



OREGON

STRAWBERRY

COMMISSION

PRODUCT

DEVELOPMENT

GUIDE

MICRO-NUTRIENT CHART

SUBSTANCE	MEASUREMENT	AMOUNT	NUTRACEUTICAL SIGNIFICANCE
Alanine	µg/g	310	Amino acid, component of protein
Alpha -Linolenic-Acid	µg/g	780	Omega 3 fatty acid found in the strawberry seeds, similar to fat in flaxseed
Alpha-carotene	µg/g	.05	Carotenoid, similar to beta-carotene, can be converted to vitamin A, antioxidant, anti-carcinogenic
Alpha-tocopherol	µg ATE/g	1.4	Vitamin E, antioxidant
Anthocyanin	µg/100g	450-1,000	Antioxidant, protects membranes
Arginine	µg/g	260	Amino acid, may affect immune function
Ascorbic Acid	µg/g	567	Vitamin C, antioxidant
Aspartic Acid	µg/g	1380	Amino acid, component of protein
Boron	µg/g	1-160	Possible role in maintaining strong bones, may be needed for proper membrane function
Caffeic Acid	µg/g	2	Phenolic acid, antioxidant activity
Calcium	µg/g	140	Helps build strong bones and teeth, involved in nerve transmission and muscle contraction
Chromium	µg/g	0.005-0.18	Works with insulin to regulate blood sugar levels
Coumaric acid	µg/g	14-27	Phenolic acid, antioxidant activity
Cystine	µg/g	50	Amino acid, component of protein
Ellagic Acid	µg/g	570	Anticancer activity
Ferulic acid	µg/g	2	Phenolic acid, antioxidant activity
Fiber	µg/g	23.000	Helps reduce cholesterol
Flavonols	µg/g	35-79	Antioxidant benefits, includes quercetin and kaempferol
Folic acid	µg/g	0.18	Needed for proper red blood cell formation, cell division and protein synthesis
Gallic Acid	µg/g	80-121	Phenolic, with antioxidant activity
Glutamic Acid	µg/g	900	Amino acid, component of protein
Glycine	µg/g	240	Amino acid, component of protein
Histidine	µg/g	120	Essential amino acid
Iodine	µg/g	0.157-0.23	Needed for proper functioning of the thyroid gland
Iron	µg/g	3.8	Constituent of hemoglobin, helps transport oxygen in body and prevents anemia
Isoleucine	µg/g	140	Essential amino acid
Leucine	µg/g	310	Essential amino acid
Lutein	µg/g	0.3-3	Carotenoid, important for vision
Lysine	µg/g	250	Essential amino acid
Magnesium	µg/g	100	Needed in enzyme systems involved in energy production
Manganese	µg/g	2.9	Co-factor in enzyme systems, involved in bone formation, energy production and protein metabolism
Methionine	µg/g	10	Essential amino acid
Pantothenic Acid	µg/g	3.4	Important in nerve and brain metabolism
Phosphorus	µg/g	190	Maintains strong bones and teeth
Proline	µg/g	190	Amino acid, component of protein
Riboflavin	µg/g	0.7	Releases energy from food, necessary for healthy skin and eyes
Salicylic Acid	µg/g	13.6	May help decrease clotting risk factor for cardiovascular disease
Selenium	µg/g	.007	Antioxidant, protects vitamin E
Serine	µg/g	230	Amino acid, component of protein
Silicon	µg/g	10-270	May be important for proper bone structure and growth
Thiamin	µg/g	0.2	Needed for releasing energy from food and normal nervous system
Threonine	µg/g	190	Essential amino acid
Tryptophan	µg/g	70	Essential amino acid
Valine	µg/g	180	Essential amino acid
Vitamin B-6	µg/g	0.6	Important for protein and fat metabolism
Zinc	µg/g	0.33	Important in protein synthesis, wound healing and growth

OREGON STRAWBERRY VARIETIES

VARIETY	CHARACTERISTIC
Totem	Predominant cultivar of Oregon <ul style="list-style-type: none"> • High soluble solids • Excellent titratable acidity for fruity taste • Flesh remains firm with texture in products • Ice cream berry • Large fruit, fully red internally and externally
Redcrest	<ul style="list-style-type: none"> • High soluble solids • Flesh remains firm • Large conic fruit, with ultra red internal and external color
Puget Reliance	<ul style="list-style-type: none"> • High yield, large fruit • High soluble solids and good acidity • Ice cream berry • Deep red internal and external color

STRAWBERRY CHEMISTRY

MEASUREMENT	AMOUNT	ANALYSIS
pH	3.27-3.86	High acidity helps stabilize color
Titratable acidity	.58-1.35g/100g	Citric and malic are primary organic acids contributing excellent flavor
Soluble solids (Brix)	8.0-11.5%	High soluble solids ideal for juice concentrate market
Soluble solids/acid ratio	8.52-13.79	Good balance of sweet-tart flavor notes

