LUBRIZOL LIFE SCIENCE

HEALTH

Theophylline Extended Release Tablets

The extended release tablet contains **Theophylline 200 mg**. The formulation features use of **Carbopol® 974P NF polymer** and hypromellose as the extended release matrix ingredient. The formulation has high drug loading of 66.67%. The formulation meets the USP drug dissolution requirements (Test 2) for Theophylline extended release capsules.

Number	Ingredients	% w/w	mg / Tablet
	Intra-Granular Phase:		
1.	Theophylline anhydrous	66.67	200.0
2.	**Carbopol® 974P NF polymer**	5.00	15.00
3.	Microcrystalline cellulose (Avicel® PH-102)	20.34	61.0
	Extra-Granular Phase:		
4.	Hypromellose (Metolose® 90 SH-4000 SR)	4.00	12.00
5.	Colloidal silicon dioxide	1.33	4.00
6.	Magnesium stearate	1.33	4.00
7.	Talc	1.33	4.00
	TOTAL:	**100.00**	**245.00**

Lab batch size – 1000 tablets (Water used as binder)

Process:

1. Weigh theophylline, **Carbopol® 974P NF polymer**, microcrystalline cellulose. Pass through 60 mesh sieve. Add all the ingredients to a high shear granulator and mix for 10 minutes at 150 RPM impeller speed.

2. Granulate the blend with water in high shear granulator, (about 40 ml water for 300 gm batch) – adding the water as a thin stream, as droplets using peristaltic pump or as a spray and impeller speed above 250 to 300 RPM during wet massing.

3. Dry the granules in fluid bed drier (inlet temperature at 60°C) to loss on drying (LOD) of about ~2%.

4. Pass the dry granules through 18 mesh screen and blend them with hypromellose for 5 minutes in V cone blender. Add the magnesium stearate, talc and silicon dioxide (60 mesh sieve) and blend for 2 minutes in V cone blender.

5. Compress the blend into tablets on a tablet press using 9.5 mm round standard concave punches to achieve following parameters:

- Target weight: 300 mg
- Mechanical Strength: 16 to 19 kP
- Friability (100 revolutions): NMT 0.5 % W/W

Theophylline Extended Release Tablets

Final Tablet Properties:
Appearance: Round tablets
Weight (mg)*: 300 ± 10
Thickness (mm)*: 4.30 - 4.40
Mechanical Strength (kP)*: 16 - 19
Friability (100 revolutions) (%): 0.016
Dissolution: Complying to Test 2 dissolution profile for Theophylline Extended-Release Capsules USP monograph

*Average ± SD

Dissolution**(% average of 6 tablets)		
Time (h)	**Lubrizol**	**USP Limit**
1	16 – 19	10 – 30
2	32 – 36	30 – 55
4	56 – 6	55 – 80
8	83 – 90	NLT 80

**USP Apparatus 2, 75 rpm, 900 ml pH 4.5 phosphate buffer.

Summary:

Carbopol® polymers have demonstrated to be useful and highly efficient as extended release matrix former making them a polymer of choice when formulating high drug load extended release tablets.

The Lubrizol Life Science Health website **www.lubrizol.com/Health** provides additional information:

- Bulletin 30 - Controlled Release Tablets and Capsules; Bulletin 31 - Formulating Controlled Release Tablets and Capsules with Carbopol; Bulletin 32 - Application of Carbopol 71G NF Polymer in Controlled Release Tablets
- Aqueous and non- aqueous granulation videos under video gallery
- Technical Papers, Technical Data Sheets, Test Procedures, Certificates, and other Formulations

Please contact your Lubrizol representative to get samples, quotations or further technical assistance.

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