

Supplementary Information

Formulation and evaluation of self nano-emulsifying mouth dissolving film of azathioprine

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Table S1 — Experimental design details for azathioprine

Sr.no	Variables	Coded levels		
		-1 (Low)	0 (Medium)	+1 (High)
Independent Variables				
1	X ₁ (S _{mix})	30	40	50
2	X ₂ (oil)	30	35	40
Dependent Variables				
3	Y ₁ (particle size)	-	-	-
4	Y ₂ (Zeta potential)	-	-	-

Table S2 — 3² full factorial design points for azathioprine

Mixture number	S _{mix} % (X ₁)	Oil% (X ₂)
A1	-1	-1
A2	-1	0
A3	-1	+1
A4	0	-1
A5	0	0
A6	0	+1
A7	+1	-1
A8	+1	0
A9	+1	+1

Table S3 — Composition of blank mouth dissolving film

Ingredients	BF1	BF2	BF3	BF4	BF5	BF6	BF7	BF8	BF9
Pullulan (mg)	50	100	150	200	250	300	350	400	450
HPMC (mg)	5	5	5	5	5	5	5	5	5
PEG-8000 (mg)	16	32	48	64	80	96	112	128	144
Sodium saccharin (mg)	15	15	15	15	15	15	15	15	15
Citric acid (mg)	15	15	15	15	15	15	15	15	15
Tween 80 (mL)	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Water (mL)	20	20	20	20	20	20	20	20	20

Formulation code	Stickiness	Surface appearance	Film clarity	<i>In-vitro</i> disintegration time (sec)	Folding endurance
BF1	Sticky	Film did not form	-	-	-
BF2	Sticky	Film did not form	-	-	-
BF3	Sticky	Film did not form	-	-	-
BF4	Non-sticky	Uniform	Clear	27 ± 1.7	97 ± 1.0
BF5	Non-sticky	Uniform	Clear	36 ± 1.5	88 ± 1.0
BF6	Non-sticky	Uniform	Clear	42 ± 1.7	85 ± 2.0
BF7	Non-sticky	Non-uniform	Turbid	-	76 ± 2.0
BF8	Non-sticky	Non-uniform	Turbid	-	70 ± 2.0
BF9	Non-sticky	Non-uniform	Turbid	-	66 ± 3.0

Composition	Oil (%)	S _{mix} (%)	Water (%)
0:10	0	100	0
1:9	7.53	66.18	26.47
2:8	13.89	55.56	30.55
3:7	20	46.67	33.33
4:6	27.21	40.82	31.97
5:5	34.25	34.25	31.5
6:4	42.55	28.37	29.07
7:3	53.85	23.08	23.07
8:2	67.8	16.95	15.25
9:1	79.65	8.85	11.5
10:0	100	0	0

Table S – 6 ANOVA results for particle size (Y1)						
Source	Sum of Squares	df	Mean Square	F-value	p-value	
Model	2.754E+05	4	68847.96	12.34	0.0160	Significant
A-Oil	1.907E+05	2	95355.08	17.09	0.0110	
B-Smix	84681.68	2	42340.84	7.59	0.0435	
Residual	22318.47	4	5579.62			
Cor Total	2.977E+05	8				

Table S7 – ANOVA results for zeta potential (Y2)						
Source	Sum of Squares	df	Mean Square	F-value	p-value	
Model	2346.36	4	586.59	8.17	0.0331	Significant
A-Oil	379.56	2	189.78	2.64	0.1855	
B-B	1966.80	2	983.40	13.70	0.0162	
Residual	287.13	4	71.78			
Cor Total	2633.49	8				