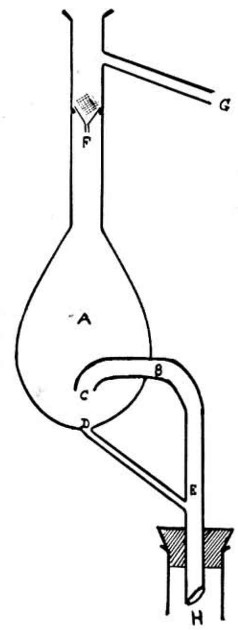
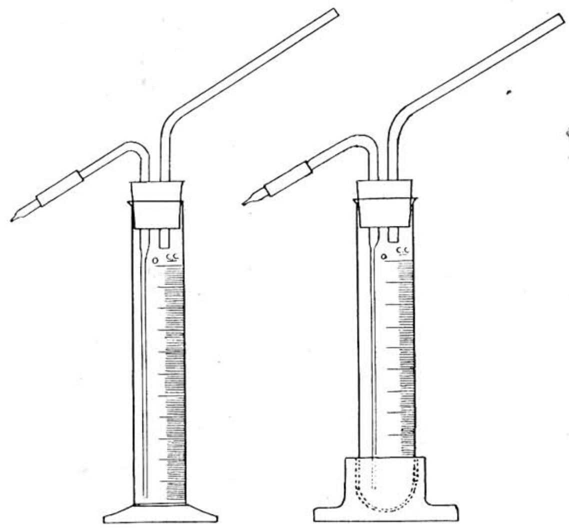
ABSTRACTS

APPARATUS AND LABORATORY PRACTICE

Modification of the Kjeldahl Trap. G. H. W. Lucas. *Ind. Eng. Chem., Analyt. Ed.*, **1**, 140 (July, 1929).—In the determination of a few mg. bromine in the presence of a large amount of chlorine, the Br was steam distilled into KI. Even with a Kjeldahl trap some of the oxidizing agent was carried over. A trap as shown in the diagram was devised and found satisfactory. *A* is a 500-cc. Pyrex Kjeldahl flask; *B* is a wide glass tube about 1 cm. bore fused into it; the end *C* is directly over the opening *D;* a small tube 3 mm. bore runs at an angle of about 45 degrees to join *E*. At *F* the sides of the tube are pushed in and a small funnel is thereby suspended; the funnel is filled with glass wool. The tube *G* leads to a condenser. The top of the trap is not sealed off, but is closed with a rubber stopper in order to allow replacement of the glass funnel and glass wool if necessary. During violent ebullition the froth passes up the stem *E* very easily and is directed down. As the tube leading from *D* is small, the gaseous pressure in the flask *H* does not force the liquid back. There is a continual drop of fluid from the flask through *D* back into *H*. This trap is large and is not intended for the ordinary Kjeldahl distillation, but when faced with the problem of distilling a very frothy substance in a Kjeldahl or with steam distillation where the ordinary trap is useless, it is invaluable. D. C. L.



Simple Graduated Wash Bottles. Earle R. Caley. *Ind. Eng. Chem., Analyt. Ed.*, **1**, 162 (July, 1929).—The bottles are constructed out of a suitable-sized graduate for cold



washing or a graduated large-sized test tube for washing with hot water. They are very convenient when it is desirable to know the amount of fluid used in washing.
D. C. L.

Wash Bottles for Special Purposes. H. Yagoda. *Chem.-Analyst*, **18,** 21 (May 1, 1929).—When it is desired to use but small quantities of the less commonly used washing fluids, the wash bottles from test tubes shown in the accompanying diagrams are recommended.

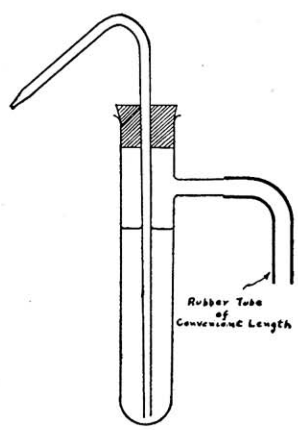


Figure 1.—Wash Bottle from Side-Necked Test Tube

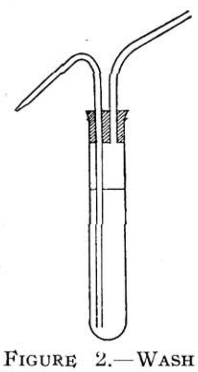


FIGURE 2.—WASH BOTTLE FROM ORDINARY TEST TUBE

"This contrivance will be found useful in the following analytical procedures:

1. Washing precipitates of silver, mercurous and lead chloride with dilute hydrochloric acid solutions in order to decrease the solvent action of the water upon the residue.

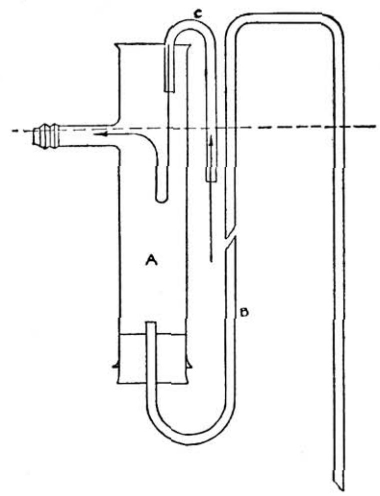
2. In the Group II separation, washing the precipitated sulfides with hydrogen sulfide water prevents the oxidation of copper sulfide to the sulfate.

3. Washing the precipitated sulfides from Group III with a solution of ammonium sulfide and ammonium chloride to prevent the formation of colloids of nickel sulfide.

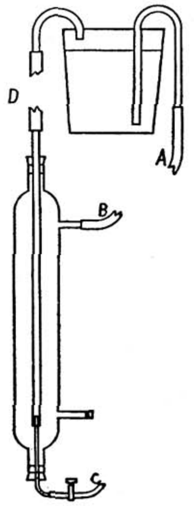
4. In the gravimetric determination of iron and aluminum, the precipitated hydroxides are washed with a dilute solution of ammonia containing ammonium nitrate.

5. For washing potassium perchlorate or chlorplatinate with alcohol in making potassium determinations." D. C. L.

A Simple Constant Level Water-Bath Regulator. C. W. EDDY. *Chem.-Analyst*, **18**, 20 (May 1, 1929).—*A* is a glass tube 15 to 20 cm. in length and 3 to 4 cm. in diameter, depending on its use, which has sealed into it near the top a side arm about 5 cm. in length. The author found in his desk a side-arm test tube which was used. The bottom was heated, plunged into water, and the broken end smoothed with a wire gauze. *B* is made of glass tubing and is the siphon. One end is inserted in the stopper in the lower end of *A* and the other end is hung over the side of the water-bath. The lower end must reach about 2–3 inches below the surface of the water in the bath. Tube *C* is the inflow, which is regulated so it allows less water to enter the tube *A* than can be carried away by the side arm.



Tube *A* is then raised or lowered until the water level (the dotted line in the diagram) is adjusted to the proper level. The tube *B* is then filled with water and the level will remain constant as long as water is allowed to flow through tube *C*. Any increase of water in *A* will cause the water to flow through *B* into the bath and, conversely, any increase of water in the bath will cause the water to flow through *B* until the two water surfaces become level again. D. C. L.



