

LIVE CHEMISTRY.

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Obtain a supply of grocery-store ammonia, and one of concentrated ammonia from a local drug store. Note prices of each in pint or quart quantities.

Let a number of students choose 15 cc. samples of either, and dilute to one-fifth the strength, i. e., add exactly 60 cc. water. If accurate graduates are not at hand, instructor may dilute a stock supply of each under the eyes of his class, still reserving a generous sample of the original article for the class to investigate in a general way qualitatively. Dilution is performed to avoid noxious odor.

Set up two burettes; call the first "A" for acid, and the right-hand burette "B" for base. Alphabetical order, A-B, helps student in keeping figures straight.

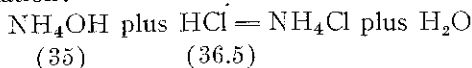
Let instructor prepare a normal HCl solution, explaining that it contains 36.5 g. HCl in one liter of solution. A supply of this is placed in burette A. For this experiment it will be allowable to dilute the present-day "C. P." hydrochloric acid by hydrometer data, or even by consultation of the "analysis" label. Accuracy of the method will likely exceed accuracy of the high-school student; moreover the standard acid is used largely for comparison of the two bases, where errors are compensated.

Fill burette B with the chosen sample, diluted as above. With methyl orange as indicator, students should practice titration with 3 or 4 cc. amounts until (1) they understand the color changes, (2) they have the approximate ratio, which guides them in the actual titration, preventing an overdose of the strong solution and consequent delay due to refilling burette. Instructor should accept no titration ratios where the volume read is less than 7 cc. After the first end-point is reached, student should record figures and let out a few more drops ammonia. A second determination of end-point is made, followed by at least three others, to test accuracy.

Data and calculations (sample figures, grocery ammonia):

Vol. acid	Vol. ammonia	Acid/Base
7.2 cc.	28.4 cc.	.25—
9.7 cc.	38.8 cc.	.250
etc. —	etc. —	etc. —

Equation:



A liter of ammonia which was of the same "strength" as the "normal" acid must contain 35 g. ammonium hydroxide. This sample as diluted is but .250 as strong, so contains 8.75 g. hydroxide. The undiluted liquid is five times stronger, or 43.75 g. per liter.

(A second student, working with commercial "concentrated" ammonia, finds a concentration more like 400 g. per liter. Suppose the retail price of this is 25c per pint, and of grocery ammonia 10c per pint. Class sees the economic side of the thing.)

A FEW THEORIES OF MODERN CHEMISTRY.

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The iconoclast has a much simpler job than has the reformer.

Almost any of us can criticize and tear down existing beliefs, but we wait for the man of genius to do the reconstruction work; to advance the new hypotheses or to discover new laws.

The writer lays no great claim to originality in this article, but, feeling that some of the old premises are no longer tenable in the light of modern scientific knowledge, would point out some places where there have been fallacies in our reasoning, and possibly remedy, in one or two instances, the confusion arising from keeping certain of the old terms in with the new.

Let us learn the chemical fundamentals well, and then to a very great extent do away with the old cook-book methods. We have learned chemical facts by rote until we are in danger of forgetting that chemistry is a science. The study of physical chemistry is doing much to restore chemistry to its proper position as a science. Let us not simply learn facts, but do our best to discover general laws governing nearly every case, as the physicist has done. Chemistry should not be treated as a distinct subject but really as a branch of physics.

One of the old words that acts as a thorn in the side of the modern chemist is *oxidation*, bearing as it does all sorts of misleading implications.

¹For several of the ideas herein expressed the writer desires to thank Prof. McPherson of the Ohio State University; Prof. H. T. Beans of Columbia, and Prof. Julius Stieglitz of the University of Chicago.