LUBRIZOL LIFE SCIENCE

HEALTH

Paracetamol Solution

The solution contains **Paracetamol 120 mg per 5 mL**. This oral solution features **Carbopol® 971P NF** polymer which is used as a rheology modifier in the formulation.

Number	Ingredients	% w/w
	Part A: Carbopol® polymer dispersion phase	
1.	**Carbopol® 971P NF polymer**	0.30
2.	Deionized water	25.00
	Part B (sugar syrup phase):	
3.	Sucrose	30.00
4.	Methyl paraben	0.20
5.	Propyl paraben	0.02
6.	Sodium saccharine	0.25
7.	Disodium EDTA	0.05
8.	Deionized water	25.00
	Part C (neutralization):	
9.	Sodium hydroxide solution (10% w/w)	q.s. to ~pH 5.00
	Part D (drug phase):	
10.	Paracetamol, USP	2.40
11.	Propylene Glycol	25.00
	Part E:	
12.	Mixed Fruit Flavor	0.25
13.	FD&C Red Number 40 (1% w/v Solution)	0.50
14.	Deionized water	q.s. to 100.00
	TOTAL:	**100.00**

Lab batch size – 1,000 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.

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 and mix for 30 minutes using a U or paddle shaped low-shear mixer.

5. **Part D (drug phase):** Dissolve the paracetamol in propylene glycol while stirring continuously.

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 uniform pH and viscosity is achieved.

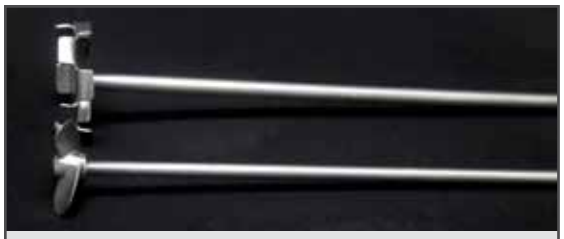
LUBRIZOL LIFE SCIENCE

HEALTH

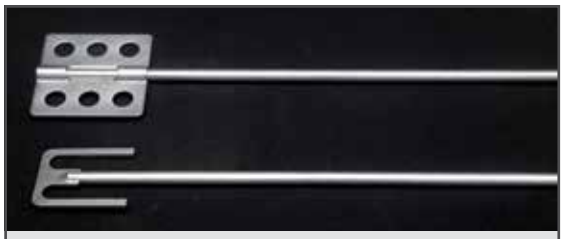
Paracetamol Solution

Product Properties	Stability
Appearance: Clear, red viscous solution	Stable for a minimum of 3 month when stored under the following ICH conditions:
pH: 5.00	Long term (25 ± 2°C / 60 ± 5% relative humidity)
Viscosity (cP)*: 370 • *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.



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 from video gallery
- Technical Data Sheets, Test Procedures, Certificates, and other Formulations

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

LUBRIZOL LIFE SCIENCE
9911 Brecksville Road
Cleveland, OH 44141-3201 USA
Lubrizol.com/Health

Edition: March 2020 • Previous Edition: June 2011