A Brine Circulator for Cooling Condensers. H. T. GERRY. *J. Am. Chem. Soc.*, **51**, 475 (Feb., 1929).—"In working with low-boiling compounds it has been found advisable at times to circulate cold brine through the jackets of the condensers. Such circulation may be made continuous by the use of a simple modification of the "air lift" pump used in some sulfuric acid plants. The system gives excellent cooling and requires no attention.

"The pump consists of an old condenser jacket with the lower side arm plugged up. A piece of glass tubing of about 6 mm. diameter is passed through the stopper in the top of the jacket and reaches almost to the bottom. Through the stopper in the bottom of the jacket a piece of small glass tubing of such size that it will not plug up the 6-mm. tube is passed and reaches about 2 cm. into the 6-mm. tube. This small tube is connected to an air blast tap by a rubber tube *C* with a pinchcock on it to regulate the flow of air. The top side arm of the jacket is connected by rubber tubing *B* to the outlet of the condenser to be cooled, and the 6-mm. tube is connected by a rubber tube *D* to a piece of bent glass tubing hooked over the edge of a pail. This tube *D* should be vertical or nearly so throughout its length. The pail is filled with concentrated brine and ice and the siphon *A* is connected to the inlet of the condenser to be cooled. The height of the water level in the pail should be about four feet above the bottom of the pump, which may be suspended vertically over the edge of the laboratory bench.

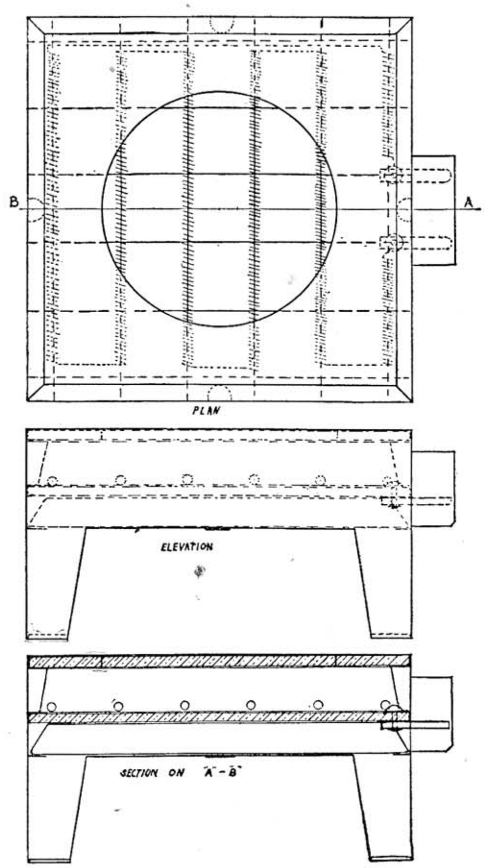
"In order to start the circulation of the brine both the condenser to be cooled and the pump are filled with brine and the air is then regulated so that a steady stream of bubbles passes up the tube. The condenser jacket can be kept below zero in this manner without any difficulty whatsoever." R. L. H.

A Laboratory Heater. L. J. N. MOTHERSILL. *Chem.-Analyst,* **18,** 17 (May 1, 1929).—The heater recommended is made from one of the cheap toaster stoves on the market, costs about $1.25 and can be easily made by the students. The accompanying drawings may be of some help in following the instructions below.

"The bottoms of these stoves are usually held in place by means of four ears. These are bent back and the bottom, element, spacer, and screen removed. If the heater is to be used for distillation work only the screen may be discarded but if the heater is to be a general purpose one the screen is retained as a support for beakers, etc. A piece of asbestos board $^1/_8''$ thick is cut to fit the top of the heater (the same size as the element board) and a hole $3''$ in diameter cut in it.

"It is then put in place, next to it the screen (if it is to be used), then the spacer element and bottom. It may be found necessary to cut away part of the side of the heater as the element terminals will be somewhat lower down.

"When apparatus requiring a smaller aperture than $3''$ is to be used boards may be provided having different sized holes. The temperature may be controlled by an exterior rheostat." D. C. L.



A New "Dry-Ice" Machine for the Laboratory. *Laboratory,* **2,** 42–3 (1929).—The Carbo-Freezer described consists essentially of a stand for supporting the cylinder of carbon dioxide gas, a calcium chloride drying tower for removing any water vapor in the gas, and the freezer proper. The complete apparatus costs one hundred and fifty dollars. Solid carbon dioxide snow can be automatically and instantly produced, and without any inconvenience.

"Some of the uses to which the Carbo-Freezer has been put in the laboratory are: low-temperature crystallization, removal of naphthalene from solvents, freezing-point. cloud- and pour-point, and dew-point determinations, gas analysis, determination of gasoline in natural gas and of light oil constituents in by-product gas from coal distillation, paraffin determination in light oils and lubricants, vapor pressure determinations.

"Other uses to which the Carbo-Freezer is being put is the preservation of biological specimens during storage before analysis, the preservation of water samples, the prevention of putrefaction, the preparation of "frozen sections" for microscopical examination, the storage of butter, ice cream, and other foods during transportation, investigation of weathering of paints, varnishes, cements, and determination of fatigue of metals at low temperature." R. L. H.

A Temperature Regulator for Carius Furnaces. G. B. HEISIG. *J. Am. Chem. Soc.*, **50,** 3388 (Dec., 1928).—"The constant attention necessary to regulate the temperature of an ordinary gas-fired Carius furnace may be avoided by equipping it with a thermostat used to control the temperature of ovens on gas cooking stoves. Such a thermostat (supplied by the Kraus Mfg. Co.) is very easily installed, inexpensive, and is accurate to about 5°. The approximate range of the device is 100–325°.

"The only precaution to be observed is not to turn the burner on full if, for example, a temperature of 100° is required, for the heat from the walls of the furnace will raise the temperature above 100° even after the thermostat has reduced the flame. The burner should be turned on approximately as it would be if no regulator were being used.

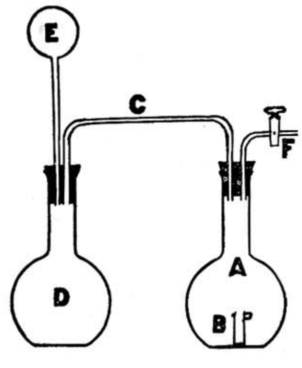
"Thermostats of this type should be satisfactory for controlling the temperature of other gas-fired furnaces used in chemical work." R. L. H.

An Acid Digester. H. YAGODA. *Chem.-Analyst*, **18,** 18 (May, 1929).—When a substance is to be digested with a specified amount of acid, and then diluted to give a desired acidity as in certain qualitative procedures, loss of acid can be cut down by placing an evaporating dish filled with cold water over the beaker in which the digestion is carried out. D. C. L.

Rapid Calibration of Pipets and Burets. A. T. SHOHL. *Ind. Eng. Chem., Analyt. Ed.*, **1,** 152 (July, 1929).—Tared flasks are placed on the balance pans, the weights corresponding to a known volume of liquid are added, and Hg covered with water is added from the object to be calibrated. The points to be marked are indicated by the water meniscus. If too much mercury has been run into the flask, it may be withdrawn with a dropper and returned to the apparatus. After one determination the Hg is poured out, and the flask is ready for the next determination. D. C. L.