STRAWBERRY COMPOSITION

AMOUNT PER 100 GRAMS

NUTRIENTS	UNITS	F*	WS*	SS*
Water	g	91.57	78.05	73.13
Energy	kcal	30	78	96
Protein	g	0.61	0.52	0.53
Fat	g	0.37	0.14	0.13
Carbohydrate	g	7.02	21.00	25.92
Fiber, total dietary	g	2.3	1.9	1.9
Ash	g	0.43	0.30	0.24
Calcium	mg	14	11	11
Iron	mg	0.38	0.47	0.59
Magnesium	mg	10	6	7
Phosphorus	mg	19	12	13
Potassium	mg	166	98	98
Sodium	mg	1	1	3
Zinc	mg	0.13	0.05	0.06
Copper	mg	0.049	0.019	0.020
Manganese	mg	0.290	0.249	0.250
Selenium	mcg	0.7	0.7	0.7
Vitamin C	mg	56.7	39.5	41.4
Thiamin	mg	0.020	0.015	0.016
Riboflavin	mg	0.066	0.077	0.051
Niacin	mg	0.230	0.293	0.401
Pantothenic acid	mg	0.340	0.108	0.108
Vitamin B6	mg	0.059	0.028	0.030
Folate	mcg	18	4	15
Vitamin A	IU	27	27	24
Vitamin A, RE	mcg	3	3	2
Vitamin E	mg ATE	0.140	0.270	0.140

F* = Fresh, WS* = frozen whole sweetened, SS* = frozen sliced sweetened

Source: USDA Nutrient Database for Standard Reference, Release 12 (1998).

TOTAL SUGARS

per 100 g fresh	5.8
Monosaccharides	
Glucose	2.2
Fructose	2.5
Disaccharides	
Sucrose	1.0
Maltose	0.1

per 100 g frozen, unsweetened	6.5
Monosaccharides	
Glucose	3.0
Fructose	3.0
Disaccharides	
Sucrose	0.5
Maltose	---

Source: USDA Sugar Content of Selected Foods Individual and Total Sugars, September 1987.

OREGON STRAWBERRIES are an excellent source of vitamin C and are recognized as a source of potassium and dietary fiber. They are considered a fat and sodium free food.

PROCESSING SPECIFICATIONS

CATEGORY	PRODUCT	PROCESS	PACKAGING	STORAGE
FRESH		Oregon strawberries are available fresh during the months of June and July.	Shipped in standard berry containers	Cold storage at 32F° (1°C). Relative humidity: 90-95%
FROZEN	USED FOR FROZEN FOODS, BAKERY INGREDIENTS WHERE FLAVOR AND FRUIT IDENTITY IS NEEDED			
	Straight Pack	Fresh berries are processed, placed in containers and blast frozen at -10° F (-23°C).	Plastic pails, 30 lb., poly-lined metal drums 375, 400 lb.	0° to -10°F (-18° to -23°C)
	IQF	Individual ripe strawberries are pre-cooled, individually frozen.	Poly-lined cartons 30 lb. and other sizes	0° to -10°F (-18° to -23°C)
	Sweetened	Whole or sliced strawberries are blended with sweeteners (normal ratio is 4:1 and 3:1 berries to sweetener), packed and blast frozen.	Variety of plastic pails and poly-lined cartons	0° to -10°F (-18° to -23°C)
	Crushed Sweetened	Strawberries are crushed with sweetener in either 3:1 or 4:1 ratio.	Variety of plastic pails	0° to -10°F (-18° to -23°C)
LIQUID	USED IN FRUIT BEVERAGES, YOGURT, SMOOTHIES, AND AS A BASE FOR ICE CREAM FLAVORS			
	Juice	Single strength juice. Strawberries are crushed, pressed/filtered, pasteurized, packaged, and frozen. 9-10 Brix.	Plastic pails (5-6 gal., 50-66 lb.), metal drums (47-53 gal.), industrial packs (400-500 lb.)	0° to -10°F (-18° to -23°C)
	Juice Concentrate	Strawberries are crushed, pressed/filtered, pasteurized, vacuum concentrated, pasteurized, packaged, and frozen. 38 to 65 Brix.	Variety of plastic pails, metal drums and industrial packs	0° to -10°F (-18° to -23°C)
	Essence	Volatile flavor components of the strawberry are captured and distilled off during the juice and concentrate process.	Plastic pails (5-6 gal.)	Tightly closed container ≤ 40°F (4°C)
SHELF STABLE	USED IN THE BAKING INDUSTRY AS A TOPPING AND FILLING			
	Bakery/ Fruit Fillings	Frozen strawberries (puree can also be used) are sweetened, starch/gum based slurry is added, heated and packaged to specifications.	5 gal. pails, 55 gal. drums.	Shelf stable, store in cool, dry place
DRIED	USED IN CEREALS AND GRANOLA BARS			
	Freeze Dried	Fresh strawberries are flash frozen, placed in a vacuum chamber and sealed in moisture proof packs. Available in whole pieces, granules and powders.	Poly-lined corrugated boxes, custom packaging available	Stable at room temp for < 3 months. After 3 months store at 40°F (4°C)

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