



## Zemea® USP-FCC Propanediol

Solubility of flavoring materials.

**Comparing the solubility of each flavor chemical  
(in terms of mL of the specific flavor chemical) in 1L of  
Zemea® Propanediol (PDO) or Propylene Glycol (PG) solvent/  
water mixtures (20% glycol to 100% glycol).**

**Percentage Solvent/Water Mixtures At 25°C (77°F)**

FLAVOR CHEMICAL	100%		80%		60%		40%		20%	
	PDO	PG	PDO	PG	PDO	PG	PDO	PG	PDO	PG
ALCOHOL C-10	x	x	15	x	2.1	4.1	<1	0.5	<1	0.2
ALDEHYDE C-16	x	x	15	22.5	0.5	0.8	<1	0.5	<1	0.4
ALLYL CAPROATE	151	162.8	22	23.4	1.2	3.8	<1	0.5	<1	0.3
AMYL ACETATE	x	x	x	x	x	x	3.1	18.2	2	15.5
AMYL BUTYRATE	40	142.4	9	23.9	2	4.9	0.6	2.0	<0.5	0.6
AMYL FORMATE	90	x	18	65.1	13	56.2	5	20.3	3.2	19.9
ANETHOL NAT. EX STARANISE	25	54.9	3.3	6.9	1.3	2.7	0.04	0.4	<0.04	<0.2
ANISOIL CRUDE	22	29.7	3.3	6.2	0.93	2.0	<1	0.5	<1	0.2
BAY OIL	20	9.7	0.41	1.8	0.21	0.5	0.09	0.2	<0.09	<0.2
BENZYL ACETATE FG	110	x	42	83.9	12	19.9	1.4	4.1	<1	2.7
BENZALDEHYDE NAT.	x	x	131	232.8	21	47.5	7.3	18.1	3.9	7.8
BENZYL PROPIONATE	x	x	17	41.3	2.5	8.0	0.7	2.4	<0.5	1.1
CARAWAY OIL RECT.	16	28	3.2	5.5	<1	0.5	<1	0.3	<1	0.3
CASSIA OIL ENRICHED	x	x	11	31.7	2	7.9	1.9	6.9	1.7	2
CASSIA OIL REDIST. USP FCC	130	x	53	52.7	7	9	<1	1	<1	0.5
CELERY OLEORESIN 09-01	3	1.2	0.4	0.4	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
CINNAMIC ALDEHYDE	x	x	35	17.5	11	3	1.2	0.5	<1	0.2
CITRAL NAT.	50	x	4	3.5	1.9	2.3	<1	1.2	<1	0.5
CLOVE LEAVES OIL	60	x	6	11.9	2	3	1.2	2	<1	0.9
DIACETYL	x	x	x	x	x	x	x	x	400	209
DILL WEED OIL	18	13.3	0.7	0.5	0.4	0.3	<0.2	<0.2	<0.2	<0.2
ETHYL ACETATE	x	x	x	x	x	x	95	148.4	76	99.8
ETHYL BUTYRATE	x	x	125	133.2	30	37.1	3.1	3.4	<1	0.9
ETHYL CINNAMATE	80	179.1	19	31.1	2.1	4.6	0.2	0.8	<0.2	0.3
ETHYL FORMATE	x	x	x	x	x	x	110	x	100	234.1
ETHYL ISOVALERATE	60	298.7	25	86.6	11	27.4	3.2	8.3	2.8	8.1

X= Completely Miscible | NM= Not Miscible

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water mixtures (20% glycol to 100% glycol).**

**Percentage Solvent/Water Mixtures At 25°C (77°F)**

FLAVOR CHEMICAL	100%		80%		60%		40%		20%	
	PDO	PG	PDO	PG	PDO	PG	PDO	PG	PDO	PG
EUCALYPTOL NAT.	160	278.5	60	55.8	5.8	19.7	<1	4.5	<1	3.4
EUGENOL	x	x	-	-	60	383.8	<0.5	1.2	<0.2	0.5
GINGER OIL	<0.2	<0.2	-	-	-	-	-	-	-	-
GINGER OLEORESIN	NM	NM	-	-	-	-	-	-	-	-
LEMON OIL ARG.	5.2	9.8	2.2	6.1	1.3	3.7	<1	2.2	<1	0.4
LIME OIL DIST.	4.5	18.3	0.1	1.8	<0.1	1.9	<0.1	0.5	<0.1	<0.2
MACE OIL	4	12.5	1.1	3.3	0.2	0.5	0.1	0.3	<0.1	0.2
METHYL ANTHRANILATE	x	x	110	240.2	12.8	32.3	<1	4.4	<1	3.5
METHYL CYCLOPENTENOLONE NAT. ANHYDROUS	106	187.7	98	179.4	91	147.1	52	84.5	50	47
METHYL SALICYLATE NAT.	55	191.1	13.4	37.4	4.1	9.1	1.1	2.7	<1	1.7
NUTMEG OIL	5.8	5.7	1.4	3.5	0.9	2.0	<1	1.6	<1	1.1
ORANGE OIL BRAZIL	3	1.6	<0.15	1.6	<0.1	1	<0.1	0.7	<0.1	0.4
PEPPER BLACK OLEORESIN	NM	NM	-	-	-	-	-	-	-	-
PEPPERMINT ARV. OIL DMO	15	x	3	3.1	0.4	0.5	<0.4	0.2	<0.4	<0.2
PETITGRAIN OIL MANDARINE	17	<0.2	3	7.6	<1	1.3	<1	0.5	<1	0.2
PHENYLETHYL ALCOHOL	x	x	x	x	x	x	120	240.2	14	32
PHENYLETHYL FORMATE	80	204.4	26	34.9	5	5.5	<1	1.4	<1	0.3
PHENYLETHYL PROPIONATE	71	x	14	66.7	3	9.4	1.1	3.3	<1	2
PIMENTO LEAVES OIL WESTIND. RED	85	x	65	9.7	23	1.6	-	0.6	-	0.3
SAGE OIL DALMATIA	25	18.9	1	2.2	<1	1.1	<1	0.5	<1	0.2
SPEARMINT OIL 65% AMERIC. NATIVE	38	8.3	12	0.5	3.8	0.4	-	0.2	-	0.2
THYME OIL WHITE	50	x	4	10.5	0.5	2.4	<0.1	0.8	<0.1	<0.2

The purpose of this chart is to provide the formulator guidance as to the differences in flavor chemical solubility in specified concentrated aqueous solutions

X= Completely Miscible | NM= Not Miscible

**For additional information or samples:**

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