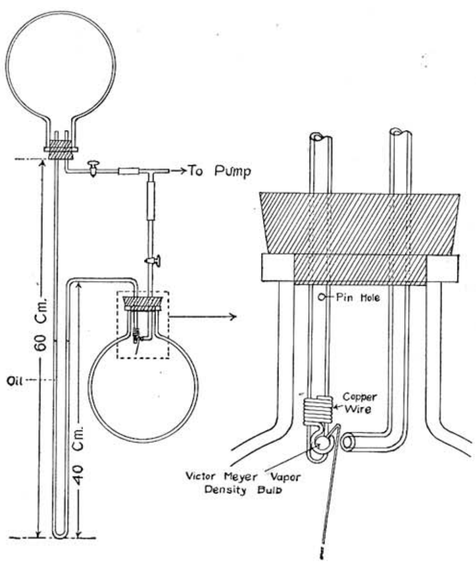
To Remove Grease from Buret Tip. C. J. SCHOLLENBERGER. *Chem.-Analyst*, **18,** 15 (May 1, 1929).—To remove grease, during a titration, from a plugged buret tip, rapidly pass under it several times a match flame. Open stopcock at once and melted lubricant will be immediately expelled. This method is superior to the fine wire method usually resorted to. D. C. L.

A Simple Apparatus for the Determination of Carbon Dioxide. R. C. WILEY. *J. Am. Chem. Soc.*, **51,** 222–3 (Jan., 1929).—"Set up the apparatus as shown in the figure and make sure that it is airtight. Weigh out 0.1000 g. of carbonate into *B*, place 100 cc. of a 1% aqueous solution of chromic anhydride in *A* and 50 cc. of water in *D*. Heat the contents of both *A* and *D* to boiling, remove both flames and add 25 cc. of a 0.2 *N* barium hydroxide solution to *D*. Carefully lower the bottle *B* containing the charge into *A* with a copper wire without letting the acid come in contact with the carbonate. Quickly stopper both *A* and *D*, which are thus connected by the tube *C*. Shake flask *A* to overturn *B*, place *D* in cold water and boil the contents of *A*. The balloon *E* serves as a safety valve, pressure regulator, and pressure indicator. After boiling for about 30 minutes, remove the flame from beneath *A* and admit carbon dioxide-free air through *F*. The flask *D* should be now at about room temperature. Disconnect it and titrate the excess barium hydroxide with standard hydrochloric acid, using phenolphthalein as indicator.



"The advantages of the method are that no train is necessary and the apparatus is cheap and easy to set up. It is likewise easy to clean. The results obtained are quite accurate." R. L. H.

A Method for Determining Vapor Densities at Room Temperatures. E. F. LINHORST. *J. Am. Chem. Soc.*, **51,** 1165–7 (Apr., 1929).—Two 2-liter round-bottomed flasks connected by an oil manometer (5-mm. inside diameter and 60 cm. length) are evacuated simultaneously through a T-tube, the arms of which are provided with stopcocks and each connected with one of the flasks. The sample is sealed up in a Victor Meyer bulb, which is then hung in a loop formed by one end of a stiff copper wire coil wrapped around the sealed end of the oil manometer (in which a small hole is blown just below the rubber stopper), projecting 4 in. into one of the flasks. The flasks are evacuated to about 1 cm. of mercury, and the cocks closed. The bulb containing the liquid is then crushed against the manometer tubing by an angle bent at the end of the stem of the stopcock, which is joined to the T-tube outside. After a few minutes the temperature and increase in pressure are read, and the molecular weight (M) may be calculated from the equation $PV = W\text{-}RT/M$. The minimum vapor pressure of the sample should be 4 cm. of mercury at room temperature or larger flasks, or a higher temperature, must be used. The main precaution to be observed is not to warm the flask with the hands. R. L. H.



A Simple Method for the Determination of C_p/C_v (as a Lecture Experiment). E. RUCHARDT. *Physik. Z.*, **30**, 58–9 (1929); *C. A.*, **23**, 2612 (June 10, 1929).—A glass tube 55 cm. long, and of a uniform 1.6 cm. inside diameter is passed through a rubber stopper into a 5–6-liter bottle with bottom tubulature, containing the gas. On dropping a perfectly spherical steel ball of diameter appropriate to the tube into the latter, the ball oscillates in the tube with a period of about 1 sec. By measuring the period for one vibration with a 0.1 sec. stop watch, and substituting in the formula (derived), the ratio C_p/C_v is determined.

$$\frac{C_p}{C_v} = k = \frac{4\pi^2 mv}{q^2 p T^2} \qquad p = b + \frac{mg}{q}$$

where m = mass of ball; V = vol. of bottle in cc.; q = cross-section of tube (in. sq. cm.); b = bar. pressure (in. cm.), T = period, g = gravitational constant. The method provides a rapid and accurate means of measuring C_p/C_v, and also offers visible proof of the adiabatic elasticity of gases. For air, $k = 1.39$ instead of the usual 1.40; for wet CO_2, $k = 1.27$ instead of 1.30. C. E. M.

The Confirmatory Test for Aluminum. R. GEMMILL, R. BRACKETT, AND C. R. MCCROSKY. *J. Am. Chem. Soc.*, **51**, 1165 (Apr., 1929).—The procedure recommended for carrying out the test for aluminum is as follows: "Pure asbestos fiber, one-half the size of a pea, was looped in platinum wire, dipped into a solution of 0.05 N cobalt nitrate, ignited, then dipped into the solution of the aluminum hydroxide precipitate (dissolved in the least amount of nitric acid) and ignited."

The test is sensitive to 0.2 mg. of aluminum, the sodium salts do not interfere, and the same test may be applied successfully for 0.5 mg. of zinc. R. L. H.

Identification of Rayon. W. D. GRIER. *Ind. Eng. Chem.*, **21**, 168–71 (Feb., 1929).—Microscopical examination of the fibers, and particularly of their cross-section, affords a reliable means of distinguishing between the four general types of artificial silk now on the market, namely, viscose, cuprammonium, nitro, and acetate silks. The first three also polarize brilliantly, acetate silk only feebly. As regards chemical tests, nitro silk gives a very distinct reaction with diphenylamine and sulfuric acid reagent, and viscose may be detected by a test proposed by Screiber and Hamm, which depends on the formation of minute residual amounts of sulfur compounds when the material is heated on a steam-bath with very dilute sulfuric acid. Acetate silk dissolves readily in acetone. D. C. L.

The Use of Aluminum for the Detection of Arsenic. E. B. SVENSON. *Chem.-Analyst*, **18**, 5 (May, 1929).—Suggests the use of Al in place of Zn, since all virgin Al is free from As. If used with sulfuric acid, the Al must first be activated by treating with a Hg or Cu salt. D. C. L.

Determination of the Moisture Content of Coal and Similar Substances. M. MANNHEIMER. *Ind. Eng. Chem., Analyt. Ed.*, **1**, 154 (July, 1929).—None of the methods ordinarily used seems completely satisfactory. By the method here described a determination can be made in 5 minutes. It consists of the extraction of the coal with a hygroscopic liquid and the subsequent determination of the water content of the liquid. Of the liquids considered, methanol appeared most satisfactory. The methanol extract had but slight yellow color due to extraction of other substances. The finely powdered coal is shaken for half a minute with a known volume of methanol, and after filtration the moisture content determined. It was found most convenient to use a glass floater having the same density as the absolute methanol at a certain temperature, and it will then sink at a higher temperature and rise at a lower. The temperature of the extract is so adjusted that it will just float. The change in temperature is a measure of the water content.

A complete account of the technic, a diagram of the apparatus, and the results of several determinations are given. D. C. L.

