LUBRIZOL LIFE SCIENCE

HEALTH

Verapamil Hydrochloride Extended Release Tablets

Each extended release tablet contains **Verapamil HCl 240 mg**. This formulation features **Carbopol® 971P NF polymer** as the extended release matrix ingredient. The formulation uses very low drug to polymer ratio of 8:1. The formulation meets the USP drug dissolution requirements (Test 3) for Verapamil Hydrochloride extended release tablets.

Number	Ingredients	% w/w	mg / Tablet
	Intra-Granular Phase:		
1.	Verapamil hydrochloride	39.22	240.0
2.	**Carbopol® 971P NF polymer**	4.90	30.0
3.	Microcrystalline cellulose (Avicel® PH-101)	53.92	330.0
	Extra-Granular Phase:		
4.	Magnesium stearate	0.82	5.0
5.	Talc	0.57	3.5
6.	Colloidal silicon dioxide	0.57	3.5
	TOTAL:	**100.00**	**612.00**

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

Process:

1. Weigh Verapamil hydrochloride, **Carbopol® 971P NF polymer** and microcrystalline cellulose and pass through a 40 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 (about 120 ml water for 1000 tablet batch) in high shear granulator, 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 magnesium stearate, talc and colloidal silicon dioxide (pre-screened through a 40-mesh sieve). Blend the dried granules with the lubricants in a V-blender for 2 minutes at 20 rpm.

5. Compress the blended granules into tablets on a tablet press as follows:

- Punches: 17 x 8 mm biconcave capsule shaped
- Target weight: 612 mg
- Mechanical strength: 16 - 20 kP
- Friability: NMT 0.5 % w/w (100 revolutions)

Note: The tablets can be coated with a non-aqueous solution of hypromellose substitution type 2910 in isopropyl alcohol and methylene chloride to a weight gain of 6 mg/tablet.

Verapamil Hydrochloride Extended Release Tablets

Final Tablet Properties:
Appearance: Capsule shaped, biconvex tablets
Weight (mg)*: 614 ± 10
Thickness (mm)*: 5.56 ± 0.1
Mechanical Strength (kP)*: 17.50
Friability (100 revolutions) (%): 0.13
Dissolution: Comply with the Test 3 of the USP monograph of Verapamil HCl ER Tablets

*Average ± SD

Dissolution**(% average of 6 tablets)		
Time (h)	**Lubrizol**	**USP Limits**
1	14.55	8 – 20
2	24.32	15 – 35
3.5	35.18	27 – 57
5	51.00	45 – 75
8	82.50	NLT 80

**USP Apparatus 2, 50 rpm, 1 hour in 900 ml 0.1N HCl followed by 7 hours in 900 ml pH 6.8 buffer with sinkers.

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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