

Paracetamol Suspension

The suspension contains **Paracetamol 120 mg per 5 ml**. This oral suspension features **Carbopol® 971P NF polymer** which is used as a suspending agent in the formulation. The formulation does not show any sedimentation tendency because of high yield value - high suspending ability- of Carbopol® 971P NF polymer at low inclusion level.

Number	Ingredients	% w/w
	Part A (Carbopol® polymer dispersion phase):	
1.	Carbopol® 971P NF polymer	0.30
2.	Disodium EDTA	0.05
3.	Sodium saccharine	0.15
4.	Deionized water	12.00
	Part B (sugar syrup phase):	
5.	Methyl paraben	0.20
6.	Propyl paraben	0.02
7.	Sucrose	50.00
8.	Sorbitol solution (70%)	12.50
9.	Deionized water	35.00
	Part C (neutralization):	
10.	Sodium hydroxide solution (10% w/w)	q.s to ~pH 5.0
	Part D (drug phase):	
11.	Paracetamol (D 90 of 50 µ)	2.40
12.	Polysorbate 80	0.50
13.	Deionized water	10.00
	Part E:	
14.	Carmoisine color (1% solution)	0.20
15.	Strawberry flavor	0.50
16.	Deionized water	q.s to 100.00

Lab batch size - 1000 mL

Process:

1. Part A (Carbopol polymer dispersion phase): Add deionized water in a vessel equipped with dispersing type or propeller type impeller. Dissolve disodium EDTA and sodium saccharine in this water. Disperse Carbopol® 971P NF into the water by submerging the impeller until it is very close to the bottom of the vessel. Angle the impeller to generate a vortex that is 1 to 1½ impeller diameters. Slowly sift the polymer through a stainless steel 20 mesh screen into the vortex of the rapidly agitating liquid (about 800-1500 rpm). Increase the agitation as the viscosity of the dispersion increases to maintain a vortex. After all of the dry polymer has been introduced, reduce the agitation to 400-600 rpm and reposition the mixer to vertical position to avoid or minimize air entrapment. Continue the agitation for about 45 minutes, or until a lump-free dispersion is attained.

2. Part B (sugar syrup phase): Dissolve methyl paraben and propyl paraben in deionized water that has been heated to 95°C. Add sucrose and maintain the temperature at 75°C to dissolve the sugar. Filter the sugar solution through a 100 mesh nylon filter while hot. Add the sorbitol solution and mix well. Cool the syrup to room temperature.

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3. Add the Carbopol® polymer dispersion phase (Part A) to the cooled syrup phase (Part B) and mix for 15 minutes.
4. **Part C:** Neutralize the above mixture with the 10% sodium hydroxide solution to pH 5.0 (desired range 4.7 to 5.1) and mix for 30 minutes using a U or paddle shaped low-shear mixer.
5. **Part D (Drug Phase):** Dissolve polysorbate 80 in deionized water. Add paracetamol and homogenize using suitable homogenizer to obtain a smooth, white dispersion.
6. Add Part D to Part C and mix for 15 minutes.
7. **Part E:** Add the color and flavor and continue mixing for 15 minutes using U or paddle shaped low-shear mixer. Add water to the specified batch size. Continue mixing for at least 30 minutes until achieved uniform pH and viscosity.

Product Properties	Stability
Appearance: Smooth, red suspension	Stable for a minimum of 3 month when stored under the following ICH conditions:
pH: 4.90	Long term (25 ± 2°C / 60 ± 5% relative humidity)
Viscosity (cP)*: 1,327 • *Brookfield RVT @25°C, 20 rpm, Spindle #3, measured at 24 hours	Accelerated (40 ± 2°C / 75 ± 5% relative humidity)

Design of mixing elements:



Propeller or dissolver for dispersing Carbopol polymers.



Homogenizer for preparing drug phase.



Paddle or U-shaped low-shear impeller for neutralization.

Summary:

Carbopol® polymers have demonstrated to be useful and highly efficient as rheology modifiers and suspension stabilizer making them a first choice when formulating liquid oral suspensions.

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

- Bulletin 04 - Dispersion Techniques; Bulletin 07 - Flow and Suspension Properties; Bulletin 22 - Oral Suspensions
- Dispersion and neutralization videos
- Technical Data Sheets, Test Procedures, Certificates, and other Formulations

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