Preservation of Anesthetic Ether. C. L. HEWER. *Lancet*, **1929**, 770–1; *Analyst*, **54**, 352 (June, 1929).—"The oxidation to which ether is prone may be prevented by treating the ether with carbon dioxide and then storing it in copper containers. When anesthetic gases are bubbled through ether for long periods, the rate of decomposition of the ether will be greatly diminished if there is an adequate area of copper both above and below the surface level of the liquid." R. L. H.

Note on the Recovery of Platinum. G. J. HOUGH. *Ind. Eng. Chem., Analyt. Ed.*, **1**, 162 (July, 1929).—Gives a brief account of the treatment of the filtrate from chloroplatinates to recover both alcohol and Pt. By this method it is shown that a solution used in a total of 200 determinations and passing through 7 recovery treatments had lost only 200 mg. Pt, or a loss of less than one-fourth of a per cent determination.
D. C. L.

Handy Cork Gage. R. B. WAILES. *Chem.-Analyst*, **18**, 20 (May 1, 1929).—Several trials usually have to be made in selecting corks from the cork bins to fit a bottle or flask, before the wanted size is found. By keeping a string of corks, each one numbered with its size, in the drawer containing the bins for corks, a standard of reference can always be had without selecting two or three before the size wanted is desired.

By fitting the flask or container with one of the corks upon the string, the exact size is ascertained, and from this the cork is ordered from stock, or the chemist himself can go to the exact cork for the exact size. D. C. L.

TEACHING METHODS, AIDS, AND SUGGESTIONS; CURRICULA

Research Method of Teaching Science. J. M. ANDERS. *Gen. Mag. & Hist. Chron.*, **31**, 479–88 (July, 1929).—The present status of science teaching in American colleges and universities, though by no means to be viewed with alarm, is far from being wholly satisfactory. An ideal condition would demand that every teacher should be an investigator in his particular field. It is contended with reason that a readjustment of the college curriculum in such manner as to bring about the adoption of research method of study, together with a corresponding lessening of the adoption of ready-made facts by the student, is of pressing importance. The time is ripe for a movement on the part of our colleges away from a purely pedagogic to a virile, intellectual atmosphere; for the passage from the older descriptive method to the newer experimental phase of education. Henry Ford is of the opinion that we are at present entering upon an era of great industrial development which he avers will be led by trained scientists. College authorities no longer need to hesitate to assign science its proper position on the roster on religious grounds, since it has been readjusting itself to spiritual thought in such a manner as to preclude the possibility of its destroying reverence and faith. Students whose ambition begets a desire to take up original research should be given free reign to prove the genius that inspired their predilection for this method of study. Some of these students, even if denied an opportunity at college, would no doubt pursue their way, later in life, toward the goal they had set for themselves, but they might justly feel aggrieved at the enforced pause in their progress. In the past, science has not kept pace with the teaching of the humanities in the colleges. Wise financial planning of a college should include the creation of an endowment for its research department. The changed order of things educational will, doubtless, cause those institutions which do not foster research to vanish like a "creed outworn." J. H. G.

Industries and Schools Confer on Engineer's Education. EDIT. *Chem. & Met.*, **36**, 401 (July, 1929).—The third conference on chemical engineering education was held in Philadelphia, June 22nd, under the auspices of the American Institute of Chemical Engineers. Some of the topics discussed were (1) the purpose and use of the chemical engineering laboratory, (2) introducing the student to industrial work, (3) a system of personal rating and character analysis, (4) the place of economics in the chemical engineering curriculum, (5) an industry's appraisal of the chemical engineering graduate, (6) mathematics for chemical engineers, and (7) the character of post-graduate work for chemical engineers. R. L. H.

Education of the Research Chemist. COMMITTEE REPORT. *News Ed., Ind. Eng. Chem.*, **7,** 1 (July 10, 1929).—In this report by a sub-committee of the Executive Committee of the Division of Chemistry and Chemical Technology of the National Research Council is presented an outline of the type of education and training desirable for the chemical research worker in industry. R. L. H.

KEEPING UP WITH CHEMISTRY

We Demand System Even in the Realm of Literature. KUTZNER. *Chem. Fabrik*, **1929,** 1–2.—Here is offered a plea for better technical articles on behalf of the person only generally interested in a certain field related to his own specialty, who must usually resign himself to the laborious task of reading through the entire contents of journals in order not to miss any details of importance to him and often finds himself involved in technical terminology which may not immediately suggest its relation to what he seeks.

In regard to externals, paragraph headings in black type which may be taken in at a glance would save much time in orientation and in detection of the necessary material. Concerning the contents of the article: the following points should be covered in a description of a new apparatus; purpose, applications already made and results obtained, manner of operation, labor and supervision needed, quality of product, size and weight of apparatus, output, space requirement, motive power, heat and power consumption, probable repairs, construction in detail (with exact drawings), material used, patent information, and other possible uses. New materials should be compared with known ones; physical and chemical properties, uses, handling, working, and forming should be described and full patent information given.

Conformity to these suggestions would insure that none of these important data would be omitted and their account in concise outlined form would save much time in searching for information. C. E. M.

Modern Methods of Cleaning Air. P. DRINKER. *Harvard Alumni Bull.* **31,** 669 (Mar. 7, 1929).—*Abstract of a lecture.* One of our most serious industrial and household problems today is the elimination of air-borne dust and dirt. Whether the dustiness is a menace to health, or whether it is simply a nuisance, we object equally to its presence in large amount. Every one knows that a house shut up during the summer requires dusting and cleaning when opened in the fall. This dust was brought in by the air currents leaking around the doors and windows and coming down the chimneys of open fireplaces.

In our large cities, new buildings are generally equipped with devices for cleaning the air which is introduced for ventilation. In factories or mines, dust-collecting devices of various sorts are found—some for collecting dusts which are dangerous to breathe, such as those containing lead compounds or quartz, and some for relatively harmless dusts, like coal.

To the householder, excessive amounts of any dust, or black smoke in the air, create a serious inconvenience. They increase his laundry and cleaning bills, damage his furnishings and discolor his house, both inside and out. Many of us were surprised recently, for example, to see the red brick walls of the Hotel Touraine in Boston emerge from the hands of the sandblaster.

Several types of air-cleaning or dust-removing apparatus are in use today. This article describes five modern types of dust remover.

1. *Dust Collector Type.* Air pipes containing the dust enter a collector. The air, slowed up, can no longer hold the dust in suspension.
2. *Bag Filter Type.* Similar to that of the ordinary vacuum cleaner. When the bags become plugged up they are cleaned by shaking either automatically or by hand.
3. *Cottrell Precipitator.* If the dust is valuable it can be caught by a process involving the use of a high tension (20,000 to 75,000 volts) electric discharge. Process very efficient but expensive.
4. *Washing Air by Water Sprays.* Less efficient than the electrical method, due to the carrying over of dust through the bubbles.
5. *Viscous Filter.* If dusty air is carried through steel wool coated with a non-volatile oil, dust particles are caught on the oily wool. Many other substances may be used instead of the steel wool in these "viscous filters," but they all give the air a tortuous path and impose a sticky surface to catch the dust particles. S. W. H.

More on the Ultra-Violet. *Technology Rev.*, **31,** 279 (Mar., 1929).—Indiscriminate use of ultra-violet light produced by the many lamps now sold to the public has been tempered, it is hoped, by recent admonitions voiced by physicists and physicians who at first suspected and now have pretty tangible proof that injury may result. An active side issue has developed over certain allegations that ultra-violet-transmitting glass gradually loses its transmitting quality, becomes "solarized," after a period of time.

