	20.63	6.12
E4M 1:0.67	12.73	15.29	11.35	13.12	2.00	26.36	23.65	9.13	19.71	9.27
E4M 1:0.5	17.97	9.01	11.11	12.70	4.69	19.90	12.78	29.95	20.88	8.63
HPC 1:1	16.32	9.65	12.69	12.89	3.34	23.60	25.98	10.32	19.96	8.44
HPC 1:0.67	14.54	10.33	9.51	11.46	2.70	8.87	27.13	25.84	20.61	10.19
HPC 1:0.5	19.15	7.63	10.81	12.53	5.95	11.63	17.54	9.65	12.94	4.11
CS 1:1	16.77	18.63	16.64	17.35	1.12	23.66	29.69	34.43	29.26	5.39
CS 1:0.67	9.54	12.98	17.14	13.22	3.80	13.80	25.06	26.39	21.75	6.92
CS 1:0.5	13.48	9.78	12.56	11.94	1.93	33.20	16.50	14.76	21.48	10.18
E15HPC 1:3	8.76	13.91	5.14	9.27	4.41	22.46	15.52	16.41	18.13	3.78
E15HPC 2:3	6.55	9.12	1.45	5.71	3.90	10.86	12.82	12.70	12.13	1.10
E15HPC 3:3	11.90	7.97	17.82	12.56	4.96	8.66	16.39	14.91	13.32	4.10
E15HPC 3:2	7.80	10.32	17.56	11.89	5.07	15.47	19.51	15.57	16.85	2.30
E15HPC 3:1	18.61	5.90	9.89	11.47	6.50	21.71	30.93	25.00	25.88	4.67

Table c10 Percentage swelling of lidocaine HCl mucoadhesive films at various %RH after 7 days

Formula	53%RH					75%RH				
	no.1	no.2	no.3	Mean	SD	no.1	no.2	no.3	Mean	SD
E15 1:1	14.43	19.74	6.29	13.49	6.78	20.66	27.22	23.45	23.77	3.29
E15 1:0.67	8.16	12.98	9.39	10.18	2.50	22.92	13.68	19.35	18.65	4.66
E15 1:0.5	7.99	8.22	8.57	8.26	0.29	18.34	15.92	17.47	17.25	1.23
E4M 1:1	12.65	20.77	9.36	14.26	5.87	12.94	17.43	21.40	17.26	4.23
E4M 1:0.67	13.08	10.81	18.61	14.17	4.01	16.59	14.88	16.83	16.10	1.07
E4M 1:0.5	16.00	15.17	10.62	13.93	2.90	17.97	10.20	9.09	12.42	4.84
HPC 1:1	5.86	10.65	15.69	10.73	4.92	15.50	19.38	19.39	18.09	2.24
HPC 1:0.67	10.24	7.50	4.85	7.53	2.69	20.15	15.22	21.63	19.00	3.36
HPC 1:0.5	2.55	13.75	4.62	6.97	5.96	20.00	19.13	22.55	20.56	1.78
CS 1:1	9.06	6.67	4.87	6.87	2.10	17.56	13.99	13.27	14.94	2.30
CS 1:0.67	8.29	4.51	7.52	6.77	1.99	11.76	12.88	10.79	11.81	1.05
CS 1:0.5	5.83	8.92	3.70	6.15	2.63	11.64	9.05	10.57	10.42	1.30
E15HPC 1:3	5.34	4.84	5.06	5.08	0.25	18.42	16.56	16.54	17.18	1.08
E15HPC 2:3	3.83	4.53	3.95	4.10	0.37	15.08	17.41	22.73	18.41	3.92
E15HPC 3:3	7.32	4.64	2.49	4.82	2.42	12.45	14.54	14.73	13.90	1.27
E15HPC 3:2	6.73	6.38	5.91	6.34	0.41	20.63	22.86	14.29	19.26	4.45
E15HPC 3:1	5.96	9.90	7.40	7.76	1.99	18.71	17.37	16.49	17.52	1.12

Table c10 Percentage swelling of lidocaine HCl mucoadhesive films at various %RH after 7 days (Cont.)

Formula	84%RH					94%RH				
	no.1	no.2	no.3	Mean	SD	no.1	no.2	no.3	Mean	SD
E15 1:1	13.82	32.12	18.60	21.51	9.49	26.63	25.30	23.16	25.03	1.75
E15 1:0.67	15.35	16.10	27.27	19.58	6.68	23.21	19.76	23.53	22.17	2.09
E15 1:0.5	18.81	14.16	22.30	18.42	4.09	18.32	20.00	19.31	19.21	0.84
E4M 1:1	16.67	18.43	17.55	17.55	0.88	29.32	26.86	26.10	27.43	1.68
E4M 1:0.67	16.36	16.86	16.15	16.46	0.36	23.41	24.48	21.71	23.20	1.40
E4M 1:0.5	11.52	17.60	10.04	13.05	4.00	20.41	17.51	28.37	22.10	5.62
HPC 1:1	20.08	23.55	19.40	21.01	2.23	25.47	27.40	28.83	27.23	1.69
HPC 1:0.67	19.86	15.59	30.58	22.01	7.72	24.29	24.88	24.47	24.55	0.30
HPC 1:0.5	26.81	13.56	16.22	18.86	7.01	24.19	25.44	18.14	22.59	3.90
CS 1:1	37.46	18.95	18.88	25.10	10.71	33.97	28.21	38.43	33.54	5.12
CS 1:0.67	12.30	15.18	14.48	13.99	1.50	21.65	25.42	21.94	23.01	2.10
CS 1:0.5	21.73	30.91	16.70	23.12	7.21	22.18	18.06	27.27	22.50	4.61
E15HPC 1:3	11.31	7.51	5.38	8.07	3.00	26.09	18.77	20.70	21.85	3.79
E15HPC 2:3	7.27	9.12	5.88	7.43	1.63	21.25	19.54	21.61	20.80	1.10
E15HPC 3:3	9.57	15.38	9.57	11.51	3.36	20.17	22.18	23.95	22.10	1.89
E15HPC 3:2	9.15	22.68	10.29	14.04	7.50	20.49	19.26	22.27	20.68	1.51
E15HPC 3:1	10.82	9.89	20.53	13.75	5.89	38.08	35.94	38.05	37.36	1.23

Table c11 Detachment force of lidocaine HCl mucoadhesive films

Formula	Detachment force (N/cm ²)										Mean	SD
	no.1	no.2	no.3	no.4	no.5	no.6	no.7	no.8	no.9	no.10		
E15 1:1	7.271	6.789	7.027	5.712	9.145	9.177	9.135	8.817	7.621	6.508	7.720	1.266
E15 1:0.67	6.025	7.865	8.669	8.617	6.010	7.516	6.616	6.608	7.011	6.970	7.191	0.959
E15 1:0.5	8.840	5.305	7.914	7.686	7.241	5.935	8.736	5.768	6.580	5.473	6.948	1.324
E4M 1:1	3.207	4.312	4.875	3.662	4.922	5.117	4.867	3.420	4.653	5.620	4.466	0.794
E4M 1:0.67	4.551	4.178	4.888	4.347	4.903	4.881	3.503	3.318	3.859	3.912	4.234	0.580
E4M 1:0.5	3.913	3.227	4.101	3.390	4.443	3.088	4.473	4.412	4.217	3.416	3.868	0.540
E4M 2:1	5.447	6.320	6.382	5.502	6.162	4.039	6.411	6.351	6.022	5.986	5.862	0.729
HPC 1:1	3.006	2.160	3.460	2.648	3.064	2.564	3.766	3.288	3.681	2.540	3.018	0.535
HPC 1:0.67	3.174	2.555	3.859	3.023	3.510	3.008	2.743	2.475	2.224	3.130	2.970	0.492
HPC 1:0.5	2.155	2.744	3.150	3.429	3.484	2.904	2.531	2.827	3.149	2.602	2.898	0.416
CS 1:1	4.560	4.182	4.237	3.915	4.746	4.912	3.809	4.849	3.677	3.986	4.287	0.452
CS 1:0.67	2.189	2.775	4.168	2.948	2.498	3.195	3.164	2.855	2.386	3.064	2.924	0.551
CS 1:0.5	1.966	3.278	3.436	2.216	2.411	2.595	2.300	2.287	2.549	2.970	2.601	0.480
E15HPC 1:3	2.972	3.382	3.890	3.703	3.081	3.598	3.208	2.611	3.412	3.209	3.307	0.375
E15HPC 2:3	4.687	3.622	4.037	3.445	2.664	5.853	4.692	3.840	4.437	4.951	4.223	0.897
E15HPC 3:3	5.031	4.897	4.145	5.286	4.179	3.937	4.165	4.468	4.620	4.824	4.555	0.448
E15HPC 3:2	5.441	3.788	5.103	6.494	5.002	5.872	5.269	5.749	5.954	5.199	5.387	0.727
E15HPC 3:1	5.038	6.263	5.715	5.191	7.043	7.996	7.172	6.135	6.235	5.348	6.214	0.956

Table c12 Tensile properties of lidocaine HCl mucoadhesive films

Formula	Sample no.	%Strain at auto break (%)	Young's modulus (Mpa)	Stress at ultimate (Mpa)
E15 1:1	1	179.504	181.080	30.668
	2	180.668	152.650	32.296
	3	188.002	166.328	33.168
	4	185.341	164.933	29.058
	5	172.003	164.280	29.690
	6	177.500	157.784	33.261
	Mean	180.503	164.509	31.357
	SD	5.691	9.633	1.807
E15 1:0.67	1	142.673	105.737	22.139
	2	146.503	94.526	22.795
	3	160.835	87.285	22.880
	4	161.014	92.252	20.555
	5	159.503	107.138	20.084
	6	163.338	94.550	19.708
	Mean	155.644	96.915	21.360
	SD	8.737	7.850	1.413
E15 1:0.5	1	139.171	20.308	6.145
	2	128.528	17.637	5.970
	3	138.005	13.168	5.701
	4	140.338	18.726	5.881
	5	142.172	10.579	5.634
	6	142.668	18.070	5.575
	Mean	138.480	16.415	5.818
	SD	5.184	3.724	0.219

Table c12 Tensile properties of lidocaine HCl mucoadhesive films (Cont.)

