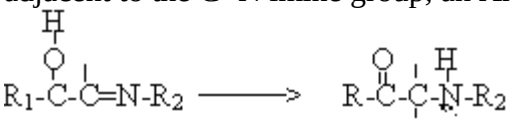
5.9 Further Reactions of Imines

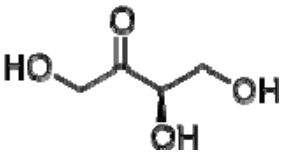
If an imine is formed on a molecule with additional OH groups, particular on the C adjacent to the C=N imine group, an Amadori rearrangement can occur as shown below:



This produces a product molecule with both a ketone and amine group which can undergo a wide variety of further complicated reactions which are collectively referred as the **Maillard reaction**, after the French organic chemist who first published a paper about them in 1912. Some of the products of the Maillard reaction are responsible for the smell of baked products (such as fresh baked bread) where amines in proteins can react with sugars. The Maillard reaction can also produce colored molecules that are responsible for the brown color of roasted coffee, bread crust, toast, other baked products, dark beers, and some types of caramel coloring.

Dihydroxyacetone, the active molecule used in sunless tan lotions, reacts with amine in the outermost dead layers of epidermis (the stratum corneum) to produce colored imine **melanoidins** which simulate a real tan. (The term melanoidins is based on melanin, the natural brown pigment; melanoidins have similar absorption patterns to melanin, but do not have the same structure).

Another small alcohol ketone, erythulose, is sometimes added to DHA for sunless tanning. What functional groups make the erythulose capable of similar reactions to DHA?



Erythulose