Donald C. Stockbarger, '19, assistant professor of physics at Massachusetts Institute of Technology, who, in *The Review* for November, effectively pointed out the dangers of artificially produced ultra-violet light, recently has refuted the assertion that ultra-violet-transmitting glass finally becomes impervious to these short waves. In a paper prepared for delivery before a conference of the National Housing Association at Philadelphia on January 30th, he said: "Whoever invented the solarization bugaboo evidently did not know that such processes slow down very rapidly so that after a short time they come to a standstill. I have here some specimens of ultra-violet-transmitting glass which has been solarized to the limit. I know that the limit has been reached because they were tested from time to time during the solarization process and those tests proved conclusively that depreciation stopped soon after it began. It seems safe to say that any of the better materials offered by responsible makers will give excellent service as long as you care to use them. . . . Finally, I want to emphasize the importance of making use of this natural health-maintaining agent [the sun]. . . to let sunshine into the house in all its natural ultra-violet quality is now a relatively simple matter. Windows, for example, can be made wider and higher and can be placed in unconventional locations if doing so will prove advantageous. Particularly would I suggest that sky-lights be used wherever possible, for a few of these could let in more health rays than all of the rest of the windows combined. . . .

"The ideal ultra-violet home, I think, would be one in which the conventional order of the present was reversed in so far as location of rooms is concerned. I would place sleeping chambers, kitchen, and dining room on the ground floor, leaving the second floor for the living room, study, playroom, or nursery. By the use of windows and sky-lights fitted with ultra-violet-transmitting glass those rooms in which we spend most of our time would thus have the greatest benefit from the sunlight." S. W. H.

A Table of Electrochemical Equivalents. Based on 1929 Atomic Weights. G. A. ROUSH. *Trans. Am. Electrochem. Soc.*, **55** (preprint), 11 pp. (1929) (also in pamphlet form); *C. A.*, **23**, 2889 (June 20, 1929).—The last complete table of electrochemical equivalents is that calculated by Hering based on 1917 atomic weights. Since that time there has been a large number of revisions in atomic weights, some of them of considerable magnitude. The entire list was therefore recalculated to 5 decimal places on the basis of the 1929 atomic weights. C. E. M.

Chemistry and Materia Medica. ANON. *Chem. Age*, **20**, 614–5 (June 29, 1929).—*A review of a lecture delivered by R. R. Bennett.* Some of the factors which are responsible for the higher average level of health today, in spite of increased physical and mental strain of modern life, are briefly outlined. Among others there are mentioned isolation of active principles from natural drugs, synthetic drugs, mercurochrome, and other antiseptics. E. R. W.

Chemistry, Agriculture, and Industry in Germany. W. A. DYES. *Chem. & Ind.*, **48**, 507–10 (May 17, 1929), 528–31 (May 24, 1929).—"Competition means progress, but overproduction and price-cutting can be disastrous. . . . The formerly flourishing rayon business is now passing through critical stages in many countries."

"The export trade of the United States depends to the extent of 45% on sales to Europe, but European sales to the United States are barred by high duties."

Besides discussions suggested by the above extracts the article gives a rather detailed summary of the condition of industrial chemistry and agriculture in Germany at the present time. E. R. W.

Manufacture of Carbon Dioxide. H. E. HOWE. *Ind. Eng. Chem.*, **20**, 1091–4 (Oct., 1928).—This article describes the plant of the Dry Ice Corporation at Elizabeth, N. J. The process of manufacture of carbon dioxide snow is given in detail, the description being accompanied by an explanatory flow chart.

"During the past few years there has been a steady growth in the demand for this material based on the convenience attending its use and the special applications to which it may be put. Today a certain frozen confection is dispensed largely from one-gallon vacuum jugs where the temperature is kept satisfactorily low with one pound of the refrigerant per day. Fresh meat and ice cream are being distributed by trucks cooled with solid carbon dioxide and no longer leave a trail of salt water on the pavement. Food specialties are being regularly shipped over long distances in specially designed containers. A development department of the company is busily engaged on a number of projects dealing with new uses, and particularly with improvement in devices in which the new refrigerant can be used to the most economical advantage.

"However, the established demands already tax the capacity of the company's facilities. The plant in Yonkers, utilizing by-product gas from molasses fermenters, continues in operation with a capacity of some 10 tons per day. The Chicago plant produces 5 tons per day and will be enlarged. It is expected that the plant described in this article will soon be greatly expanded by the addition of further units in which will be embodied new methods both of construction and operation established through research in which the company is continually engaged. Each unit consists of a coke-fired boiler, two scrubbing towers, two absorber towers, a heat interchanger, a lye boiler, and cooling coils. The compressor room works on gas from a common header of gas from a holder, so that the enlargement of the plant can go on without any interference with established operating units.

"The last two years have seen carbon dioxide greatly emphasized as a commercial gas. We have long been familiar with the steel cylinders which in themselves have represented a considerable annual tonnage of output. But now that its place as a commercial refrigerant has become established, it seems but a question of time when demand will require plants for production of solid carbon dioxide as widely and conveniently distributed as are those for the production of the indispensable soda fountain accessory and of a size comparable with other units of the chemical industry."

D. C. L.

Preparation and Industrial Use of Solid Carbonic Acid. R. PLANK. *Z. Ver. deut. Ing.*, **73,** 221–4 (1929).—The article is a review of American practice in the preparation and use of solid CO_2 or dry ice and is essentially the same as an article by Howe in the October, 1928, number of *Industrial and Engineering Chemistry.* [See Abstracts, THIS JOURNAL, **6,** 1826 (Oct., 1929)]. An account of its manufacture and a discussion of its properties are given together with its advantages over ice as a refrigerant, the most noteworthy of these being the economy of space, the fewer number of required reloadings (of advantage to freight car operators), and the more sanitary conditions and decreased corrosion due to the elimination of water. The convenient use of solid carbon dioxide in the shipment of sea-food, ice cream, and other perishable food products in small containers is pointed out, this being of economic significance in Germany. Although in that country, the present-day price of liquid carbon dioxide makes the cost of industrial use prohibitive, the author points out that a great portion of the cost is due to the use of steel containers which add to the cost of shipment and which are eliminated in the shipment of the solid carbon dioxide. Results of experiments which show solid carbon dioxide to be not much more expensive but very much more advantageous than ice are given.

C. E. M.

Dry Ice, The New Refrigerating and Preserving Agent and Its Production. A. KARSTEN-SALMONY. *Chem.-Tech. Rundschau*, **44,** 275 (1929); *C. A.*, **23,** 2536 (May 20, 1929).—The characteristics of commercial solid CO_2 are described, as well as the method of its production by the Carba Akt.-Ges. of Bern. This method consists in chilling at a pressure of over 5 atm. and yields a solid of sp. gr. 1.4–0.5. This is contrasted with other processes which yield first a somewhat spongy CO_2-snow, which must be further compressed. C. E. M.

High Pressures in the Manufacture of Synthetic Ammonia. ANON. *Chem. & Ind.*, **48,** 591–8 (June 14, 1929).—A discussion of the Haber process and the Claude modification of this process for the manufacture of ammonia. The article deals especially with the development of the high pressures necessary for efficient manufacturing. Compressors working at 14,000 lb. per sq. in. are now in operation. E. R. W.

