

## Measuring Ascorbic Acid as an Oxidation-Reduction Reaction

### Description:

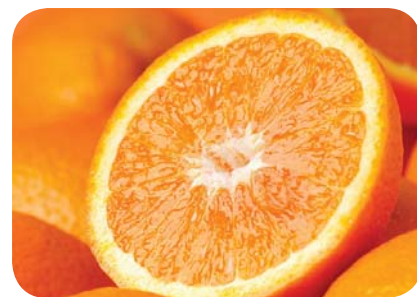
**AN #:** 07\_010\_11\_001

**Subcategory:** Food Supplements

**Market:** Food & Dairy

**Product:** HI902C

Vitamins are a necessity to humans in order to maintain good health. Humans obtain vitamins through their diet since they are not synthesized in the human body. Ascorbic acid, or better known to us as vitamin C, is known as the “powerhouse vitamin.” Vitamin C is an antioxidant, helping to prevent against long-term tissue damage. It also takes part in the production of collagen, a necessity for healthy skin, hair and teeth. However, what vitamin C is most well-known for is its role in improving the immune system and in warding off diseases.



When vitamins are absent from a diet on a consistent basis, vitamin deficiencies can occur within humans. Vitamin C deficiency, specifically, is the cause of the historic mariner’s ailment, scurvy. Individuals that suffer from a vitamin C deficiency procure various skin and gum problems, like hair loss and gum disease, as well as lack of energy. Based on age and gender, the recommended daily consumption of vitamin C ranges from 75-120 mg. A large majority of vitamin C comes from citrus fruits such as oranges, limes, lemons and grapefruit, but the vitamin can also be found in various other fruits and vegetables. In lieu of fruits and vegetables, individuals may take vitamin C supplements that provide the essential vitamin in synthetic form. Some vitamin C supplements provide an excess of vitamin C, between 10 and 20 times the recommended minimum dosage. These supplements are marketed as providing an extra boost to the body’s immune system and ability to overcome sickness due to extra vitamin C consumption, though there is little research to back up the claims that taking excess vitamin C provides additional benefit.

### Application:

A customer approached Hanna Instruments for a means to measure the vitamin C levels in a vitamin C supplement. The sales representative recommended the HI 902 titration system with a Hanna method to measure ascorbic acid as an oxidation-reduction reaction. The customer’s product contained a very high concentration of ascorbic acid (~2,000 mg). The customer wanted to measure the amount of vitamin C in one supplement, but due to the high concentration, a dilution was required. The customer was concerned this would require a complicated calculation, and was pleased to learn about the dilution option in the method parameters on the HI 902. The dilution option prompts the customer to enter their analyte size (the weight of the vitamin C supplement), their dilution volume (the total volume of the vitamin C supplement and distilled water), and aliquot volume (the volume taken from the dilution stock and run as a sample). Using this information, the HI 902 automatically compensates for this dilution factor in the calculation. Another feature the customer appreciated was the stabilized form in which the titrant is provided. Ascorbic acid reacts with iodine, but iodine is naturally unstable and would require frequent standardization to

ensure accurate results, which takes time and consumes valuable chemicals. The titrant supplied by Hanna is iodate, which is much more stable than iodine, and is used in conjunction with potassium iodide packets. The iodide packet is added to the sample before the start of the titration, and as the titrator doses iodate, the iodide and iodate react to form iodine, which then reacts with the ascorbic acid. The customer then appreciated that titrant standardizations did not need to be performed as frequently, therefore saving time and money.

