Physicochemical stability of lansoprazole 3 mg/mL and 10 mg/mL oral suspensions in SuspendIt®

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Lansoprazole is a proton pump inhibitor with actions and uses similar to those of omeprazole. The commercially available capsules and tablets are not licensed for use in children and do not permit flexible age/weight adjustments of the dosage strength[1]. As such, an alternative extemporaneous preparation was developed for lansoprazole 3 mg/mL and 10 mg/mL in the child-appropriate vehicle SuspendIt® (sugar-free, paraben-free, dye-free and gluten-free). The corresponding Beyond-Use Dates (BUDs) were determined by testing the physicochemical stability of the oral suspensions.

Methodology

A batch of 1,500 mL was prepared for lansoprazole 3 mg/mL and for lansoprazole 10 mg/mL by adding the active ingredient to SuspendIt®, as well as the following excipients: acesulfame potassium 4.5 g, steviol glycosides 95% 4.5 g, sodium bicarbonate 165 g, polysorbate 20 3 mL, flavor (watermelon), and sodium hydroxide 10% (as required, pH adjustment). Each oral suspension was distributed into 50-mL amber plastic bottles and the study samples were then stored for 181 days in a laboratory refrigerator at a temperature of 5ºC ± 3ºC; and in an environmentally controlled chamber at a temperature of 25ºC ± 2ºC and relative humidity of 60% ± 5%. The physical characterization consisted in observing all samples for appearance/color and odor, and testing for pH and density. The chemical characterization consisted in a validated, stability-indicating Ultra-High Performance Liquid Chromatography (UHPLC) assay testing (Waters Acquity). At pre-determined time points [0 (baseline), 7, 17, 31, 45, 60, 91, 119, and 181 days], a study sample (one unopened bottle) of each strength was withdrawn from the storage conditions, shaken vigorously and tested for physicochemical stability.

Rx

Lansoprazole	0.3 or 1 g
Acesulfame potassium	0.3 g
Steviol glycosides 95%	0.3 g
Sodium bicarbonate	11 g
Polysorbate 20	0.2 mL
Flavor (Watermelon)	qs
Sodium hydroxide 10%	qs
Vehicle: SuspendIt®	qs 100 mL

Results & Discussion

Considering the physical characterization, the lansoprazole oral suspensions stored at refrigerated temperature exhibited a homogeneous pink color, opaque, smooth appearance, and a watermelon odor across the study. The range of densities (1.069-1.077 g/mL for 3 mg/mL and 1.072-1.080 g/mL for 10 mg/mL) and the range of pH (8.4-8.6 for 3 mg/mL and 8.3-8.5 for 10 mg/mL) were within the limits. The lansoprazole oral suspensions stored at room temperature, on the other hand, exhibited remarkable changes of color, appearance and odor over the 181 days of the study. Considering the chemical characterization, the chromatographic assay method was validated by evaluating the system suitability, linearity, accuracy, precision (repeatability and intermediate), robustness, solution stability, and specificity. Subsequently, the percent potency was calculated taking into account the baseline measurements on day 0. The potency of the oral suspensions remained within the ±10% specifications[2] throughout the study for the refrigerated temperature, as follows: 96.88% - 100.03% for 3 mg/mL and 98.54% - 101.72% for 10 mg/mL. For the room temperature, the potency of the oral suspensions 3 mg/mL was below the limits from day 60 but it was within the specifications for the oral suspensions 10 mg/mL (95.05% - 99.26%). As a result, the lansoprazole oral suspensions from 3 mg/mL up to 10 mg/mL (bracketed study) are physically and chemically stable at 5°C (only), for 181 days in amber plastic bottles.

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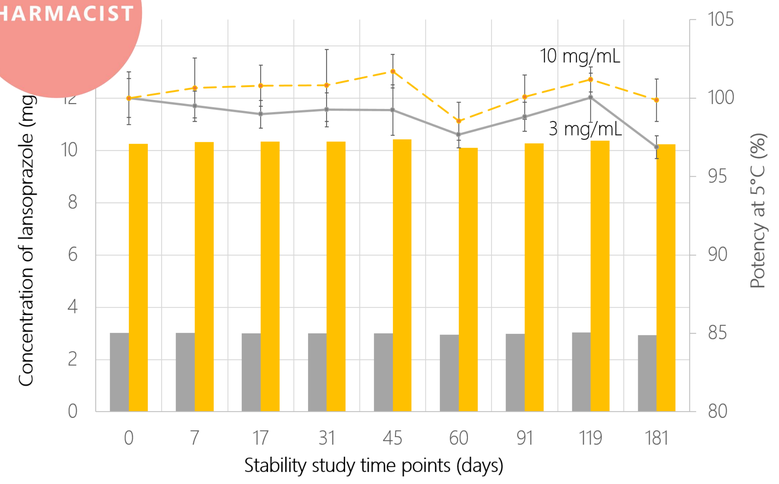

The BUD of the lansoprazole 3 mg/mL - 10 mg/mL oral suspensions (SuspendIt®) is 6 months at refrigerated temperature, in amber plastic bottles.

1. Paediatric Formulary Committee (2016) BNF for Children. London: BMJ Group and Pharmaceutical Press, p.51,54-5.

2. The United States Pharmacopeial Convention (2016c) 'General Requirements / <2> Oral Drug Products – Product Quality Tests'. USP 39 – NF 34. Rockville: USP, p.77.