Tungsten as a Technical Material. ANON. *Chem. & Ind.*, **48,** 573 (June 7, 1929).—The metallurgy of tungsten is briefly described. Nickel and copper surfaces may be coated with tungsten by electrolytic deposition from an alkaline electrolyte. Beside the common uses of tungsten in lamps and in carbon electrodes it is important in the preparation of alloys, conferring hardness and resistance to acid corrosion. E. R. W.

Northern Rhodesia Rich in Copper. O. LETCHER. *Compressed Air Mag.*, **34,** 2801–5 (July, 1929).—The large deposits of copper ore in Rhodesia are of interest to the people of the United States because of the lead in the copper industry which we have so far maintained. Much American capital and machinery are being used in the development of this new field. Production, at present amounting to only 7000 tons per annum, is expected to increase to 150,000 tons in four or five years' time. The history of the discovery and development of the Rhodesia copper country is presented in an interesting, well-illustrated article. E. R. W.

The Production, Properties, and Uses of Special Brasses. ANON. *Chem. Age (Mo. Met. Sect.)*, **20,** 41–2 (June 1, 1929).—A classification of the different types of brasses, and a brief discussion of the effect of adding different elements on the properties of brass. E. R. W.

Emulsified Asphalts (Asphalt Emulsions). E. S. ROSS. *Chem. & Ind.*, **48,** 112T–

14T (May 17, 1929).—An interesting discussion of the application of theoretical colloid chemistry to the preparation of asphalt road-making material. In order to prepare an emulsion suitable for road building, the interfacial tension between asphalt and water must be lowered by some soap, the mixture should be slightly alkaline, some protective agent such as fine clay should be added. E. R. W.

The Exploitation of the Dead Sea. I. MELAMEDE. *Chem. Age*, **20,** 558–60 (June 15, 1929); 582–3 (June 22, 1929).—An interesting and authoritative account of the resources of the Dead Sea. The waters of this sea contain 2000 million tons of potassium chloride, 980 million tons of magnesium bromide, 11,900 million tons of sodium chloride, 22,000 million tons of magnesium chloride and 6000 million tons of calcium chloride. The method by which this immense wealth of raw material may be exploited, using only the sun's heat to evaporate the water, is outlined. E. R. W.

Facts and Fancies about Gas Warfare. EDIT. *Technology Rev.*, **31,** 213 (Feb., 1929).—"Deadly gases purported to have sufficient toxicity to wipe out whole cities are periodically discovered, according to the public press, and it has grown to be the great indoor sport of a school of front-page chemists to draw horrific pictures of the use of gas in the next war. A ready-made example of this is available in a public statement emanating from Hilton Ira Jones of Chicago, listed in the Directory of the American Chemical Society as Director of Scientific Research, The Redpath Bureau. He is quoted as asserting that the government possesses knowledge of a new gas believed by him to be cacodyl isocyanide, which is so overwhelmingly deadly that the Chemical Warfare Service of the Army has attempted to suppress discussion about it.

"At best Dr. Jones' statement is an ill-informed outburst, adding to public fear and misunderstanding of lethal gases and their military uses. It is a generally accepted maxim among informed chemists and physiologists that no gas exists at the present time (nor will one be discovered) for which some means of protection and defense may not be devised. Professor James F. Norris, Director of the Institute's Research Laboratory of Organic Chemistry, and former President of the American Chemical Society, on talking recently of the development and use of war gases, stated that the gas referred to by Dr. Jones was tested exhaustively by the Germans (Just and Haber worked at it) during the World War but was not used by them. Dr. Norris, who was in charge of offense chemical research and war gas investigating for the United States Government during the war and is now a consultant for the Edgewood Arsenal, holds that the Allies were also familiar with the cacodyl group and found it unsatisfactory. Thus, it seems, there is nothing particularly new or startling about the gas to which the Chicago chemist refers.

Moreover, as Dr. Norris points out, it is improbable that more deadly or toxic gases will be discovered; enough sufficiently lethal gases are already known. Asphyxiant gases such as phosgene ($COCl_2$) and blistering gases such as mustard gas (dichlorethylsulfide) will certainly kill if they make contact in sufficient quantities. Instead, the probable trend of gas warfare studies will be toward finding more effective means of using these known gases against the increasing effectiveness of methods to combat them, and in the development of so-called neutralizing gases which incapacitate rather than kill. Anyhow, it is patently absurd to say that any gas could be used in quantities sufficient to annihilate whole populations and altruism of the sort implied by Dr. Jones would be obviously incompatible with faithful adherence to the responsibilities the Republic has entrusted to its Chemical Warfare Service. S. W. H.

HISTORICAL AND BIOGRAPHICAL

NOTE: References which are consulted for the material on the frontispieces to THIS JOURNAL will be recorded hereafter in this section of the Abstracts each month.

Van't Hoff Memorial Lecture. J. WALKER. *J. Chem. Soc.*, **101,** 1127–43 (1913).—An account of the life of van't Hoff and his contributions to chemistry. M. W. G.

Jacobus Henricus van't Hoff. B. HARROW. "Eminent Chemists of Our Time," D. Van Nostrand Co., New York City, **1927,** 2nd edition, pp. 79–109. M. W. G.

Van't Hoff—His Work. B. HARROW. "Eminent Chemists of Our Time," D. Van Nostrand Co., New York City, **1927,** 2nd edition, pp. 337–55. M. W. G.

Jacobus Henricus van't Hoff—Sein Leben und Wirken. ERNST COHEN. Leipzig, Akademische Verlagsgesellschaft m. b. H., **1912.** M. W. G.

Jacobus Henricus van't Hoff. ANON. *Sci. Mo.*, **7,** 563–4 (1928).—Biographical note. M. W. G.

Van't Hoff in America. B. HARROW. *Sci. Mo.*, **7,** 564–8 (1918). M. W. G.

Stereochemistry and Technics. P. WALDEN. *Z. angew. Chem.*, **38,** 429–39 (1925).—A thorough review of the history and the modern application of stereochemistry with biographical note on van't Hoff and Le Bel. M. W. G.

Emil Fischer—Sein Leben und Sein Werk. K. HOESCH. *Ber.*, **54,** special number, 480 pp. (1921). M. W. G.

Emil Fischer Memorial Lecture. M. O. FORSTER. *J. Chem. Soc.*, **1920,** 1157–201.—Contains a biographical note and a thorough survey of Fischer's invaluable work in organic and biological chemistry. M. W. G.

Commemoration Speech on Emil Fischer. BECKMANN. *Sitzber. preuss. Akad.*, **1920,** 698–703. M. W. G.

Prof. Emil Fischer. *Nature*, **103,** 430–1 (1919).—An obituary. M. W. G.

Emil Fischer. P. JACOBSON. *Chem.-Ztg.*, **43,** 565–9 (1919).—Obituary. M. W. G.

Emil Fischer's Recollections. W. J. POPE. *J. Soc. Chem. Ind.*, **41,** 495–6R (1922). M. W. G.

Emil Fischer. *Proc. Roy. Soc.* (London), **98A,** l–lvii (1921).—An outline of Fischer's work. M. W. G.

Emil Fischer. B. HARROW. "Eminent Chemists of Our Time," D. Van Nostrand Co., New York City, **1927,** 2nd edition, pp. 217–39. M. W. G.

Fischer—His Work. B. HARROW. "Eminent Chemists of Our Time," D. Van Nostrand Co., New York City, **1927,** 2nd edition, pp. 440–58. M. W. G.

Adolph von Baeyer. F. A. MASON. *Sci. Progress*, **12,** 489–90 (1928).—Biographical sketch and obituary notice. M. W. G.