Formula	Sample no.	%Strain at auto break (%)	Young's modulus (Mpa)	Stress at ultimate (Mpa)
E4M 1:1*	1	18.497	295.402	33.770
	2	20.667	305.897	33.733
	3	17.999	326.197	33.299
	4	17.328	322.036	35.677
	5	16.627	298.108	33.323
	6	19.005	325.491	32.196
	Mean	18.354	312.189	33.666
	SD	1.411	14.070	1.138
E4M 1:0.67	1	94.339	188.856	27.417
	2	105.674	173.626	29.079
	3	110.833	138.300	31.979
	4	108.517	271.046	32.477
	5	107.837	183.339	29.131
	6	102.442	175.426	30.089
	Mean	104.940	188.432	30.029
	SD	5.917	44.165	1.915
E4M 1:0.5	1	183.671	80.372	17.212
	2	202.330	95.005	19.729
	3	196.677	93.117	17.190
	4	157.842	106.672	21.491
	5	176.331	95.744	20.227
	6	161.342	91.586	19.474
	Mean	179.699	93.749	19.221
	SD	18.123	8.445	1.712
E4M 2:1	1	121.200	122.400	21.870
	2	120.000	114.800	21.010
	3	130.300	117.500	20.370
	4	124.300	122.600	22.210
	5	128.800	101.300	19.150
	6	127.500	102.200	21.920
	Mean	125.350	113.467	21.088
	SD	4.195	9.552	1.170

Table c12 Tensile properties of lidocaine HCl mucoadhesive films (Cont.)

Formula	Sample no.	%Strain at auto break (%)	Young's modulus (Mpa)	Stress at ultimate (Mpa)
HPC 1:1	1	178.666	5.159	5.273
	2	179.661	4.768	4.458
	3	200.504	4.364	4.737
	4	187.839	5.090	4.353
	5	176.165	4.485	4.049
	6	178.666	6.035	5.515
	Mean	183.584	4.984	4.731
	SD	9.200	0.604	0.564
HPC 1:0.67	1	338.341	6.702	11.979
	2	266.337	8.145	15.133
	3	252.671	11.589	13.316
	4	198.672	7.434	9.155
	5	189.837	5.522	10.764
	6	172.508	9.201	10.019
	Mean	236.394	8.099	11.728
	SD	62.011	2.118	2.220
HPC 1:0.5	1	139.502	8.086	6.508
	2	160.672	5.649	5.880
	3	158.502	8.139	6.553
	4	229.676	9.339	9.218
	5	166.663	4.596	4.885
	6	155.506	10.125	6.825
	Mean	168.420	7.656	6.645
	SD	31.359	2.133	1.440

Table c12 Tensile properties of lidocaine HCl mucoadhesive films (Cont.)

Formula	Sample no.	%Strain at auto break (%)	Young's modulus (Mpa)	Stress at ultimate (Mpa)
CS 1:1	1	16.010	228.200	18.840
	2	14.000	232.700	18.820
	3	12.000	207.200	18.350
	4	15.000	300.600	17.620
	5	14.170	236.600	18.850
	6	9.840	287.500	19.590
	Mean	13.503	248.800	18.678
	SD	2.231	36.726	0.653
CS 1:0.67	1	12.510	310.900	20.400
	2	13.010	287.500	18.530
	3	15.670	273.900	19.720
	4	13.500	295.500	20.200
	5	15.670	294.300	21.510
	6	13.010	305.000	20.260
	Mean	13.895	294.517	20.103
	SD	1.410	13.066	0.972
CS 1:0.5	1	5.164	222.400	8.099
	2	6.994	218.300	8.920
	3	5.839	216.500	8.609
	4	7.331	197.200	7.991
	5	5.499	235.500	8.659
	6	5.161	220.500	8.148
	Mean	5.998	218.400	8.404
	SD	0.942	12.376	0.375

Table c12 Tensile properties of lidocaine HCl mucoadhesive films (Cont.)

Formula	Sample no.	%Strain at auto break (%)	Young's modulus (Mpa)	Stress at ultimate (Mpa)
E15HPC 1:3	1	133.502	9.847	5.954
	2	158.833	11.302	7.510
	3	148.838	11.049	7.226
	4	138.170	10.783	7.345
	5	160.839	9.562	6.555
	6	174.331	9.714	7.458
	Mean	152.419	10.376	7.008
	SD	15.270	0.756	0.622
E15HPC 2:3	1	133.498	28.747	7.573
	2	134.012	26.489	8.007
	3	126.835	21.399	6.998
	4	131.833	31.192	7.608
	5	133.002	29.444	7.614
	6	123.343	25.050	5.625
	Mean	130.421	27.054	7.238
	SD	4.335	3.522	0.853
E15HPC 3:3	1	70.997	94.920	11.460
	2	70.673	87.789	11.144
	3	53.508	83.966	10.985
	4	71.672	102.283	10.867
	5	65.840	102.523	10.944
	6	52.842	81.653	10.865
	Mean	64.255	92.189	11.044
	SD	8.831	9.101	0.228

Table c12 Tensile properties of lidocaine HCl mucoadhesive films (Cont.)

Formula	Sample no.	%Strain at auto break (%)	Young's modulus (Mpa)	Stress at ultimate (Mpa)
E15HPC 3:2	1	66.177	124.369	12.982
	2	60.164	113.062	12.799
	3	58.509	163.466	12.922
	4	55.335	150.743	12.013
	5	64.168	160.530	12.659
	6	63.505	120.949	13.971
	Mean	61.310	138.853	12.891
	SD	4.038	21.966	0.634
E15HPC 3:1	1	52.348	131.638	17.407
	2	67.174	163.638	19.384
	3	55.007	134.472	17.223
	4	60.841	183.520	20.639
	5	55.512	190.688	18.416
	6	66.333	197.411	16.690
	Mean	59.536	166.895	18.293
	SD	6.239	28.561	1.497

