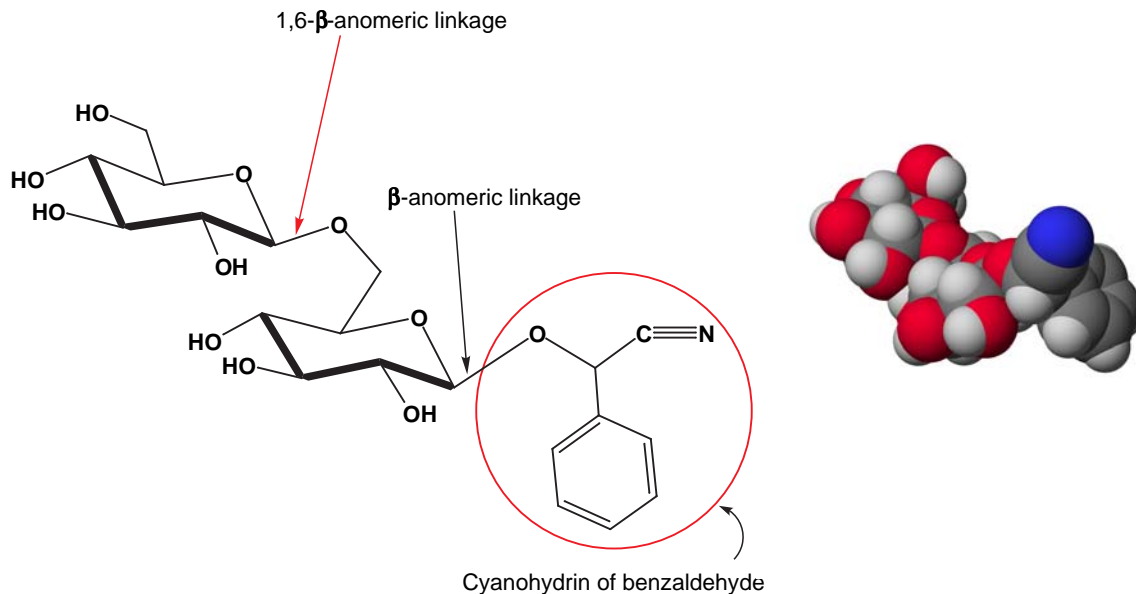


Molecule of the week-Amygdalin

Concepts: Cyanohydrin formation and degradation, carbohydrate structure

Amygdalin, from the Greek word for almond, is a disaccharide consisting of 2 glucose units with a modified cyanohydrin that contains a benzaldehyde unit and a cyano group. Under acid conditions this compound reacts to form 2 equivalents of glucose, an equivalent of benzaldehyde and an equivalent of hydrogen cyanide (HCN). Fruit seeds, especially apricots and peaches and almonds, contain amygdalin. The aroma of almonds is due to benzaldehyde and the smell of cherries is due to the combined aroma of benzaldehyde and HCN. Amygdalin, isolated from natural sources, was used as an anticancer agent in the United States in the 1920s. But this material was quite toxic. In the 1950s, a semi-synthetic form of amygdalin was patented in the United States as Laetrile®. Laetrile gained popularity in the 1970s as an anticancer agent and by 1978, more than 70,000 people in the United States had reportedly been treated with Laetrile®. However, no clinical trials of Laetrile have ever been conducted and the U.S. Food and Drug Administration has not approved Laetrile, although the drug is manufactured and used as a cancer treatment in Mexico. For more information on the use of Laetrile as an anti-cancer agent see the NIH's website at http://cis.nci.nih.gov/fact/9_3.htm

For a recent reference on the chemical synthesis of amygdalin and analogs: Araya, Eyleen; Rodriguez, Alex; Rubio, Jaime; Spada, Alessandro; Joglar, Jesus; Llebaria, Amadeu; Lagunas, Carmen; Fernandez, Andres G.; Spisani, Susanna; Perez, Juan J. **Synthesis and evaluation of diverse analogs of amygdalin as potential peptidomimetics of peptide T.** *Bioorganic & Medicinal Chemistry Letters* (2005), 15(5), 1493-1496.

For a recent reference on the NMR properties of amygdalin, see: Widmalm, Goeran; Jansson, Kjell; Pellijeff, Gustav; Sandstroem, Dick. **Probing Segmental Mobility in the Cyanogenic Glycoside Amygdalin by ^{13}C Solid-State NMR.** *Journal of Physical Chemistry B* (2003), 107(42), 11794-11798.

Problem of the Day

Draw a stepwise reaction mechanism that clearly illustrates the acid catalyzed formation of the glucose disaccharide, benzaldehyde and HCN from amygdalin.

