





Replacing Artificials

Alternatives to Sunset Yellow / FD&C Yellow 6

Givaudan
Human by nature

Yellow 6 Overview

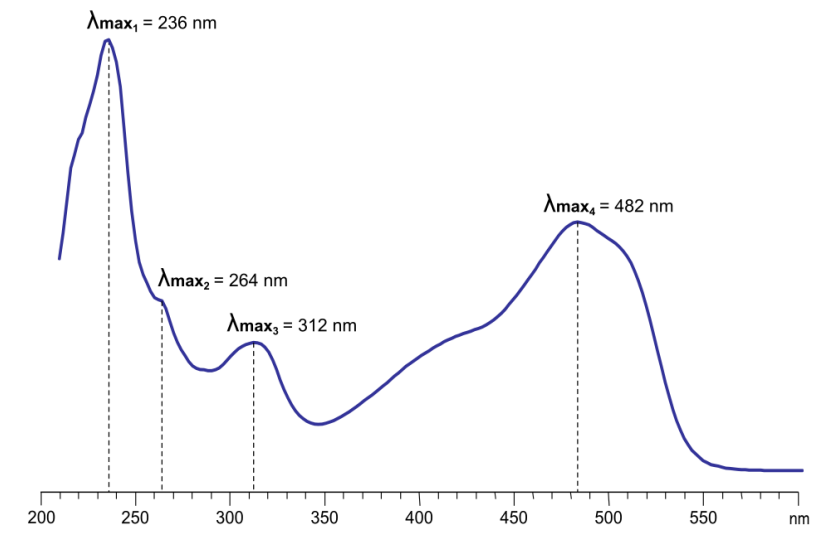
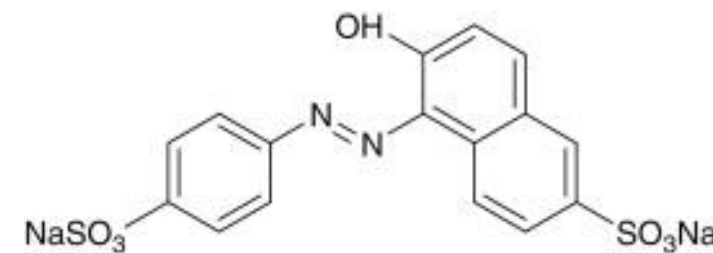
Yellow 6 Overview

- Max spectrum in the visible range at $\lambda = 482\text{nm}$
- Orange to reddish-orange color
- Fades in presence of ascorbic acid
- Monoazo Dye -N=N-
- Acceptable Daily Intake (ADI) of 4 mg//kgbw/day, according to JECFA and EFSA(EU)
- No classifiable as to its carcinogenicity to humans, (IARC, group 3)
- No evidence of genotoxicity
- Mentioned in McCann et al., 2007 (SouthamptonStudy) as one of the 6 synthetic colors that can impact the attention level of children.



 pH 2.0-7.0

Source: Gobara, et al. 2016



Natural Options



Paprika

- Bright orange shade
- Belongs to the carotenoids family (xanthophylls)
- Max peak at $\lambda \approx 462$ nm, in acetone
- Oil soluble pigments: capsanthin and capsorbin
- Stable W/O emulsions, between pH 3.0-7.0
- Fair heat and light stability, that is improved with the addition of about 300 ppm ascorbic acid to the food matrix
- Available as a deodorized extract



pH 3.0-7.0





Annatto

- Shades from golden yellow to orange
- Belongs to the carotenoids family (xanthophylls)
- Available as an oil soluble pigment (bixin) or as a water soluble one (norbixin)
- Norbixin: max peaks at λ 453 nm and 482 nm, in alkaline solutions
- Bixin: max peaks at λ 425, 457 and 487 nm, in acetone
- Norbixin is stable at pH >4.0
- Acid proof formula available *
- Heat and light stable



pH 3.0*-7.0





Vegebrite® Orange Carrot

- Orange-y to golden yellow color
- Concentrated carrot juice obtained from agronomically selected carrots with high carotenoids content
- Stable between pH 3.0-7.0
- Extremely clean labeling (Colouring Foods in EU, Vegetable Juice in the US)
- Agronomy expertise in carrots
- Continuous improvement efforts to increase product offering and color intensity
- Available in liquid & powder formats
- Worldwide approval



pH 3.0-7.0





Beta-Carotene

- Golden yellow color
- Max peak at $\lambda \approx 455$ nm in acetone
- Fair heat and light stability, that is improved with the addition of about 300 ppm ascorbic acid to the food matrix
- Wide variety of formats and a range of emulsification systems for use in just about any application and local market's regulatory environment
- Effective alternative to blends of Yellow #5/Tartrazine (E102) & Yellow #6/Sunset Yellow (E110)



pH 3.0-7.0



Carminic Acid

- Bright orange with orange-red fluorescence
- Max peak at $\lambda \approx 494$ nm in dilute hydrochloric solution
- Water soluble
- Stable orange color at pH < 5.0. Shifts to red and magenta at higher pH levels, but it is not stable.
- Very good heat and light stability
- Non-Kosher nor apt for vegetarian or vegan diets



pH < 5.0



Apocarotenal (-Apo8'-carotenal)