Table c13 Penetration of lidocaine HCl through dialysis membrane

Formula	time (min)	%penetrate					Cumulative amount (mg/cm ²)				
		1	2	3	Mean	SD	1	2	3	Mean	SD
Saturated solution	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5	2.61	2.79	2.84	2.75	0.12	1.15	1.23	1.25	1.21	0.05
	10	5.69	5.76	5.92	5.79	0.12	2.51	2.54	2.61	2.55	0.05
	20	11.50	11.68	11.50	11.56	0.10	5.06	5.14	5.07	5.09	0.04
	45	23.82	25.29	24.25	24.45	0.76	10.49	11.14	10.68	10.77	0.33
	60	31.16	32.04	30.87	31.36	0.61	13.72	14.11	13.60	13.81	0.27
	120	56.52	57.03	53.47	55.67	1.93	24.89	25.12	23.55	24.52	0.85
	180	65.36	67.30	62.70	65.12	2.31	28.78	29.64	27.61	28.68	1.02
E15 1:1	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5	20.60	18.57	19.67	19.61	1.02	1.86	1.68	1.78	1.77	0.09
	10	33.76	31.97	34.77	33.50	1.42	3.05	2.89	3.14	3.03	0.13
	20	51.91	49.70	51.25	50.95	1.13	4.69	4.49	4.63	4.60	0.10
	30	62.39	58.95	62.29	61.21	1.96	5.63	5.32	5.63	5.53	0.18
	45	73.60	70.48	72.37	72.15	1.57	6.65	6.36	6.54	6.52	0.15
	60	80.74	76.52	77.23	78.16	2.26	7.29	6.91	6.97	7.06	0.20
	90	89.55	84.81	86.56	86.97	2.40	8.09	7.66	7.82	7.86	0.22
	120	93.58	92.25	90.95	92.26	1.32	8.45	8.33	8.21	8.33	0.12
180	98.02	98.84	95.87	97.58	1.53	8.85	8.93	8.66	8.81	0.14	
E15 1:0.67	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5	16.19	19.36	17.85	17.80	1.59	1.46	1.75	1.61	1.61	0.15
	10	29.19	34.86	33.21	32.42	2.92	2.64	3.15	3.00	2.93	0.26
	20	46.30	54.15	51.88	50.78	4.04	4.09	4.89	4.69	4.56	0.42
	45	70.52	71.30	71.95	71.26	0.72	6.37	6.44	6.50	6.44	0.07
	60	78.30	77.59	79.46	78.45	0.94	7.07	7.01	7.18	7.09	0.09
	120	92.36	91.05	93.46	92.29	1.21	8.34	8.22	8.44	8.33	0.11
	180	96.60	96.51	98.55	97.22	1.15	8.72	8.72	8.90	8.78	0.10
E15 1:0.5	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5	17.07	16.31	16.51	16.63	0.39	1.54	1.47	1.49	1.50	0.04
	10	28.49	28.97	28.95	28.80	0.27	2.57	2.62	2.61	2.60	0.03
	20	44.27	45.49	46.28	45.35	1.01	4.00	4.11	4.18	4.10	0.09
	45	67.66	67.50	70.48	68.55	1.68	6.11	6.10	6.37	6.19	0.15
	60	76.02	73.91	78.25	76.06	2.17	6.87	6.68	7.07	6.87	0.20
	120	92.81	88.52	93.31	91.55	2.63	8.38	7.99	8.43	8.27	0.24
	180	97.75	95.46	98.06	97.09	1.42	8.83	8.62	8.86	8.77	0.13
E4M 1:1	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5	16.31	15.24	13.63	15.06	1.35	1.48	1.38	1.23	1.36	0.13
	10	26.23	32.09	25.58	27.97	3.59	2.37	2.90	3.21	2.83	0.42
	20	43.06	46.34	40.81	43.40	2.78	3.89	4.18	3.69	3.92	0.25
	30	51.38	57.17	51.64	53.40	3.27	4.64	5.16	4.16	4.65	0.50
	45	65.57	66.53	65.20	65.77	0.69	5.92	6.01	5.89	5.94	0.06
	60	74.33	76.18	73.61	74.71	1.33	6.71	6.88	6.65	6.75	0.12
	90	83.83	85.77	83.57	84.39	1.20	7.57	7.75	7.62	7.65	0.09
	120	89.16	93.38	91.58	91.37	2.12	8.05	8.43	8.27	8.25	0.19
180	99.93	97.80	97.61	98.45	1.29	9.03	8.83	8.82	8.89	0.12	

Table c13 Penetration of lidocaine HCl through dialysis membrane (Cont.)

Formula	time (min)	%penetrate					Cumulative amount (mg/cm ²)				
		1	2	3	Mean	SD	1	2	3	Mean	SD
E4M 1:0.67	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5	17.87	17.96	18.78	18.20	0.50	1.16	1.62	1.70	1.49	0.29
	10	28.30	29.16	30.83	29.43	1.29	2.56	2.63	2.78	2.66	0.11
	20	44.29	43.69	47.83	45.27	2.24	4.00	3.95	4.32	4.09	0.20
	30	54.12	54.03	59.00	55.72	2.84	4.89	4.88	5.33	5.03	0.26
	45	65.07	65.44	70.34	66.95	2.94	5.88	5.91	6.35	6.05	0.26
	60	72.91	73.37	78.22	74.83	2.94	6.58	6.63	7.06	6.76	0.26
	90	83.79	84.39	80.09	82.76	2.33	7.57	7.62	7.96	7.72	0.21
	120	90.45	91.48	93.06	91.66	1.31	8.17	8.26	8.40	8.28	0.12
	180	97.03	98.78	97.63	97.81	0.89	8.76	8.92	8.82	8.83	0.08
E4M 1:0.5	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5	20.93	19.16	18.37	19.49	1.31	1.89	1.73	1.66	1.76	0.12
	10	34.24	32.64	28.93	31.94	2.72	3.09	2.95	2.61	2.88	0.25
	20	52.67	50.91	42.50	48.69	5.44	4.76	4.60	3.84	4.40	0.49
	30	64.21	62.53	55.31	60.68	4.73	5.80	5.65	5.00	5.48	0.43
	45	75.48	73.10	65.18	71.25	5.39	6.82	6.60	5.89	6.44	0.49
	60	82.32	80.46	73.15	78.64	4.85	7.43	7.27	6.61	7.10	0.43
	90	89.53	88.88	83.19	87.20	3.49	8.09	8.03	7.51	7.88	0.32
	120	93.07	93.60	90.16	92.28	1.85	8.41	8.45	8.14	8.33	0.17
	180	99.68	97.68	97.17	98.18	1.33	9.00	8.82	8.78	8.87	0.12
E4M 2:1	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5	14.04	12.94	14.07	13.68	0.64	2.54	2.34	2.54	2.47	0.12
	10	26.92	23.85	26.50	25.76	1.66	4.86	4.31	4.79	4.65	0.30
	20	42.40	40.58	43.78	42.25	1.61	7.66	7.33	7.91	7.63	0.29
	45	64.61	65.20	67.37	65.73	1.45	11.67	11.78	12.17	11.87	0.26
	60	73.20	73.64	76.17	74.34	1.60	13.22	13.30	13.76	13.43	0.29
	120	90.28	91.15	91.57	91.00	0.66	16.31	16.46	16.54	16.44	0.12
	180	96.46	96.42	96.13	96.34	0.18	17.42	17.42	17.36	17.40	0.03
	HPC 1:1	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5		18.08	19.87	20.61	19.52	1.30	1.63	1.79	1.86	1.76	0.12
10		31.25	32.96	35.38	33.20	2.08	2.82	2.98	3.19	3.00	0.19
20		50.65	52.24	54.12	52.39	2.45	4.57	4.72	4.89	4.73	0.16
45		74.72	77.06	78.38	76.72	1.85	6.75	6.96	7.08	6.93	0.17
60		81.98	83.96	85.70	83.88	1.86	7.40	7.58	7.74	7.57	0.17
120		94.89	95.55	97.67	96.04	1.45	8.57	8.63	8.82	8.67	0.13
180		98.12	98.65	100.42	99.06	1.20	8.86	8.91	9.07	8.95	0.11
HPC 1:0.67	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5	21.55	21.45	21.54	21.51	0.06	1.95	1.94	1.95	1.95	0.01
	10	35.89	35.69	35.07	35.55	0.43	3.24	3.22	3.22	3.23	0.01
	20	54.13	54.87	54.14	54.38	0.42	4.89	4.96	4.89	4.91	0.04
	45	77.68	80.06	78.01	78.58	1.29	7.02	7.23	7.04	7.10	0.12
	60	84.78	87.07	85.20	85.68	1.22	7.66	7.86	7.69	7.74	0.11
	120	94.84	94.97	96.97	95.59	1.19	8.56	8.58	8.76	8.63	0.11
	180	97.44	97.92	98.41	97.92	0.49	8.80	8.84	8.89	8.84	0.05

Table c13 Penetration of lidocaine HCl through dialysis membrane (Cont.)

Formula	time (min)	%penetrate					Cumulative amount (mg/cm ²)				
		1	2	3	Mean	SD	1	2	3	Mean	SD
HPC 1:0.5	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5	20.73	20.34	20.26	20.44	0.25	1.87	1.84	1.83	1.85	0.02
	10	35.14	35.09	36.05	35.43	0.54	3.17	3.17	3.26	3.20	0.05
	20	54.52	52.93	54.11	53.85	0.83	4.92	4.78	4.89	4.86	0.07
	45	80.68	79.87	81.18	80.58	0.66	7.29	7.21	7.33	7.28	0.06
	60	87.45	86.86	88.09	87.47	0.62	7.90	7.84	7.96	7.90	0.06
	120	97.24	96.45	98.35	97.35	0.95	8.78	8.71	8.88	8.79	0.09
	180	98.54	97.31	98.90	98.25	0.83	8.90	8.79	8.93	8.87	0.07
CS 1:1	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5	10.03	9.22	8.68	9.31	0.68	0.91	0.83	0.78	0.84	0.07
	10	18.77	17.27	17.48	17.84	0.81	1.70	1.56	1.58	1.61	0.08
	20	32.18	29.02	31.75	30.98	1.71	2.91	2.62	2.87	2.80	0.16
	45	56.01	49.08	56.60	53.90	4.18	5.06	4.43	5.11	4.87	0.38
	60	64.22	57.26	64.73	62.07	4.17	5.80	5.17	5.85	5.61	0.38
	120	82.29	77.83	82.44	80.85	2.62	7.43	7.03	7.45	7.30	0.24
	180	88.54	87.47	89.20	88.40	0.87	8.00	7.90	8.06	7.99	0.08
CS 1:0.67	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5	10.75	10.68	10.53	10.65	0.11	0.97	0.96	0.95	0.96	0.01
	10	20.44	20.65	20.69	20.59	0.13	1.85	1.87	1.87	1.86	0.01
	20	34.40	33.48	34.27	34.05	0.50	3.11	3.02	3.10	3.08	0.05
	45	57.97	57.39	57.17	57.51	0.41	5.24	5.18	5.16	5.19	0.04
	60	66.33	65.78	66.22	66.11	0.29	5.99	5.94	5.98	5.97	0.03
	120	85.81	87.40	85.25	86.15	1.12	7.75	7.89	7.70	7.78	0.10
	180	91.94	93.11	91.02	92.02	1.05	8.30	8.41	8.22	8.31	0.10
CS 1:0.5	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5	11.06	12.60	11.84	11.83	0.77	1.00	1.14	1.07	1.07	0.07
	10	20.83	23.37	22.07	22.09	1.27	1.88	2.11	1.99	1.99	0.12
	20	35.46	39.57	38.22	37.75	2.09	3.20	3.57	3.45	3.41	0.19
	45	60.16	64.91	62.48	62.52	2.38	5.43	5.86	5.64	5.64	0.22
	60	68.15	72.96	70.63	70.58	2.41	6.16	6.59	6.38	6.38	0.22
	120	85.43	87.76	85.90	85.67	0.33	7.72	7.93	7.76	7.80	0.11
	180	89.44	91.56	90.71	90.57	1.07	8.08	8.27	8.19	8.18	0.10
E15HPC 1:3	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5	18.86	18.82	18.57	18.75	0.16	1.70	1.70	1.68	1.69	0.01
	10	31.34	32.34	32.31	32.00	0.57	2.83	2.92	2.92	2.89	0.05
	20	50.23	49.00	48.39	49.21	0.94	4.54	4.43	4.37	4.45	0.09
	45	70.17	72.83	71.85	71.62	1.35	6.34	6.58	6.49	6.47	0.12
	60	78.40	80.39	79.08	79.29	1.01	7.08	7.26	7.14	7.16	0.09
	120	82.87	91.02	92.03	88.64	5.02	8.39	8.22	8.31	8.31	0.09
	180	97.80	97.52	97.63	97.65	0.14	8.83	8.81	8.82	8.82	0.01

