

when sold to the consumer that none of the listed preservatives would be harmful, even though present in somewhat larger quantities than permitted. It is true there remains the question as to whether any other preservative than the sugar is necessary. Barnard (Chem. Abst. 3 (1909), 2475), claims that fruits preserved in 10 pounds sucrose per gallon of water keep at least seven days, exposed to room temperature during the day and placed in a refrigerator at night; if preserved in 14 pounds sucrose, a syrup results "sufficiently heavy for all practical purposes" which keeps under any ordinary conditions. As no work along these lines has been done in this laboratory up to the present time, we are unable to comment on Barnard's work. As stated above, however, there is no reason why permitted preservatives in reasonable amounts should not be used, provided they are declared by the manufacturer on the label.

*Artificial Colouring.*—Freshly prepared fruit syrups are beautifully coloured, due to the natural pigments present in the fruit. Exposure to light causes most of these colours to fade, often to a very unpleasing shade. The fruit itself is not affected, but its appearance renders it unattractive. This would unjustly and seriously affect the business of the dispenser, were it not possible to reproduce nature's colours by the addition of small amounts of harmless dyes. The Department has, therefore, certified in G. 1167, January 18, 1915, seven aniline dyes for use in colouring of foods, as follows: Amaranth 107, Ponceau 3R 56, Erythrosin 517, Orange 1-85, Naphthol Yellow S4, Light Green ST435, Indigo Carmine 692, and in G. 1278, April 21, 1917, Tartrazine 94. The numbers refer to the classification by Schulz and Julius, as edited by Arthur G. Green.

Among these eight certified colours are found the three primary colours (red, blue and yellow) as well as the complementaries, orange and green. They are sufficient, therefore, to satisfy every demand, since combining two or more of them practically any colour or shade may be produced. The United States has but five certified colours: Amaranth 107, Ponceau 3R 56, Orange 1-85, Tartrazine 94, and Indigo Carmine 692. The National Aniline and Chemical Company, Inc., of New York, has combined these so as to produce fifteen shades and colours besides the original certified five, which they sell under such trade names as "Strawberry Red," "Deep Chocolate," "Yellow Colour, Egg Shade," etc. They have kindly furnished us with samples of all their certified colours for food products and confectionery. Investigation of these samples has demonstrated the fact that manufacturers of fruit syrups have here every colour and shade of the natural fruit, so have no excuse for the use of any but certified colours. As will be shown later, the majority of samples of fruit syrups examined were found coloured with certified dyes, a fact much to the credit of the manufacturers as this is the first examination of this class of fruit syrups, as well as the first investigation of dyes used to colour food products in this laboratory.

The method used for the detection and identification of the dye is outlined in the Journal of the Association of Official Agricultural Chemists (J.A.O.A.C., 2, 161). A piece of white woollen yarn is boiled for about fifteen minutes in the solution to be tested, to which a few drops of hydrochloric acid have been added. It is then removed, washed well with water and dried. If an aniline dye is present in the solution, the wool will be fast dyed. When dry it is cut into four pieces, which are treated with concentrated hydrochloric and sulphuric acids, and dilute solutions of sodium and ammonium hydroxides. The colour reactions are noted and by means of a table of these reactions the dye is identified. This identification can be regarded as only approximate, as the method is rather crude, some of the reactions as given in the table being questionable. For example Amaranth 107, according to the table, gives reactions which we could not duplicate with samples of the pure dye. To show these discrepancies, we will copy the reactions as given in the table and under them give those we obtained with two separate samples of the pure dye:—