

## SPF 50<sup>a</sup> sunscreen spray with Eastman AQ™ 38S polymer

Part	Product Name	Wt%	Ingredient/INCI name	Manufacturer
A	Deionized water	51.32	Water (aqua)	—
	AMPHISOL® K	2.5	Potassium cetyl phosphate	DSM
	Glycerin	3.0	Glycerin	VVF
	EDETA® BD	0.05	Disodium EDTA	BASF
	Eastman AQ™ 38S polymer	3.0	Polyester-5	Eastman
B	Crodamol™ AB	5.0	C12-15 alkyl benzoate	Croda
	PARSOL® MCX	7.5	Ethylhexyl methoxycinnamate	DSM
	PARSOL® 340	4.0	Octocrylene	DSM
	Uvinul® M 40	6.0	Benzophenone-3	BASF
	Z-Cote® HP	1.43	Zinc oxide (and) triethoxycaprylsilane	BASF
	Neo Heliopan® HMS	8.0	Homosalate	Symrise
	Eusolex® OS	5.0	Ethylhexyl salicylate	EMD
	Cutina® GMS	2.0	Glyceryl stearate	BASF
Lanette® O	1.20	Cetearyl alcohol	BASF	
C	Preservative	q.s.	—	—

<sup>a</sup>SPF determined by *in vivo* testing.

### PROCEDURE

#### Part A

1. Combine all part A ingredients except Eastman AQ 38S polymer, and heat to 75°C while stirring.
2. Add Eastman AQ 38S pellets at 75°C; continue stirring until pellets are completely dispersed.

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## Part B

3. Combine part B ingredients and heat to about 85°C, stirring continually until mixture is completely dissolved.
4. With part A at 75°C and part B at 85°C, gradually add part B to part A with rapid stirring. Continue stirring until the combined parts A and B pre-emulsion is homogeneous.
5. Homogenize\* the combined parts A and B pre-emulsion at high speed for 10 minutes with no additional heating; cover container to prevent water loss.
6. While stirring, cool the combined parts A and B emulsion to 40°C or less.

## Part C

7. Add preservative at 40°C or less while stirring. If necessary, adjust pH to 6.0–7.0 with dilute sodium hydroxide solution.

*\*Suitable laboratory homogenizers include rotor-stator, slotted-head mixers—with a head diameter of 4.5 cm or more—available from Silverson Machines, Inc. or Janke & Kunkel. The mean particle diameter of this homogenized emulsion is about 0.7–1.2 micron, which is in a desired range for formula stability. Since homogenizer type, homogenizer head design, and rotor speed may produce different mean particle sizes, it is up to the formulator to obtain their required particle size.*

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