



# 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 <sup>®</sup> 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<sup>®</sup> 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  |  |  |  |  |
| <b>Weight (mg)*:</b> 300 ± 10  |  |  |  |  |
| <b>Thickness (mm)*:</b> 4.30 - 4.40  |  |  |  |  |
| Mechanical Strength (kP)*: 16 - 19   |  |  |  |  |
| Friability (100 revolutions) (%): 0.016  |  |  |  |  |
| <b>Dissolution:</b> Complying to Test 2 dissolution profile for Theophylline Extended-Release Capsules USP monograph |  |  |  |  |

| 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    |  |  |

\*Average ± SD

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

### Summary:

Carbopol<sup>®</sup> 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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