Baeyer Memorial Lecture. W. H. PERKIN. *J. Chem. Soc.*, **1923,** 1520–46.—An account of Baeyer's life and his contributions to chemistry. M. W. G.

Moissan Memorial Lecture. W. RAMSAY. *J. Chem. Soc.*, **101,** 477–88 (1912).—An account of Moissan's life and work with portrait. M. W. G.

Henry Moissan. B. HARROW. "Eminent Chemists of Our Time," D. Van Nostrand Co., New York City, **1927,** 2nd edition, pp. 135–54. M. W. G.

Hideyo Noguchi, A Biographical Sketch. S. FLEXNER. *Science*, **69,** 653 (June 28, 1929). G. H. W.

Missionaries of Science—Elihu Thompson and William Stanley. E. W. RICE, JR. *Gen. Elec. Rev.*, **32,** 355–61 (July, 1929).—Missionary! What a picture that word brings to one's mind! He is a man who strives to lift his fellowmen from the depths of ignorance; who pushes back the border of the unknown; and who is "inspired by something finer than the desire for fame or power or money." Elihu Thompson and William Stanley were missionaries—"missionaries of science." They did much to make possible the modern electric transformer. Truly they have helped to light the path of man, and to ease his burden.

The author has brought to us the story of how these men stuck with an idea until it bore fruit. H. T. B.

Charles M. Hall and Aluminum. *Laboratory*, **2,** 35 (1929).—A short account of Hall's discovery of the electrolytic production of aluminum. A full-page illustration of the aluminum memorial to Charles Martin Hall presented to Oberlin College by Richard B. Mellon faces the article. R. L. H.

The Aluminum "Crown Jewels." *Laboratory*, **2,** 36 (1929).—An illustration with brief description of an exhibit of the specimens which form the historical background of aluminum in America. Some of the small buttons of aluminum which Hall had in his hands when he rushed into Dr. Jewett's laboratory and announced that "he had it" are included in this exhibit. R. L. H.

The New Chemical Laboratories of Harvard University. A. B. LAMB. *Harvard Alumni Bull.*, **31,** 799–814 (Apr. 18, 1929).—A fifteen-page article, illustrated by eleven photographs of exterior and interior views, describing the New Mallinckrodt Chemical Laboratory may be found in the April 18 number of the *Harvard Alumni Bulletin*. This article is written by the director, Professor A. B. Lamb. S. W. H.

EDUCATIONAL MEASUREMENTS AND DATA

Tests and Visual Education. A. HARN. *Educ. Screen*, **8,** 166 (June, 1929).—Tests are looked upon as instruments for determining the efficiency of instruction. To have validity the test must be defined by the aims and objectives of education.

Visual education looks to its effectiveness as a sanction for its continuance. So the tests used in measuring its effectiveness are basic in experimentation with this aspect of education.

Tests are reckoned valid if they: (1) measure achievements of educational objectives, or if (2) they measure achievements which have a high degree of correlation with those objectives.

Knowledge may be directly usable by the student either in the present (or later life) or it may be valuable in education because of its usefulness in developing attitudes, ideals, appreciations, and sympathies. The paramount contribution of visual education is to the second of the above uses. Direct and convenient tests for these ends are not at present known. Tests commonly employed have not shown a dependable correlation with these indices of "culture," "character," and the "liberally educated man."

Tests designed especially for visual instruction are needed. Such tests would, among other things, magnify the visual method of instruction in the minds of its teacher-users. B. C. H.

Leisure Reading of Junior High-School Boys and Girls. J. JENNINGS. *Peabody J. Educ.*, **6,** 333–47 (May, 1929).—"Proper use of leisure" is one of the seven cardinal aims of secondary education. The right kind of reading should further other of these aims including ethical conduct, worthy home membership, and good citizenship.

In an endeavor to learn the nature of the leisure reading of Knoxville (Tenn.) junior high-school boys and girls the author, assisted by junior high-school English teachers, obtained the reading records and some reading preferences of 890 junior high-school pupils; 375 boys and 515 girls. Results were tabulated separately for boys and girls.

Records are presented showing types of newspaper and magazine reading done, names of magazines and books read, and the magazine and book preferences.

Of interest to science teachers, *Popular Science* has fourth place in the preference list of the boys, *Science and Invention* stands sixth, and *National Geographic* has ninth place. No magazine of a scientific turn finds a place among the highest ten preferences of the girls. B. C. H.

Secondary Education as a Field for Research. W. C. REAVIS. *Phi Delta Kappan*, **12,** 21–4 (June, 1929).—The period 1925–27 shows a 188% increase of degrees granted for investigations in secondary education over the two years, 1923–25, preceding. From partial reports for 1927–28, 114 more theses on secondary education were completed for the one-year period than for the total four-year period, 1923–27.

Some phases of secondary education already partially studied include curriculum, extra-curricular activities, personnel administration, school costs, and experimental teaching.

References are cited to typical pieces of such work and bibliographies of such investigations are appended. B. C. H.

THE METHODS AND PHILOSOPHY OF EDUCATION

High-School Limitations. EDIT. *High-Sch. Quart.*, **17,** 160 (July, 1929).—Small school principals cannot be expected to keep up with ever-varying unit requirements of twenty to forty colleges. They must consider financial limitations and limitations of teachers as to preparation, teaching load, and pupil load. College entrance is only one of several needs to be satisfied. Accredited schools will all give 16 units as defined by the Associations. Colleges can take graduates or not on what is offered and certified. The school must give courses which it can best do within the limitations mentioned above. J. H. G.

Summer High-School Credits. EDIT. *High-Sch. Quart.*, **17,** 161 (July, 1929).—There seems to be some irregular certification of high-school pupils doing summer work. There are two kinds of students doing summer work, those who have failed in a subject and are repeating it, and those who are pursuing a new subject. Forty-five days of summer school sessions or at least six weeks are suggested; no pupil should be allowed to carry more than two half-units of new work and with this carry no review work; no more than one unit of review work should be carried in a single term; recitation periods should be 60 minutes. J. H. G.

Books and Their Use. EDIT. *Harvard Alumni Bull.*, **31,** 1054 (June 13, 1929).—One of the symptoms in change in methods of college teaching is the decline in the use of "textbooks." This pedagogic artifice represented the view that knowledge was a finished thing that could be parcelled out in sealed packages bearing the trademark of authority. It implied that the teacher was a retailer or distributor of the product and that the student was the consumer, both being clearly distinguished from the manufacturer.

The new idea is that knowledge is in a state of perpetual flux and development, and that teachers and even students participate with investigators in this process. To be understood, knowledge has to be re-thought, whether by the teacher who imparts it or by the student who receives it, and this act of re-thinking has in it something of that critical or creative originality which distinguishes research.

The passing of the textbook means that students to an increasing extent resort directly to classics, to fundamental treatises, and even sources. This has led to the multiplication of standard works in convenient editions at low prices, and to the greatly increased use of libraries. For this service the American libraries were happily prepared by the enlightened methods which had already been for some time in vogue. At a gathering recently held to celebrate the completion of thirty years of service by Herbert Putnam, '83, as Librarian of Congress, Congressman Robert Luce, '82, described the earlier idea, which was accepted when he and Mr. Putnam attended Harvard together, an idea which even yet survives in continental Europe. John Langdon Sibley was then librarian at Harvard. On a certain Sunday afternoon, as he was locking up, with a smile of satisfaction on his face, a friend asked him why he felt so pleased. He answered, "Every book but one is in its place on the shelf. Agassiz has that one and I am going after it now."