Table c13 Penetration of lidocaine HCl through dialysis membrane (Cont.)

Formula	time (min)	%penetrate					Cumulative amount (mg/cm ²)				
		1	2	3	Mean	SD	1	2	3	Mean	SD
E15HPC 2:3	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5	18.14	19.31	18.20	18.55	0.66	1.64	1.74	1.64	1.67	0.06
	10	30.57	33.06	28.41	30.68	2.33	2.76	2.99	2.57	2.77	0.21
	20	47.58	51.71	43.71	47.67	4.00	4.30	4.67	3.95	4.31	0.36
	45	70.46	77.40	70.11	72.66	4.11	6.36	6.99	6.33	6.56	0.37
	60	78.01	83.64	76.34	79.33	3.82	7.04	7.55	6.92	7.17	0.33
	120	92.48	94.45	93.21	93.38	1.00	8.35	8.53	8.42	8.43	0.09
	180	97.41	97.29	100.25	98.32	1.68	8.80	8.79	9.05	8.88	0.15
E15HPC 3:3	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5	19.98	19.05	22.86	20.63	1.99	1.80	1.72	2.06	1.86	0.18
	10	34.56	33.69	39.41	35.89	3.08	3.12	3.04	3.56	3.24	0.28
	20	53.88	52.18	59.75	55.27	3.97	4.87	4.71	5.40	4.99	0.36
	45	77.99	70.12	76.14	74.75	4.12	7.04	6.33	6.88	6.75	0.37
	60	84.34	81.61	78.20	81.38	3.08	7.62	7.37	7.06	7.35	0.28
	120	95.88	97.83	90.18	94.63	3.98	8.66	8.84	8.14	8.55	0.36
	180	99.67	100.55	95.27	98.50	2.83	9.00	9.08	8.60	8.89	0.26
E15HPC 3:2	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5	17.62	19.10	17.03	17.92	1.07	1.59	1.72	1.54	1.62	0.09
	10	30.78	32.31	30.78	31.29	0.88	2.78	2.92	2.78	2.83	0.08
	20	48.63	50.75	49.32	49.57	1.08	4.39	4.58	4.45	4.47	0.10
	30	59.64	60.40	61.76	60.60	1.07	5.39	5.45	5.58	5.47	0.10
	45	71.28	70.02	73.94	71.75	2.00	6.44	6.32	6.67	6.48	0.18
	60	78.58	76.31	81.34	78.74	2.52	4.10	6.89	7.35	6.11	1.76
	90	87.31	84.79	89.51	87.20	2.36	7.89	7.66	8.08	7.88	0.21
	120	92.26	90.40	93.88	92.18	1.74	8.33	8.16	8.48	8.32	0.16
	180	97.10	96.29	97.41	96.93	0.58	8.77	8.70	8.80	8.76	0.05
E15HPC 3:1	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5	17.10	19.21	21.91	19.41	2.41	1.54	1.73	1.98	1.75	0.22
	10	27.98	31.63	34.68	31.43	3.35	2.53	2.86	3.13	2.84	0.30
	20	46.69	51.74	53.77	50.73	3.65	4.22	4.67	4.86	4.58	0.33
	30	56.48	61.51	65.94	61.31	4.73	5.10	5.55	5.96	5.54	0.43
	45	66.05	71.03	76.78	71.29	5.37	5.96	6.42	6.93	6.44	0.49
	60	74.26	76.81	82.76	77.94	4.36	6.71	6.94	7.47	7.04	0.39
	90	84.46	85.90	90.02	86.79	2.89	7.63	7.76	8.13	7.84	0.26
	120	91.34	91.58	93.95	92.29	1.44	8.25	8.27	8.48	8.33	0.13
	180	97.80	97.41	99.13	98.11	0.90	8.83	8.80	8.95	8.86	0.08

Table c14 Release of lidocaine HCl without dialysis membrane

Formula	time (min)	%release					Cumulative amount (mg/cm ²)				
		1	2	3	Mean	SD	1	2	3	Mean	SD
E15 1:1	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1	17.38	14.07	17.05	16.17	1.82	1.57	1.27	1.54	1.46	0.17
	3	34.67	31.73	35.65	34.02	2.04	3.13	2.87	3.22	3.07	0.18
	5	66.95	62.03	62.34	63.77	2.76	6.05	5.60	5.63	5.76	0.25
	7	77.24	79.23	74.35	76.94	2.45	6.98	7.16	6.71	6.95	0.23
	10	88.69	88.46	83.86	87.00	2.72	8.01	7.99	7.57	7.86	0.25
	15	92.83	95.61	90.01	92.82	2.80	8.38	8.64	8.13	8.38	0.26
	20	98.13	99.89	93.62	97.21	3.23	8.86	9.02	8.46	8.78	0.29
	45	101.31	103.80	98.90	101.34	2.45	9.15	9.37	8.93	9.15	0.22
	60	102.28	104.61	99.29	102.06	2.67	9.24	9.45	8.97	9.22	0.24
120	106.69	107.54	103.90	106.04	1.90	9.64	9.71	9.38	9.58	0.17	
E4M 1:1	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1	11.82	16.47	13.99	14.09	2.33	1.07	1.49	1.26	1.27	0.21
	3	30.96	33.71	32.69	32.45	1.39	2.80	3.04	2.95	2.93	0.12
	5	47.68	46.21	46.02	46.64	0.91	4.31	4.17	4.16	4.21	0.08
	7	54.71	55.33	54.82	54.95	0.33	4.94	5.00	4.95	4.96	0.03
	10	63.04	63.45	62.68	63.06	0.39	5.69	5.73	5.66	5.69	0.04
	15	74.37	70.04	70.24	71.55	2.44	6.72	6.33	6.34	6.46	0.22
	20	75.93	74.53	73.88	74.78	1.05	6.86	6.73	6.67	6.75	0.10
	45	86.22	81.47	82.31	83.33	2.53	7.79	7.36	7.43	7.53	0.23
	60	92.34	84.48	89.37	88.73	3.97	8.34	7.63	8.07	8.01	0.36
120	104.34	95.70	99.82	99.95	4.32	9.42	8.64	9.01	9.02	0.39	
HPC 1:1	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1	17.89	19.57	21.26	19.57	1.69	1.62	1.77	1.92	1.77	0.15
	3	40.14	41.21	45.11	42.15	2.62	3.63	3.72	4.07	3.81	0.23
	5	56.74	56.09	62.63	58.49	3.60	5.12	5.07	5.66	5.28	0.33
	7	67.22	65.42	71.18	67.94	2.95	6.07	5.91	6.43	6.14	0.27
	10	74.74	73.36	80.22	76.11	3.63	6.75	6.62	7.24	6.87	0.33
	15	83.30	80.47	86.83	83.53	3.19	7.52	7.27	7.84	7.54	0.29
	20	88.58	87.37	93.71	89.89	3.37	8.00	7.89	8.46	8.12	0.30
	45	99.73	93.58	100.57	97.96	3.82	9.01	8.45	9.08	8.85	0.35
	60	102.03	95.59	101.50	99.71	3.57	9.21	8.63	9.17	9.00	0.32
120	108.38	101.63	106.10	105.37	3.43	9.79	9.18	9.58	9.52	0.31	

Table c14 Release of lidocaine HCl without dialysis membrane (Cont.)

