subtracting from the amount of total nitrogen compounds the sum of the casein and albumen.

In conclusion, I wish to call attention to the crude nomenclature in common use in stating the results of milk analysis for nitrogen compounds. It is an almost universal custom to call the total nitrogen compounds of milk casein. It would be quite as correct to call the fat of milk palmitin or some similar name. This wrong use of the term casein leads to much confusion, and it is highly desirable that we should use a more discriminating nomenclature. It is also desirable that, in making analysis of milk, pains should be taken to separate and determine the different kinds of nitrogen compounds, since our knowledge of these compounds is far from complete.

I am much indebted to Mr. A. L. Knisely for assistance rendered by him in carrying out the analytical details of the work.

AN APPARATUS ("LYSIMETER") FOR DETERMINING SOLUBILITIES.

BY CHARLES RICE.

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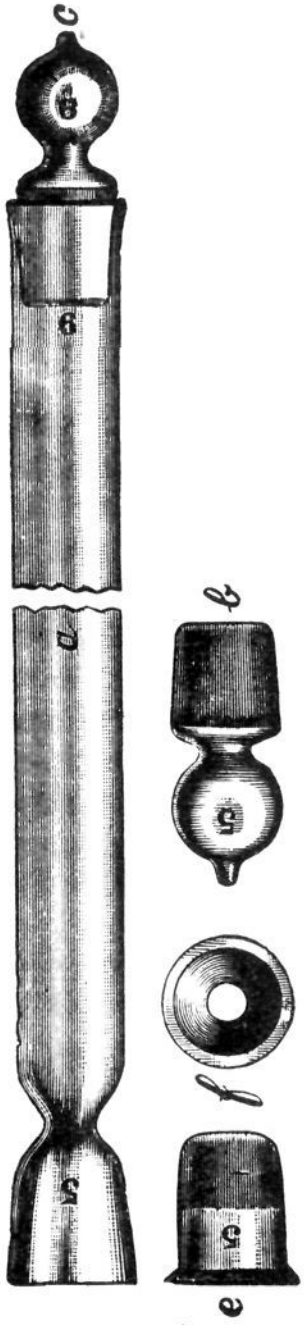
IN determining the solubility of a substance in some liquid at a given temperature, there is usually but little difficulty encountered when the solvent is not very volatile and the temperature at which the determination is to be made is not high. With a highly volatile solvent, and a high temperature, however, certain difficulties present themselves which are liable to lead to error. The main difficulty is encountered in the endeavor to separate from the original solution, which usually contains an excess of the substance in suspension, a *filtered* portion at the same temperature as that of the solution. The higher this temperature is, the more difficult becomes the removal of a portion without the introduction of errors by the ordinary methods of filtration. It appears, therefore, that it is only necessary to modify the method of filtration in such a way as to maintain the temperature of the original solution unchanged in order to eliminate these errors. This may be easily accomplished by upward filtration into a tube placed in the original solution, and so constructed that it will enable the operator to control the act of filtration, as well as accurately to determine the amount of solvent

and dissolved material. For this purpose the little apparatus here described has been found very serviceable.



The apparatus consists of a glass tube *a*, fifteen cm. long and one cm. in external diameter, provided at one end with a well-ground stopper *c*, while the other end is cup-shaped, there being a contracted neck between the cup and the main tube. Into this cup is made to fit, a carefully ground glass bell *e*, having a perforation in its bottom (as shown in *f*). There is also a stopper *b* which is carefully ground to fit into the cup, and which is inserted after the glass bell *e* has been removed. The several stoppers, etc., are all numbered to show where they belong.

To show how the apparatus is used it will be best to quote a practical example.

Let us assume that the solubility of morphine in boiling alcohol is to be determined. It will be necessary to provide for such an amount of liquid that at least one-half of the glass tube *a* may be immersed in the liquid. In the case of comparatively cheap solvents and substances to be dissolved, beaker glasses may be used; for more expensive materials, test-tubes of such a size that there will be no great waste of material are preferable.

The glass tube is made ready by inserting the stopper *c*, and introducing into the cup-shaped end the glass bell *e*, containing a pellet of purified cotton and prevented from dropping out by a thin platinum wire fastened around the contracted neck and crossed over the mouth of the bell. A sufficient amount of alcohol having been introduced into a beaker, or test-tube, heat is applied and morphine added until, after the boiling has been kept up some time, a portion of the alkaloid remains

undissolved. The prepared glass tube is now inserted in the liquid. As long as the stopper *c* closes the mouth of the tube no liquid will be able to filter upwards. When the tube has acquired the temperature of the boiling liquid the stopper *c* is removed, whereupon the liquid will begin to filter through the pellet of cotton and rise in the tube as far as the quantity of liquid will permit. In order to insure perfect uniformity of the liquid within and without the tube, it is best to allow the filtered portion to flow back through the pellet of cotton once or several times. The stopper *c* having then been inserted, the tube is withdrawn, turned upside down, the glass bell removed, and the stopper b inserted. The tube is now carefully cleaned with alcohol, and laid aside until cold. Its tare having previously been determined, the increase in weight represents the weight of the solution contained therein. On transferring or washing the contents into a tared beaker or capsule and evaporating, the weight of the dissolved morphine will be found.

The apparatus here described, which has been frequently in use during several years, and to which, for brevity's sake, the name *lysimeter* (from the Greek *lysis*, solution) has been given, was made for the writer in a very satisfactory manner by Mr. Emil Greiner, of New York City.

NEW YORK, July 7, 1894.

NEW BOOKS.

THE DECOMPOSITION OF THE FIXED ALKALIES AND ALKALINE EARTHS. By Humphry Davy, 1807–1808. Alembic Club Reprint, No. 6. 12 mo. 51 pp. Edinburgh: William F. Clay. 1894.

This number of the Alembic Club Reprints contains the Bakerian Lecture delivered by Davy before the Royal Society in 1807, and also part of a paper communicated by him to the same Society in the following year. The Bakerian Lecture is on the Decomposition of the Fixed Alkalies and on the General Nature of the Alkaline Bodies. The other paper is on the Decomposition of the Earths, with observations on the metals obtained from the alkaline earths.

In the first paper we have the first published record of the experiments by which Davy proved the compound nature of the alkalies and prepared the metals potassium and sodium. The