- Orange Color
- Nature Identical carotenoid
- Max peak at $\lambda \approx 460$ nm
- Stable emulsions between pH 3.0-7.0
- Fair heat and light stability, that is improved with the addition of about 300 ppm ascorbic acid to the food matrix
- Wide range of emulsification systems for use in just about any application and local market's regulatory environment
- Effective alternative to Yellow #6/Sunset Yellow (E110)



pH 3.0-7.0



Orange

Collection at a glance

Colour Shades		Name	Form	Main Ingredient	Confections	Beverages	Snacks	Frozen Desserts	Pet Food
		emSeal® Paprika	LWS	Paprika Extract	Y	Y	Y	Y	Y
		Paprika	LOD/P	Paprika Extract	Y (white chocolate)	-	Y	-	-
		Apocarotenal	LWS		Y	Y	-	-	-
		Carminic Acid	LWS	Carminic Acid	Y	Y	-	Y	-
		michroma™ Annatto	LOD	Annatto Extract	Y	-	Y	-	-
		Annatto	LWD/LOD/P	Annatto Extract	Y (white chocolate)	Y (dairy)	Y	Y	Y
		Vegebrite® Orange Carrot	LWS/PWS	Carrot concentrate	Y	-	-	Y	-
		emSeal® Beta-Carotene	LWS/PWS	Beta-carotene	Y	Y	Y	Y	Y
		Beta-Carotene	LOS	Beta-carotene	Y (white chocolate)	-	Y	Y	-

Natural Colors in Application

Beverages (Clear)

Sunset Yellow



emSeal®
Paprika



Carminic Acid
Lutein



Vegebrite® Lemon Yellow
+
Vegebrite® Red Radish



emSeal® beta-carotene
+
Amaize® Orange Red



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Beverages (Cloudy)

Sunset Yellow



Vegebrite®
Orange



emSeal®
Paprika



emSeal® beta-carotene
+
Amaize® Orange-Red



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Frozen Desserts

Ice Cream	Yellow 6	Vegebrite® Orange Carrot	emSeal® Paprika	Annatto	Annatto	
						
Sorbet	Yellow 6	Vegebrite® Orange Carrot	emSeal® Paprika	Annatto	emSeal® Beta-carotene	Carminic Acid
						
Ice Pops						
						

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Bakery

Cakes

Yellow 6



Paprika



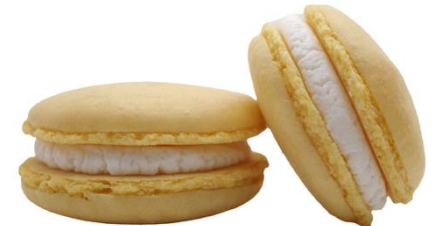
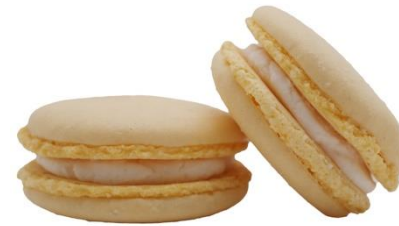
Annatto



Vegebrite® Orange Carrot



Macarons



Givaudan

Frosting & Fillings

Buttercreams



Yellow 6



Annatto



Paprika



Annatto + Curcumin

Fruit Fillings



Yellow 6



emSeal® Paprika



Annatto



Vegebrite® Orange Carrot

Fat Fillings



Yellow 6



michroma™ Annatto



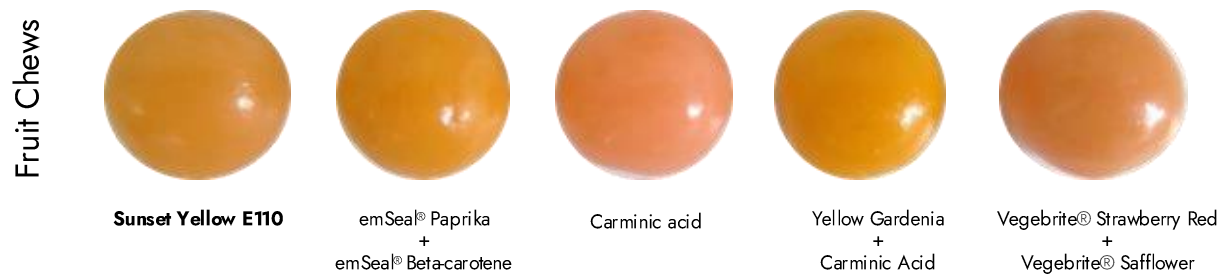
michroma™ Annatto



Paprika

Givaudan

Confections



Givaudan

Confections

Panned Candies



Yellow 6



emSeal® Paprika



Annatto



Radish + Curcumin



Vegebrite® Orange Carrot

White Chocolate



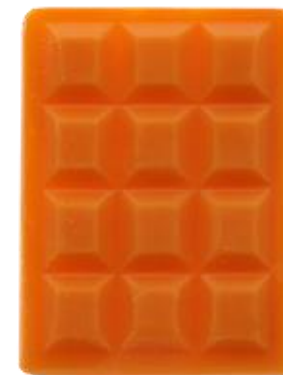
Yellow 6



Paprika



Paprika



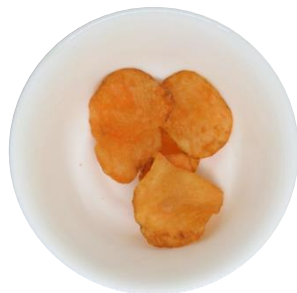
michroma™
Annatto



Annatto

Snacks

Seasonings



FD&C Yellow 6
Lake



Paprika



Paprika + Amaize®
Orange Red



Paprika + Curcumin +
Amaize® michroma™
Berry Red

Slurries



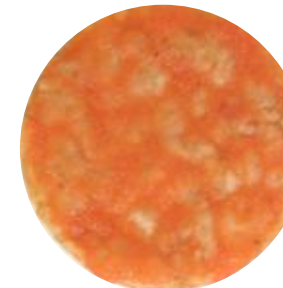
FD&C Yellow 6
Lake



Paprika OS



Beta Carotene OSS



Blend Paprika OS +
michroma™ Berry Red

Extrusion



FD&C Yellow 6
Lake



emSeal® Paprika



Annatto



Red Beet

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