Formula	time (min)	%release					Cumulative amount (mg/cm ²)				
		1	2	3	Mean	SD	1	2	3	Mean	SD
CS 1:1	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1	6.01	6.91	6.45	6.46	0.45	0.54	0.62	0.58	0.58	0.04
	3	13.79	14.80	15.28	14.62	0.76	1.24	1.34	1.38	1.32	0.07
	5	20.22	21.40	21.29	20.97	0.65	1.83	1.93	1.92	1.89	0.06
	7	25.58	27.66	26.01	26.42	1.10	2.31	2.50	2.35	2.39	0.10
	10	33.61	35.56	34.60	34.59	0.98	3.04	3.21	3.13	3.13	0.09
	15	46.76	48.96	47.10	47.61	1.18	4.22	4.42	4.25	4.30	0.11
	20	57.25	58.71	57.20	57.72	0.86	5.17	5.30	5.17	5.21	0.08
	45	89.52	90.59	90.45	90.19	0.58	8.08	8.18	8.17	8.14	0.06
	60	92.71	93.04	93.57	93.11	0.43	8.37	8.40	8.45	8.41	0.04
120	101.35	102.07	103.64	102.35	1.17	9.15	9.22	9.36	9.24	0.11	
E15HPC 3:3	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1	17.17	16.05	19.91	17.71	1.99	1.55	1.45	1.80	1.60	0.18
	3	38.82	36.89	39.40	38.37	1.31	3.51	3.33	3.56	3.47	0.12
	5	60.75	68.24	60.56	63.18	4.38	5.49	6.16	5.47	5.71	0.39
	7	74.02	79.79	77.08	76.96	2.89	6.68	7.21	6.96	6.95	0.27
	10	80.25	86.77	83.63	83.55	3.26	7.25	7.84	7.55	7.55	0.30
	15	85.37	91.95	89.14	88.82	3.30	7.71	8.30	8.05	8.02	0.30
	20	88.33	94.55	90.83	91.24	3.13	7.98	8.54	8.20	8.24	0.28
	45	95.64	100.82	97.91	98.12	2.60	8.64	9.11	8.84	8.86	0.24
	60	98.25	103.12	100.47	100.61	2.44	8.87	9.31	9.07	9.08	0.22
120	104.86	108.78	105.39	106.34	2.13	9.47	9.82	9.52	9.60	0.19	

APPENDIX D

Statistical Analysis

The statistical significance was calculated by Scheffe's equation.

Table d1 An example of ANOVA table of detachment force of the mucoadhesive films

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	120.578	3	40.193	59.043	.000
Within Groups	24.506	36	.681		
Total	145.084	39			

Table d2 Multiple comparisons of the detachment force of mucodehesive films

(I) formula	(J) formula	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
E15 1:1	E4M 1:1	2.9515*	0.3842	0.0000	1.8250	4.0780
	HPC 1:1	4.3993*	0.3842	0.0000	3.2728	5.5258
	CS 1:1	3.2681*	0.3842	0.0000	2.1416	4.3946
E4M 1:1	E15 1:1	-2.9515*	0.3842	0.0000	-4.0780	-1.8250
	HPC 1:1	1.4478*	0.3842	0.0069	0.3213	2.5743
	CS 1:1	0.3166	0.3842	0.8774	-0.8099	1.4431
HPC 1:1	E15 1:1	-4.3993*	0.3842	0.0000	-5.5258	-3.2728
	E4M 1:1	-1.4478*	0.3842	0.0069	-2.5743	-0.3213
	CS 1:1	-1.1312*	0.3842	0.0487	-2.2577	-0.0047
CS 1:1	E15 1:1	-3.2681*	0.3842	0.0000	-4.3946	-2.1416
	E4M 1:1	-0.3166	0.3842	0.8774	-1.4431	0.8099
	HPC 1:1	1.1312*	0.3842	0.0487	0.0047	2.2577
E15 1:0.67	E4M 1:0.67	2.9747*	0.2967	0.0000	2.1048	3.8446
	HPC 1:0.67	4.2391*	0.2967	0.0000	3.3692	5.1090
	CS 1:0.67	4.2845*	0.2967	0.0000	3.4146	5.1544
E4M 1:0.67	E15 1:0.67	-2.9747*	0.2967	0.0000	-3.8446	-2.1048
	HPC 1:0.67	1.2644*	0.2967	0.0019	0.3945	2.1343
	CS 1:0.67	1.3098*	0.2967	0.0013	0.4399	2.1797
HPC 1:0.67	E15 1:0.67	-4.2391*	0.2967	0.0000	-5.1090	-3.3692
	E4M 1:0.67	-1.2644*	0.2967	0.0019	-2.1343	-0.3945
	CS 1:0.67	0.0454	0.2967	0.9990	-0.8245	0.9153
CS 1:0.67	E15 1:0.67	-4.2845*	0.2967	0.0000	-5.1544	-3.4146
	E4M 1:0.67	-1.3098*	0.2967	0.0013	-2.1797	-0.4399
	HPC 1:0.67	-0.0454	0.2967	0.9990	-0.9153	0.8245

* The mean difference is significant at the .05 level.

Table d2 Multiple comparisons of the detachment force of mucodehesive films
(Cont.)

(I) formula	(J) formula	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
E15 1:0.5	E4M 1:0.5	3.0811*	0.3496	0.0000	2.0559	4.1063
	HPC 1:0.5	4.0503*	0.3496	0.0000	3.0251	5.0755
	CS 1:0.5	4.3470*	0.3496	0.0000	3.3218	5.3722
E4M 1:0.5	E15 1:0.5	-3.0811*	0.3496	0.0000	-4.1063	-2.0559
	HPC 1:0.5	0.9692	0.3496	0.0700	-0.0560	1.9944
	CS 1:0.5	1.2659*	0.3496	0.0101	0.2407	2.2911
HPC 1:0.5	E15 1:0.5	-4.0503*	0.3496	0.0000	-5.0755	-3.0251
	E4M 1:0.5	-0.9692	0.3496	0.0700	-1.9944	0.0560
	CS 1:0.5	0.2967	0.3496	0.8678	-0.7285	1.3219
CS 1:0.5	E15 1:0.5	-4.3470*	0.3496	0.0000	-5.3722	-3.3218
	E4M 1:0.5	-1.2659*	0.3496	0.0101	-2.2911	-0.2407
	HPC 1:0.5	-0.2967	0.3496	0.8678	-1.3219	0.7285
E15HPC 1:3	E15HPC 2:3	-0.9162	0.3572	0.3744	-2.2276	0.3952
	E15HPC 3:3	-1.2486	0.3572	0.0737	-2.5600	0.0628
	E15HPC 3:2	-2.0805*	0.3572	0.0001	-3.3919	-0.7691
	E15HPC 3:1	-2.9070*	0.3572	0.0000	-4.2184	-1.5956
	E15HPC 0:3	0.2889	0.3572	0.9951	-1.0225	1.6003
	E15HPC 3:0	-4.4104*	0.3572	0.0000	-5.7218	-3.0990
E15HPC 2:3	E15HPC 1:3	0.9162	0.3572	0.3744	-0.3952	2.2276
	E15HPC 3:3	-0.3324	0.3572	0.9895	-1.6438	0.9790
	E15HPC 3:2	-1.1643	0.3572	0.1196	-2.4757	0.1471
	E15HPC 3:1	-1.9908*	0.3572	0.0002	-3.3022	-0.6794
	E15HPC 0:3	1.2051	0.3572	0.0952	-0.1063	2.5165
	E15HPC 3:0	-3.4942*	0.3572	0.0000	-4.8056	-2.1828
E15HPC 3:3	E15HPC 1:3	1.2486	0.3572	0.0737	-0.0628	2.5600
	E15HPC 2:3	0.3324	0.3572	0.9895	-0.9790	1.6438
	E15HPC 3:2	-0.8319	0.3572	0.4978	-2.1433	0.4795
	E15HPC 3:1	-1.6584*	0.3572	0.0040	-2.9698	-0.3470
	E15HPC 0:3	1.5375*	0.3572	0.0103	0.2261	2.8489
	E15HPC 3:0	-3.1618*	0.3572	0.0000	-4.4732	-1.8504
E15HPC 3:2	E15HPC 1:3	2.0805*	0.3572	0.0001	0.7691	3.3919
	E15HPC 2:3	1.1643	0.3572	0.1196	-0.1471	2.4757
	E15HPC 3:3	0.8319	0.3572	0.4978	-0.4795	2.1433
	E15HPC 3:1	-0.8265	0.3572	0.5061	-2.1379	0.4849
	E15HPC 0:3	2.3694*	0.3572	0.0000	1.0580	3.6808
	E15HPC 3:0	-2.3299*	0.3572	0.0000	-3.6413	-1.0185

* The mean difference is significant at the .05 level.

Table d2 Multiple comparisons of the detachment force of mucodehesive films
(Cont.)

