ART. XV.—*On the Detection of Hydrocyanic Acid*; by M. CAREY LEA, Philadelphia.

1. *New Test.*

If a little pure protosalt of iron (I have used ferrous ammonia sulphate) be dissolved together with a little uranic nitrate, we have a solution which, with a soluble cyanide, gives a purple precipitate, or in very dilute solutions of the cyanide, a greyish purple.

This test is very delicate. Used in the manner to be presently described, a solution of potassic cyanide, containing only $\frac{1}{3000}$ of a grain of anhydrous hydrocyanic acid, gives a perfectly distinct reaction. It is therefore not exceeded in delicacy by any known test for that substance.

The solution of iron and uranium must not be acidulated, but on the contrary should be quite neutral, and so dilute as to be nearly colorless. A grain or two of each salt may be dissolved in a half ounce of water. Two or three drops of the mixed solution are to be placed in a clean white porcelain capsule, and a drop or two of the liquid to be tested should be made to slip slowly down, that the reaction at the point of contact may be carefully noted.

Cobaltous nitrate may be substituted for the uranium salt, and gives an almost equally delicate reaction, but the color of the cobalt salt is an objection.

2. *Prussian Blue Test.*

The delicacy of the Prussian blue reaction for the detection of hydrocyanic acid has been much understated. Thus Taylor (quoted in Watts' Dict., ii, 219) affirms that whilst the sulphocyanide reaction is capable of distinctly indicating the presence of $\frac{1}{3000}$ of a grain of anhydrous prussic acid, the Prussian blue test will not detect less than $\frac{1}{7000}$ of a grain. A much greater delicacy than this can be obtained by using appropriate precautions.

There must not be too much iron salt present, and the solution of iron salt must not be too strong: these two points are essential. For ferric salt, the ammonia citrate is to be preferred to ammonia ferric alum or ferric chloride. The best mode of proceeding is as follows:

A weak solution of iron is to be made, containing a ferrous salt, to which a little ferric ammonia citrate is to be added. Of this solution, acidified with hydrochloric acid, two or three drops only are to be placed in a white porcelain capsule. A drop of the liquid to be tested is then allowed to slip down the side of the capsule, and this meeting the iron solution will give rise to the production of a blue cloudiness.

If a grain of potassic cyanide be dissolved in four ounces of pure water, rendered slightly alkaline with caustic alkali, and a single drop of the solution be allowed to flow down the capsule in the manner just described, a distinct blue coloration will result. This drop will have contained about $\frac{1}{2000}$ of a grain of cyanide, or about $\frac{1}{3000}$ of a grain of anhydrous prussic acid, a degree of delicacy very far surpassing that found by Mr. Taylor; surpassing, indeed, that claimed by him for the sulphocyanhydric test.

The advantage of using ferric ammonia citrate over ferric ammonia alum may be curiously shown as follows :

Place in a small white porcelain basin about an ounce of a solution containing a few grains each of ferrous ammonia sulphate and ferric ammonia sulphate acidulated with hydrochloric acid. Take about a milligramme of cyanide of potassium, or about as much dust of that substance as can be distinctly perceived and shake it into the basin. Each infinitesimal particle will produce a blue coloration as it touches the liquid, but on agitating, the blue (if the quantity of cyanide has been small enough) will disappear. If now the same experiment be repeated with a solution of ferrous ammonia sulphate and ferric ammonia citrate, also acidulated, the blue color produced does not disappear on shaking, but presently settles or becomes more conspicuous.

For the same reason, ferric ammonia citrate will detect infinitesimal traces of potassic ferrocyanide in the ferridecyanide when ferric chloride and ferric ammonia alum will not, and therefore it should have the preference for testing the purity of potassic ferridecyanide.