

Coating Performance Study Of INSTACOAT™ 4G Using Various Spray Guns And Nozzles

S. Pareek, K. Oza, S. Negi, S. Bandbe
Ideal Cures Pvt. Ltd.

QR Code Only

CONTACT INFORMATION: info@idealcures.co.in/ +(91)-22-42688700

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PURPOSE

Spray nozzles are commonly used in the application of coatings to provide a finely atomized spray, which adheres to the tumbling tablets to form a thin, uniform coating. Slight changes in coating uniformity or thickness can cause adverse effects on the quality of the finished tablet product. Spray guns have recently been developed with unique nozzle designs that enhance aerodynamic properties and minimize air consumption, thus reducing the risk of unwanted spray drying. These factors coupled with the latest anti-bearding technology plus excellent uniformity of droplet size distribution, eliminate the need for cleaning of air caps during the coating process and provide superior coating uniformity. The purpose of this work was to evaluate the coating performance of an aqueous high solids coating formulation, INSTACOAT™ 4G and a standard HPMC system, comparing three different spray guns (Gansons GHPN-III, Spraying Systems RAU & Schlick 930 ABC).

OBJECTIVE

The objective of this study was to perform coating trials using high solid aqueous coating formulation to compare three different spray guns.

METHOD

INSTACOAT™ 4G, IDEAL CURES revolutionary high solids aqueous coating formulation, was reconstituted at 35% solids and applied at a target weight gain of 2.5% w/w.. This coating product has been designed to provide fast drying of tablets at high spray rates without causing gun blockage.

Gansons High Performance Spray Nozzle (GHPN-III), Spraying Systems RAU and Schlick spray nozzles were used for these studies and evaluated for coating performance using different parameters. Spray patterns were visualized on paper surfaces using each nozzle at a distance of approximately 12 to 15 cm inches distance from the gun.



Figure No.1: Different Gun Nozzles

Preparation of Coating Suspensions:

The INSTACOAT™ 4G coating formulation was reconstituted in water at 35% w/w solids level and stirred for 45 minutes.

Coating Process:

Coating trials were performed using predetermined optimised coating conditions at the Ideal Cures laboratory facility in a Gansons Autocoater Model GAC-600 fitted with a 24 inch diameter pan. Coating suspensions were screened 100# prior to application.

Table No. 1: Core Tablet Details

Placebo Tablets dimensions	11 mm diameter and 4.38 mm thickness round shaped tablets INSTACOAT™ logo on both sides.
Hardness (kg/cm ²)	8-9
Friability (%)	0.1

Table No. 2: Coating Process Parameter

Nozzle Type	Schlick	RAU	GHPN-III
Coating Pan Details			
Pan Diameter (Inch)	24		
Baffles (No.)	6		
Spray Gun Details			
No. of Guns	1		
Liquid Nozzle Diameter (mm)	1.0		
Coating Process Parameters			
Batch Size (kg.)	10		
Inlet Air Temperature (°C)	60-70	65-70	65-70
Product Bed Temperature (°C)	42-45	42-45	42-45
Exhaust Temperature (°C)	50-60	65	65
Inlet CFM*	2500	2500	2500
Exhaust rpm**	1650	1650	1650
Atomizing Air Pressure (kg/cm ²)	2.2	2.2	2.2
Fan Air Pressure (kg/cm ²)	3.0	3.0	1.8
Pan Differential Pressure (bar)	5-6	5-6	5-6
Pan Speed (rpm)	11-13	11-13	11-13
Peristaltic pump speed (rpm)	2-4	2-4.5	2-4.5
Spray Rate (g/min.)	23.62	22.76	27.70
Spray Time (min.)	47	28	33
Weight gain (%)	3	3	3

RESULTS

Coating trials were carried out successfully in a 24 inch Gansons Autocoater 600 using predetermined coating parameters with three spray gun/nozzle combinations at Ideal Cures Goregaon Laboratory. INSTACOAT™ 4G (35% w/w solids content) was used in these studies. Coating suspensions were prepared according to the standard reconstitution procedure for this coating material. The resultant suspension was evaluated and the results summarized in Table No. 4.

Table No. 4: Coating Suspension Characteristics

Sr. No.	Parameter	Observations
		INSTACOAT™ 4G
1	Appearance	Free-flowing, agglomerate free coating suspension
3	Viscosity (cP)	176.1

Coating process evaluation was carried out in terms of coating process time, finished tablet appearance, spray pattern and quantity of suspension remaining after reaching the target weight gain.

Table no. 5: Coating Process Evaluation

Parameter	Schlick	RAU	GHPN-III
Coating Process Time (min.)*	47	28	33
Appearance of Tablets	Smooth surface, no logo filling observed		
Initial Quantity of Suspension (g.)	1020		
Quantity of Suspension Remaining (g.)	75	180	269

**The same experiment was performed using HPMC based formulation (Hydro-alcoholic Solvent System). The time required to complete coating process was 60 Min., 45 Min., and 50 Min. for Schlick, RAU and GHPN-III gun nozzles respectively.*

CONCLUSION

It was found that the INSTACOAT™ 4G high solids, low viscosity coating formulation could be rapidly applied at 35% solids of the coated tablets. The coating process time required for INSTACOAT™ 4G is also significantly reduced. It was reduced by 21.67%, 44% and 26.67% using Schlick, RAU and GHPN nozzles respectively compared to HPMC based system. These unique features INSTACOAT™ 4G makes an ideal and preferred choice for film coating.

FUNDING / GRANTS / ENCORE / REFERENCE

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