(I) formula	(J) formula	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
E15HPC 3:1	E15HPC 1:3	2.9070*	0.3572	0.0000	1.5956	4.2184
	E15HPC 2:3	1.9908*	0.3572	0.0002	0.6794	3.3022
	E15HPC 3:3	1.6584*	0.3572	0.0040	0.3470	2.9698
	E15HPC 3:2	0.8265	0.3572	0.5061	-0.4849	2.1379
	E15HPC 0:3	3.1959*	0.3572	0.0000	1.8845	4.5073
	E15HPC 3:0	-1.5034*	0.3572	0.0133	-2.8148	-0.1920
E15HPC 0:3	E15HPC 1:3	-0.2889	0.3572	0.9951	-1.6003	1.0225
	E15HPC 2:3	-1.2051	0.3572	0.0952	-2.5165	0.1063
	E15HPC 3:3	-1.5375*	0.3572	0.0103	-2.8489	-0.2261
	E15HPC 3:2	-2.3694*	0.3572	0.0000	-3.6808	-1.0580
	E15HPC 3:1	-3.1959*	0.3572	0.0000	-4.5073	-1.8845
	E15HPC 3:0	-4.6993*	0.3572	0.0000	-6.0107	-3.3879
E15HPC 3:0	E15HPC 1:3	4.4104*	0.3572	0.0000	3.0990	5.7218
	E15HPC 2:3	3.4942*	0.3572	0.0000	2.1828	4.8056
	E15HPC 3:3	3.1618*	0.3572	0.0000	1.8504	4.4732
	E15HPC 3:2	2.3299*	0.3572	0.0000	1.0185	3.6413
	E15HPC 3:1	1.5034*	0.3572	0.0133	0.1920	2.8148
	E15HPC 0:3	4.6993*	0.3572	0.0000	3.3879	6.0107

* The mean difference is significant at the .05 level.

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Table d3 Multiple comparisons of percent strain at auto break of mucodehesive films

(I) formula	(J) formula	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
E15 1:1	E4M 1:1	162.1492*	3.2148	0.0000	152.6674	171.6309
	HPC 1:1	-3.0790	3.2148	0.9852	-18.1952	12.0372
	CS 1:1	166.9997*	3.2148	0.0000	157.7149	176.2844
E4M 1:1	E15 1:1	-162.1492*	3.2148	0.0000	-171.6309	-152.6674
	HPC 1:1	-165.2282*	3.2148	0.0000	-180.8007	-149.6557
	CS 1:1	4.8505*	3.2148	0.0104	1.1758	8.5252
HPC 1:1	E15 1:1	3.0790	3.2148	0.9852	-12.0372	18.1952
	E4M 1:1	165.2282*	3.2148	0.0000	149.6557	180.8007
	CS 1:1	170.0787*	3.2148	0.0000	154.7336	185.4237
CS 1:1	E15 1:1	-166.9997*	3.2148	0.0000	-176.2844	-157.7149
	E4M 1:1	-4.8505*	3.2148	0.0104	-8.5252	-1.1758
	HPC 1:1	-170.0787*	3.2148	0.0000	-185.4237	-154.7336
E15 1:0.67	E4M 1:0.67	50.7040*	18.1628	0.0000	36.1772	65.2308
	HPC 1:0.67	-80.7500	18.1628	0.1347	-185.8846	24.3846
	CS 1:0.67	141.7493*	18.1628	0.0000	126.9806	156.5181
E4M 1:0.67	E15 1:0.67	-50.7040*	18.1628	0.0000	-65.2308	-36.1772
	HPC 1:0.67	-131.4540*	18.1628	0.0201	-237.1725	-25.7355
	CS 1:0.67	91.0453*	18.1628	0.0000	81.1699	100.9208
HPC 1:0.67	E15 1:0.67	80.7500	18.1628	0.1347	-24.3846	185.8846
	E4M 1:0.67	131.4540*	18.1628	0.0201	25.7355	237.1725
	CS 1:0.67	222.4993*	18.1628	0.0019	116.2754	328.7232
CS 1:0.67	E15 1:0.67	-141.7493*	18.1628	0.0000	-156.5181	-126.9806
	E4M 1:0.67	-91.0453*	18.1628	0.0000	-100.9208	-81.1699
	HPC 1:0.67	-222.4993*	18.1628	0.0019	-328.7232	-116.2754
E15 1:0.5	E4M 1:0.5	-41.2185*	10.5656	0.0114	-71.2183	-11.2187
	HPC 1:0.5	-29.9398	10.5656	0.3380	-82.9156	23.0360
	CS 1:0.5	132.4823*	10.5656	0.0000	123.7475	141.2172
E4M 1:0.5	E15 1:0.5	41.2185*	10.5656	0.0114	11.2187	71.2183
	HPC 1:0.5	11.2787	10.5656	0.9772	-39.9377	62.4951
	CS 1:0.5	173.7008*	10.5656	0.0000	142.6946	204.7071
HPC 1:0.5	E15 1:0.5	29.9398	10.5656	0.3380	-23.0360	82.9156
	E4M 1:0.5	-11.2787	10.5656	0.9772	-62.4951	39.9377
	CS 1:0.5	162.4222*	10.5656	0.0003	108.7170	216.1273
CS 1:0.5	E15 1:0.5	-132.4823*	10.5656	0.0000	-141.2172	-123.7475
	E4M 1:0.5	-173.7008*	10.5656	0.0000	-204.7071	-142.6946
	HPC 1:0.5	-162.4222*	10.5656	0.0003	-216.1273	-108.7170

* The mean difference is significant at the .05 level.

Table d4 Multiple comparisons of Young's modulus of mucoadhesive films

(I) formula	(J) formula	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
E15 1:1	E4M 1:1	-147.6693*	11.6902	0.0000	-171.1052	-124.2334
	HPC 1:1	159.5357*	11.6902	0.0000	143.0649	176.0064
	CS 1:1	-84.2808*	11.6902	0.0114	-145.3184	-23.2433
E4M 1:1	E15 1:1	147.6693*	11.6902	0.0000	124.2334	171.1052
	HPC 1:1	307.2050*	11.6902	0.0000	283.1218	331.2882
	CS 1:1	63.3885*	11.6902	0.0387	3.4160	123.3610
HPC 1:1	E15 1:1	-159.5357*	11.6902	0.0000	-176.0064	-143.0649
	E4M 1:1	-307.2050*	11.6902	0.0000	-331.2882	-283.1218
	CS 1:1	-243.8165*	11.6902	0.0001	-306.7363	-180.8967
CS 1:1	E15 1:1	84.2808*	11.6902	0.0114	23.2433	145.3184
	E4M 1:1	-63.3885*	11.6902	0.0387	-123.3610	-3.4160
	HPC 1:1	243.8165*	11.6902	0.0001	180.8967	306.7363
E15 1:0.67	E4M 1:0.67	-91.5177*	13.5012	0.0000	-119.6806	-63.3547
	HPC 1:0.67	88.8158*	13.5012	0.0000	60.6529	116.9788
	CS 1:0.67	-197.6020*	13.5012	0.0000	-225.7650	-169.4390
E4M 1:0.67	E15 1:0.67	91.5177*	13.5012	0.0000	63.3547	119.6806
	HPC 1:0.67	180.3335*	13.5012	0.0000	152.1705	208.4965
	CS 1:0.67	-106.0843*	13.5012	0.0000	-134.2473	-77.9214
HPC 1:0.67	E15 1:0.67	-88.8158*	13.5012	0.0000	-116.9788	-60.6529
	E4M 1:0.67	-180.3335*	13.5012	0.0000	-208.4965	-152.1705
	CS 1:0.67	-286.4178*	13.5012	0.0000	-314.5808	-258.2549
CS 1:0.67	E15 1:0.67	197.6020*	13.5012	0.0000	169.4390	225.7650
	E4M 1:0.67	106.0843*	13.5012	0.0000	77.9214	134.2473
	HPC 1:0.67	286.4178*	13.5012	0.0000	258.2549	314.5808
E15 1:0.5	E4M 1:0.5	-77.3347*	4.4991	0.0000	-86.7197	-67.9496
	HPC 1:0.5	8.7590	4.4991	0.0657	-0.6260	18.1440
	CS 1:0.5	-201.9853*	4.4991	0.0000	-211.3704	-192.6003
E4M 1:0.5	E15 1:0.5	77.3347*	4.4991	0.0000	67.9496	86.7197
	HPC 1:0.5	86.0937*	4.4991	0.0000	76.7086	95.4787
	CS 1:0.5	-124.6507*	4.4991	0.0000	-134.0357	-115.2656
HPC 1:0.5	E15 1:0.5	-8.7590	4.4991	0.0657	-18.1440	0.6260
	E4M 1:0.5	-86.0937*	4.4991	0.0000	-95.4787	-76.7086
	CS 1:0.5	-210.7443*	4.4991	0.0000	-220.1294	-201.3593
CS 1:0.5	E15 1:0.5	201.9853*	4.4991	0.0000	192.6003	211.3704
	E4M 1:0.5	124.6507*	4.4991	0.0000	115.2656	134.0357
	HPC 1:0.5	210.7443*	4.4991	0.0000	201.3593	220.1294

* The mean difference is significant at the .05 level.

