

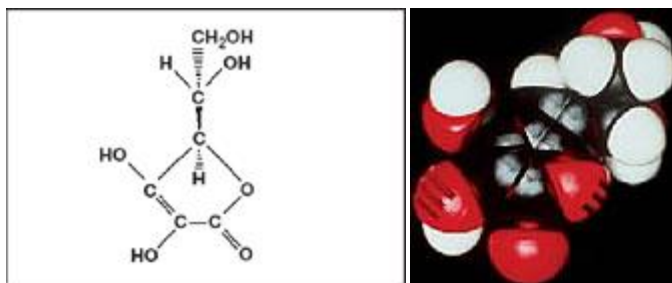
## PROCESS FOR PREPARATION OF VITAMIN-C

Ascorbic acid (vitamin C) is a water-soluble vitamin. It occurs as a white or slightly yellow crystal or powder with a slight acidic taste. It is an antiscorbutic product. On exposure to light, it gradually darkens. In the dry state, it is reasonably stable in air, but in solution it rapidly oxidizes. Ascorbic acid (vitamin c) is freely soluble in water; sparingly soluble in alcohol; insoluble in chloroform, in ether, and in benzene. The chemical name of ascorbic acid (vitamin c) is L-ascorbic acid (vitamin c) . The empirical formula is  $C_6H_8O_6$ , and the molecular weight is 176.13.

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The synthesis of ascorbic acid was achieved by Reichstein in 1933, followed by industrial production of ascorbic acid two years later by Roche. Today, vitamin C identical to that occurring in nature is produced on a very large industrial scale. The ultimate raw material for the production of vitamin C (ascorbic acid) is corn or wheat. This is converted via starch to glucose by specialist companies, and then to sorbitol. We produce the pure final products from sorbitol in a series of biotechnical, chemical processing and purification steps.

Vitamin C = Ascorbic Acid



**Empirical formula:**  $C_6H_8O_6$

**Molecular weight:** 176.1

**Melting point:** about  $190^{\circ}C$  (with decomposition)

**Appearance:** white to slightly yellowish crystalline powder, practically odorless, with a strong acidic taste.

The water-soluble vitamin C is probably the most well-known vitamin. Even before its discovery in 1932, physicians recognized that there must be a compound in citrus fruits preventing scurvy, a disease that killed as many as two million sailors between 1500 and 1800. Later researchers

discovered that man, other primates and the guinea pig depend on external sources to cover their vitamin C requirements. Most other animals are able to synthesize vitamin C from glucose and galactose in their bodies.

- c. 400 BC    Hippocrates describes the symptoms of scurvy.
- 1747        British naval physician James Lind prescribes citrus fruits and fresh vegetables to prevent and cure scurvy.
- 1907        Scurvy is experimentally produced in guinea pigs by Holst and Frohlich.
- 1917        Bioassay developed by Chick and Hume to determine the anti-scorbutic properties of foods.
- 1930        Szent-Györgyi demonstrates that the hexuronic acid which he had first isolated from pigs' adrenal glands in 1928 is identical to vitamin C, which he could extract in large quantities from sweet peppers.
- 1932        In independent efforts, Haworth and King establish the chemical structure of vitamin C.
- 1932        The relationship between vitamin C and anti-scorbutic factor is discovered by Szent-Györgyi and at the same time by King and Waugh.
- 1933        In Basel, Reichstein synthesizes ascorbic acid identical to natural vitamin C. This is the first step towards the vitamin's industrial production in 1935.
- 1937        Haworth and Szent-Györgyi receive the Nobel Prize for their research on vitamin C.
- 1970        Pauling draws world-wide attention with his controversial bestseller "Vitamin C and the Common Cold".
- 1975-79    Experimental studies in vitro illustrate the antioxidant and singlet oxygen-quenching properties of vitamin C.
- 1979        Packer and coworkers observe the free radical interaction of vitamin E and vitamin C.
- 1982        Niki demonstrates the regeneration of vitamin E by vitamin C in model reactions.
- 1985        The worldwide requirement for vitamin C is estimated at 30,000-35,000 tons per year. Today it amounts to 120,000 tons per year.
- 1988        National Cancer Institute (USA) recognizes the inverse relationship between Vitamin C intake and various forms of cancer and issues guidelines to increase vitamin C in the diet.
- 1989        Recommended Daily Intake (RDA) of 60 milligrams for the average healthy adult was established - The Food & Nutrition Board of the National Research Council (USA). This was the first time the RDAs had taken into account the importance of environment and lifestyle factors in establishing the need for a vitamin

### **Procedure for calcium Ascorbate**

#### **Process :**

- 1) In 500.0 ml RBF fitted with thermometer pocket and stirrer.

- 2) Take 200.0 ml DM water at 25-30°C.
- 3) Charge 30.0 gm CaCO<sub>3</sub> at 25-30°C.
- 4) Charge 0.5 ml TGA (Thioglycolic acid)
- 5) Maintain and stir for 1.0 hr at 25-30°C.
- 6) Filter the slurry at 25-30°C.
- 7) Suck dry and wash with 100.0 ml water.
- 8) Suck dry and unload wet cake.

Wt. of wet cake    42.0 gm

**Process :**

- 1) In 1000.0 ml RBF fitted with thermometer pocket and stirrer.
- 2) Charge 150.0 ml water at 25-30°C.
- 3) Charge 100.0 g Ascorbic acid at 25-30°C.
- 4) Charge 0.2 gm EDTA and 0.2 ml TGA at 25-30°C.
- 5) Maintain and stir reaction mass for 15.0 min. at 25-30°C.
- 6) Charge above wet cake in 30-45 min. at 25-30°C.
- 7) Maintain and stir reaction mass for 1.0 hr. at 25-30°C. Solution should be hazy.
- 8) Clarify the reaction mass at 25-30°C.
- 9) Collect filtrate
- 10) In another 1.0 lit. RBF fitted with thermometer pocket and stirrer.
- 11) Take 500.0 ml 95.0% methanol (475.0 ml methanol and 25.0 ml water).
- 12) Start addition of above filtrate in 30-45 min. at 25-30°C.
- 13) Maintain and stir reaction mass for 30.0 min. at 25-30°C.
- 14) Cool reaction mass to 10°C in 30.0 min.
- 15) Maintain and stir reaction mass for 1.0 hr. at 10-15°C.
- 16) Filter the reaction mass at 10-15°C.
- 17) Suck dry and wash with 50.0 ml methanol at 25-30°C.
- 18) Suck dry and unload wet cake.

Wt. of wet cake 100-110.0 gm

Dry at 40°C under vacuum LOD NMT 0.1%

Wt. of dry material 90.0 gm