Table d5 Multiple comparisons of tensile strength of mucoadhesive films

(I) formula	(J) formula	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
E15 1:1	E4M 1:1	-2.3095	0.6649	0.1567	-5.2839	0.6649
	HPC 1:1	26.6260*	0.6649	0.0000	23.6474	29.6046
	CS 1:1	12.6785*	0.6649	0.0000	9.7205	15.6365
E4M 1:1	E15 1:1	2.3095	0.6649	0.1567	-0.6649	5.2839
	HPC 1:1	28.9355*	0.6649	0.0000	27.0875	30.7835
	CS 1:1	14.988*	0.6649	0.0000	13.1305	16.8455
HPC 1:1	E15 1:1	-26.6260*	0.6649	0.0000	-29.6046	-23.6474
	E4M 1:1	-28.9355*	0.6649	0.0000	-30.7835	-27.0875
	CS 1:1	-13.9475*	0.6649	0.0000	-15.1036	-12.7914
CS 1:1	E15 1:1	-12.6785*	0.6649	0.0000	-15.6365	-9.7205
	E4M 1:1	-14.988*	0.6649	0.0000	-16.8455	-13.1305
	HPC 1:1	13.9475*	0.6649	0.0000	12.7914	15.1036
E15 1:0.67	E4M 1:0.67	-8.8352*	1.0151	0.0000	-10.9526	-6.7178
	HPC 1:0.67	9.4658*	1.0151	0.0000	7.3484	11.5832
	CS 1:0.67	1.090167	1.0151	0.2956	-1.0272	3.2076
E4M 1:0.67	E15 1:0.67	8.8352*	1.0151	0.0000	6.7178	10.9526
	HPC 1:0.67	18.3010*	1.0151	0.0000	16.1836	20.4184
	CS 1:0.67	9.9253*	1.0151	0.0000	7.8079	12.0427
HPC 1:0.67	E15 1:0.67	-9.4658*	1.0151	0.0000	-11.5832	-7.3484
	E4M 1:0.67	-18.3010*	1.0151	0.0000	-20.4184	-16.1836
	CS 1:0.67	-8.3757*	1.0151	0.0000	-10.4931	-6.2583
CS 1:0.67	E15 1:0.67	-1.09017	1.0151	0.2956	-3.2076	1.0272
	E4M 1:0.67	-9.9253*	1.0151	0.0000	-12.0427	-7.8079
	HPC 1:0.67	8.3757*	1.0151	0.0000	6.2583	10.4931
E15 1:0.5	E4M 1:0.5	-13.4027*	0.6576	0.0000	-14.7745	-12.0309
	HPC 1:0.5	-0.82717	0.6576	0.2230	-2.1990	0.5446
	CS 1:0.5	-2.5867*	0.6576	0.0008	-3.9585	-1.2149
E4M 1:0.5	E15 1:0.5	13.4027*	0.6576	0.0000	12.0309	14.7745
	HPC 1:0.5	12.5755*	0.6576	0.0000	11.2037	13.9473
	CS 1:0.5	10.8160*	0.6576	0.0000	9.4442	12.1878
HPC 1:0.5	E15 1:0.5	0.827167	0.6576	0.2230	-0.5446	2.1990
	E4M 1:0.5	-12.5755*	0.6576	0.0000	-13.9473	-11.2037
	CS 1:0.5	-1.7595*	0.6576	0.0145	-3.1313	-0.3877
CS 1:0.5	E15 1:0.5	2.5867*	0.6576	0.0008	1.2149	3.9585
	E4M 1:0.5	-10.8160*	0.6576	0.0000	-12.1878	-9.4442
	HPC 1:0.5	1.7595*	0.6576	0.0145	0.3877	3.1313

* The mean difference is significant at the .05 level.

Table d6 An Example of ANOVA table of release rate of lidocaine HCl from HPMC E15 films with various ratio of drug to polymer through dialysis membrane

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.407	14	2.906E-02	60.348	.000
Intercept	1.197	1	1.197	2485.058	.000
FORMULA * TIME	5.319E-03	8	6.649E-04	1.381	.245
FORMULA TIME	2.511E-03	2	1.255E-03	2.607	.090
Error	.399	4	9.975E-02	207.152	.000
Total	1.445E-02	30	4.815E-04		
Corrected Total	1.618	45			
	.421	44			

a R Squared = .966 (Adjusted R Squared = .950)

Table d7 Multiple comparisons of release rate of lidocaine HCl through dialysis membrane

(I) formula	(J) formula	Mean Difference (I-J)	Std. Error	Sig. ^a	95% Confidence Interval ^a	
					Lower Bound	Upper Bound
E15 1:1	E15 1:0.67	-0.0174*	0.0080	0.0379	-0.0338	-0.0010
	E15 1:0.5	-0.0038	0.0080	0.6388	-0.0202	0.0126
E15 1:0.67	E15 1:1	0.0174*	0.0080	0.0379	0.0010	0.0338
	E15 1:0.5	0.0136	0.0080	0.1000	-0.0028	0.0300
E15 1:0.5	E15 1:1	0.0038	0.0080	0.6388	-0.0126	0.0202
	E15 1:0.67	-0.0136	0.0080	0.1000	-0.0300	0.0028
E4M 1:1	E4M 1:0.67	-0.0040	0.0082	0.6275	-0.0207	0.0127
	E4M 1:0.5	-0.0148	0.0082	0.0797	-0.0315	0.0019
E4M 1:0.67	E4M 1:1	0.0040	0.0082	0.6275	-0.0127	0.0207
	E4M 1:0.5	-0.0108	0.0082	0.1956	-0.0275	0.0059
E4M 1:0.5	E4M 1:1	0.0148	0.0082	0.0797	-0.0019	0.0315
	E4M 1:0.67	0.0108	0.0082	0.1956	-0.0059	0.0275
HPC 1:1	HPC 1:0.67	-1E-17	0.0041	1.0000	-0.0085	0.0085
	HPC 1:0.5	-0.0079	0.0041	0.0651	-0.0164	0.0005
HPC 1:0.67	HPC 1:1	1.5E-17	0.0041	1.0000	-0.0085	0.0085
	HPC 1:0.5	-0.0079	0.0041	0.0651	-0.0164	0.0005
HPC 1:0.5	HPC 1:1	0.0079	0.0041	0.0651	-0.0005	0.0164
	HPC 1:0.67	0.0079	0.0041	0.0651	-0.0005	0.0164
CS 1:1	CS 1:0.67	-0.0115*	0.0027	0.0002	-0.0171	-0.0059
	CS 1:0.5	-0.0213*	0.0027	0.0000	-0.0269	-0.0157
CS 1:0.67	CS 1:1	0.0115*	0.0027	0.0002	0.0059	0.0171
	CS 1:0.5	-0.00987*	0.0027	0.0011	-0.0155	-0.0043
CS 1:0.5	CS 1:1	0.0213*	0.0027	0.0000	0.0157	0.0269
	CS 1:0.67	0.0099*	0.0027	0.0011	0.0043	0.0155

Table d7 Multiple comparisons of release rate of lidocaine HCl through dialysis membrane (Cont.)

(I) formula	(J) formula	Mean Difference (I-J)	Std. Error	Sig. ^a	95% Confidence Interval ^a	
					Lower Bound	Upper Bound
E15 1:1	E4M 1:1	0.0190*	0.0069	0.0087	0.0051	0.0329
	HPC 1:1	-0.0059	0.0069	0.3994	-0.0198	0.0081
	CS 1:1	0.0606*	0.0069	0.0000	0.0467	0.0745
E4M 1:1	E15 1:1	-0.0190*	0.0069	0.0087	-0.0329	-0.0051
	HPC 1:1	-0.0249*	0.0069	0.0008	-0.0388	-0.0109
	CS 1:1	0.0416*	0.0069	0.0000	0.0277	0.0555
HPC 1:1	E15 1:1	0.0059	0.0069	0.3994	-0.0081	0.0198
	E4M 1:1	0.0249*	0.0069	0.0008	0.0109	0.0388
	CS 1:1	0.06647*	0.0069	0.0000	0.0525	0.0804
CS 1:1	E15 1:1	-0.0606*	0.0069	0.0000	-0.0745	-0.0467
	E4M 1:1	-0.0416*	0.0069	0.0000	-0.0555	-0.0277
	HPC 1:1	-0.0665*	0.0069	0.0000	-0.0804	-0.0525
E15 1:0.67	E4M 1:0.67	0.0134*	0.0041	0.0020	0.0052	0.0216
	HPC 1:0.67	-0.0154*	0.0041	0.0005	-0.0236	-0.0072
	CS 1:0.67	0.04753*	0.0041	0.0000	0.0393	0.0557
E4M 1:0.67	E15 1:0.67	-0.0134*	0.0041	0.0020	-0.0216	-0.0052
	HPC 1:0.67	-0.0288*	0.0041	0.0000	-0.0370	-0.0206
	CS 1:0.67	0.0341*	0.0041	0.0000	0.0259	0.0423
HPC 1:0.67	E15 1:0.67	0.0154*	0.0041	0.0005	0.0072	0.0236
	E4M 1:0.67	0.0288*	0.0041	0.0000	0.0206	0.0370
	CS 1:0.67	0.0629*	0.0041	0.0000	0.0547	0.0711
CS 1:0.67	E15 1:0.67	-0.0475*	0.0041	0.0000	-0.0557	-0.0393
	E4M 1:0.67	-0.0341*	0.0041	0.0000	-0.0423	-0.0259
	HPC 1:0.67	-0.0629*	0.0041	0.0000	-0.0711	-0.0547
E15 1:0.5	E4M 1:0.5	-0.0110*	0.0044	0.0169	-0.0199	-0.0021
	HPC 1:0.5	-0.0290*	0.0044	0.0000	-0.0379	-0.0201
	CS 1:0.5	0.0241*	0.0044	0.0000	0.0151	0.0330
E4M 1:0.5	E15 1:0.5	0.0110*	0.0044	0.0169	0.0021	0.0199
	HPC 1:0.5	-0.0180*	0.0044	0.0002	-0.0269	-0.0091
	CS 1:0.5	0.0351*	0.0044	0.0000	0.0261	0.0440
HPC 1:0.5	E15 1:0.5	0.0290*	0.0044	0.0000	0.0201	0.0379
	E4M 1:0.5	0.0180*	0.0044	0.0002	0.0091	0.0269
	CS 1:0.5	0.0531*	0.0044	0.0000	0.0441	0.0620
CS 1:0.5	E15 1:0.5	-0.0241*	0.0044	0.0000	-0.0330	-0.0151
	E4M 1:0.5	-0.0351*	0.0044	0.0000	-0.0440	-0.0261
	HPC 1:0.5	-0.0531*	0.0044	0.0000	-0.0620	-0.0441

Based on estimated marginal means

* The mean difference is significant at the .05 level.

^a Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

Table d7 Multiple comparisons of release rate of lidocaine HCl through dialysis membrane (Cont.)

(I) formula	(J) formula	Mean Difference (I-J)	Std. Error	Sig. ^a	95% Confidence Interval ^a	
					Lower Bound	Upper Bound
E15HPC 1:3	E15HPC 2:3	0.0051	0.0059	0.3916	-0.0067	0.0168
	E15HPC 3:3	-0.0140*	0.0059	0.0199	-0.0257	-0.0023
	E15HPC 3:2	0.0023	0.0059	0.7009	-0.0095	0.0140
	E15HPC 3:1	0.0017	0.0059	0.7689	-0.0100	0.0135
	E15HPC 0:3	-0.0022	0.0059	0.7093	-0.0139	0.0095
	E15HPC 3:0	-0.0081	0.0059	0.1743	-0.0198	0.0037
E15HPC 2:3	E15HPC 1:3	-0.0051	0.0059	0.3916	-0.0168	0.0067
	E15HPC 3:3	-0.0191*	0.0059	0.0018	-0.0308	-0.0073
	E15HPC 3:2	-0.0028	0.0059	0.6352	-0.0145	0.0089
	E15HPC 3:1	-0.0033	0.0059	0.5724	-0.0151	0.0084
	E15HPC 0:3	-0.0073	0.0059	0.2204	-0.0190	0.0045
	E15HPC 3:0	-0.0131*	0.0059	0.0286	-0.0249	-0.0014
E15HPC 3:3	E15HPC 1:3	0.0140*	0.0059	0.0199	0.0023	0.0257
	E15HPC 2:3	0.0191*	0.0059	0.0018	0.0073	0.0308
	E15HPC 3:2	0.0163*	0.0059	0.0072	0.0045	0.0280
	E15HPC 3:1	0.0157*	0.0059	0.0092	0.0040	0.0275
	E15HPC 0:3	0.0118*	0.0059	0.0485	0.0001	0.0235
	E15HPC 3:0	0.0059	0.0059	0.3162	-0.0058	0.0177
E15HPC 3:2	E15HPC 1:3	-0.0023	0.0059	0.7009	-0.0140	0.0095
	E15HPC 2:3	0.0028	0.0059	0.6352	-0.0089	0.0145
	E15HPC 3:3	-0.0163*	0.0059	0.0072	-0.0280	-0.0045
	E15HPC 3:1	-0.0005	0.0059	0.9279	-0.0123	0.0112
	E15HPC 0:3	-0.0045	0.0059	0.4498	-0.0162	0.0073
	E15HPC 3:0	-0.0103	0.0059	0.0831	-0.0221	0.0014
E15HPC 3:1	E15HPC 1:3	-0.0017	0.0059	0.7689	-0.0135	0.0100
	E15HPC 2:3	0.0033	0.0059	0.5724	-0.0084	0.0151
	E15HPC 3:3	-0.0157*	0.0059	0.0092	-0.0275	-0.0040
	E15HPC 3:2	0.0005	0.0059	0.9279	-0.0112	0.0123
	E15HPC 0:3	-0.0039	0.0059	0.5055	-0.0157	0.0078
	E15HPC 3:0	-0.0098	0.0059	0.0999	-0.0215	0.0019

Based on estimated marginal means

* The mean difference is significant at the .05 level.

^a Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

Table d7 Multiple comparisons of release rate of lidocaine HCl through dialysis membrane (Cont.)

(I) formula	(J) formula	Mean Difference (I-J)	Std. Error	Sig. ^a	95% Confidence Interval ^a	
					Lower Bound	Upper Bound
E15HPC 0:3	E15HPC 1:3	0.0022	0.0059	0.7093	-0.0095	0.0139
	E15HPC 2:3	0.0073	0.0059	0.2204	-0.0045	0.0190
	E15HPC 3:3	-0.0118*	0.0059	0.0485	-0.0235	-0.0001
	E15HPC 3:2	0.0045	0.0059	0.4498	-0.0073	0.0162
	E15HPC 3:1	0.0039	0.0059	0.5055	-0.0078	0.0157
	E15HPC 3:0	-0.0059	0.0059	0.3216	-0.0176	0.0059
E15HPC 3:0	E15HPC 1:3	0.0081	0.0059	0.1743	-0.0037	0.0198
	E15HPC 2:3	0.0131*	0.0059	0.0286	0.0014	0.0249
	E15HPC 3:3	-0.0059	0.0059	0.3162	-0.0177	0.0058
	E15HPC 3:2	0.0103	0.0059	0.0831	-0.0014	0.0221
	E15HPC 3:1	0.0098	0.0059	0.0999	-0.0019	0.0215
	E15HPC 0:3	0.0059	0.0059	0.3216	-0.0059	0.0176

Based on estimated marginal means

* The mean difference is significant at the .05 level.

^a Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

Table d7 Multiple comparisons of release rate of lidocaine HCl through dialysis membrane (Cont.)

(I) Formula	(J) Formula	Mean Difference (I-J)	Std. Error	Sig. ^a	95% Confidence Interval ^a	
					Lower Bound	Upper Bound
E4M 1:0.5	E4M 2:1	-.129*	.008	.000	-.145	-.114
E4M 2:1	E4M 1:0.5	.129*	.008	.000	.114	.145

Based on estimated marginal means

* The mean difference is significant at the .05 level.

^a Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

Table d8 Multiple comparisons of release rate of lidocaine HCl without dialysis membrane

(I) formula	(J) formula	Mean Difference (I-J)	Std. Error	Sig. ^a	95% Confidence Interval ^a	
					Lower Bound	Upper Bound
E15 1:1	E4M 1:1	0.1187*	0.0416	0.0054	0.0361	0.2014
	HPC 1:1	0.0250	0.0416	0.5489	-0.0576	0.1077
	CS 1:1	0.2682*	0.0416	0.0000	0.1855	0.3508
	E15HPC 3:3	0.0548	0.0416	0.1910	-0.0278	0.1375
E4M 1:1	E15 1:1	-0.1187*	0.0416	0.0054	-0.2014	-0.0361
	HPC 1:1	-0.0937*	0.0416	0.0267	-0.1764	-0.0110
	CS 1:1	0.1494*	0.0416	0.0005	0.0668	0.2321
	E15HPC 3:3	-0.0639	0.0416	0.1280	-0.1466	0.0187
HPC 1:1	E15 1:1	-0.0250	0.0416	0.5489	-0.1077	0.0576
	E4M 1:1	0.0937*	0.0416	0.0267	0.0110	0.1764
	CS 1:1	0.2431*	0.0416	0.0000	0.1605	0.3258
	E15HPC 3:3	0.0298	0.0416	0.4760	-0.0529	0.1124
CS 1:1	E15 1:1	-0.2682*	0.0416	0.0000	-0.3508	-0.1855
	E4M 1:1	-0.1494*	0.0416	0.0005	-0.2321	-0.0668
	HPC 1:1	-0.2431*	0.0416	0.0000	-0.3258	-0.1605
	E15HPC 3:3	-0.2134*	0.0416	0.0000	-0.2960	-0.1307
E15HPC 3:3	E15 1:1	-0.0548	0.0416	0.1910	-0.1375	0.0278
	E4M 1:1	0.0639	0.0416	0.1280	-0.0187	0.1466
	HPC 1:1	-0.0298	0.0416	0.4760	-0.1124	0.0529
	CS 1:1	0.2134*	0.0416	0.0000	0.1307	0.2960

Based on estimated marginal means

* The mean difference is significant at the .05 level.

^a Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

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VITAE

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