A great university is both a treasure and form of service. S. W. H.

PROFESSIONAL

The Wages of Teaching. *Technology Rev.*, **31**, 153–4 (Jan., 1929).—A recent study (*Occasional Papers, Number 8*) conducted by the General Education Board has revealed significant facts about salaries in American Colleges, particularly for the years 1926–27. In the 302 colleges of arts, literature, and science and corresponding colleges or departments of universities located in all parts of the country with which this study was concerned, the average salary of all grades of college teachers in all types of colleges was $2958. This figure represented an increase of 29.8 per cent over 1919–20.

To bring the facts nearer home, the average salary of all teachers, regardless of rank, in New England men's or co-educational institutions (women's colleges are lower) was $3605. The average at Massachusetts Institute of Technology during the current year is $3540, or 2 per cent less than the above figure of 1926–27 and 15 per cent more than the average in men's and co-educational institutions over the whole country.

In making comparisons with past years it should be kept in mind that these figures are, of course, based on nominal salaries. In what direction do they vary from real salaries? The Statistical Abstract of the United States, 1926, gives the index number of the cost of living in the United States, based on an average of 100 for 1913 as against 216.5 in June, 1920, and 175.6 in December, 1926. With this decrease in living cost, it is apparent that the salary increases are real increases over 1919–20.

Comparison with pre-war conditions, however, is not so encouraging. Using the above index figures and comparing the average salary in all types of colleges in all parts of the country, the author of the report computed the following table:

	Nominal average salary	Real average salary
1914–15	$1724	$1724
1919–20	2279	1114
1926–27	2958	1825

Says the report: "There was a distressing depreciation, it appears, in the real average salaries of college teachers from 1914–15 to 1919–20. The increase in 1926–27 over 1919–20 has been material and is gratifying. Nevertheless, despite all the efforts exerted in recent years to improve their economic status, teachers in the 302 institutions under consideration were only slightly better off financially in 1926–27 than like workers in 1914–15."

Deploring the low salaries paid in the teaching profession is nothing new. In "Galileo: His Life and Work," by J. L. Zahie (London: John Murray) there are interesting data on salaries and their attendant discontent in the teaching profession during the sixteenth and seventeenth centuries. Galileo accepted the mathematical professorship at Pisa on a salary of 60 scudi per annum, a scudo being equivalent to about $0.97. Later he had much difficulty in making ends meet at Padua where he first received 300 florins, or about $150 per annum. He was forced into much trouble getting this increased, and, in fact, received no increase of notable size until his development of the telescope prompted an admiring Venetian Senate to give him his professorship for life with a salary of 1000 florins, or a little less than $500 a year.

Unfortunately, no index figures were computed in those days, so it is impossible to reduce these nominal figures to real ones. But they attest the ever-present need for better economic conditions among academicians that is reflected in the study conducted by the General Education Board. S. W. H.

How Industry Absorbs College Crop of Chemical Engineers. J. A. LEE. *Chem. & Met.*, **36,** 415–6 (July, 1929).—"Registration in chemical engineering in our universities and colleges increased by more than 20 per cent last year. Sixty of the 80 institutions that give courses in chemical engineering reported a current output of 740 graduates. Of the number that went directly into industry the figures show that one in every six went into petroleum refining while only one in fifteen was absorbed by the strictly chemical industries. These and other interesting deductions and trends are revealed as the result of an extensive survey that *Chem. & Met.* has conducted through the cordial and effective coöperation of the chemical engineering departments of the principal colleges and universities of the United States."

Data is included in chart form on (1) distribution of chemical engineering graduates in the process industries and (2) chemical engineering registration statistics for 55 of the institutions giving courses in chemical engineering. R. L. H.

The Qualifications of an Industrial Chemist. F. A. FREETH. *Chem. & Ind.*, **48,** 647–50 (June 28, 1929).—The average college graduate is "crammed" to an extraordinary extent. Because most professors feel bound to give out research problems which will yield a definite result we find an atmosphere of artificiality around most post-graduate research. This sort of training may spoil otherwise good research men by causing them to expect certain results so that they do not observe keenly what really does happen when a new experiment is performed. The man intending to become an industrial chemist should pay much attention to the development of technic.

E. R. W.

MISCELLANEOUS

Home or Income. *Harvard Alumni Bull.*, **31,** 1081–2 (June 30, 1929).—In the past year two serious attempts have been made to survey the practical, the material value of college education for women. One experiment was conducted at Radciffe, the other at Columbia, and though like Tweedledum and Tweedledee, the final figures have proved themselves contrary-wise, the research has brought to light some surprising information.

At Radcliffe a study was made of the salaries of 1350 alumnae. As a unit of measure the median salary was chosen, that is, the salary earned by the middle person in any graded series. Analysis showed that the highest median salary—$2900—is earned by the Ph.D.'s; that the next highest median salary—$2500—is that representing some four hundred M.A.'s. The 772 holders of the A.B. degree have a $2000 median salary, while the median for the special students who have no college degree is $1900. Thus, say the college authorities, a Radcliffe woman's earning power increases in proportion to the amount of her education.

Professor Walter B. Pitkin of Columbia has started his research in the same direction but has fetched up at the opposite pole. According to his article in the current *North American Review* there are now 900,000 women in the United States whose mental caliber equals or surpasses that of the average college graduate—and there are jobs available for only 125,000 of them. "The intellectual woman's chance of finding work outside the home," he writes, "that will satisfy her superior mind is growing smaller every year, and not because of the antagonism of men but because such jobs are growing scarcer for everybody." He believes we are close to the saturation point. Banking cannot absorb more than 500 women in posts that require high intellectual ability; engineering, 400; journalism, 2000; medicine, 6000; teaching, 12,000; government service, 5000; scientific research, 10,000, and so on.

Between 1910 and 1920 there was an increase of only 26,834 women in the leading professions while the increase of those *qualified* to enter such fields was 130,000. The only natural recourse, says the statistician, is to motherhood, which, as we progress, will be regarded as "the greatest as well as the hardest of all the sciences."

From a casual review of these figures one is not to assume that the choice is between Radcliffe or matrimony. It might be nearer the truth to predict that in time to come the college type of woman, thanks to a labor-saving existence and the need for part-time work, will be better able to equate her intellectual ambition and her duty to the home.

S. W. H.

Fathers and Sons. EDIT. *Harvard Alumni Bull.*, **31,** 905 (May 9, 1929).—Many fathers have probably asked themselves from time to time whether their incomes and their intesrets, especially those fostered by their daily occupations, had any bearing on the attitudes of their sons toward academic work. Would sons do better in college if they realized the value of the dollar or if, on the other hand, they did not have to work to help pay their own tuition bills?

Answers to these questions are contained in "Incentives to Study," a book [for review see "Recent Books," THIS JOURNAL, **6**, 1371 (July-August, 1929)] recently published by Albert Beecher Crawford, Director of Personnel Study at Yale.

A greatly condensed statement of his findings based on elaborate statistical tabulations is here given.

1. Boys with limited financial means have higher college grades than those who have plenty of money.
2. This fact is not due to inferiority of the rich.
3. Poverty increases the chance that a boy will do as well as could be expected of him in view of his scholastic ability.
4. Sons of professional men tend to do better in college than sons of business men.
5. Sons of college parents are not superior as students to sons of non-college parents.

Of course, these conclusions are not absolutely accurate or reliable in all cases; they merely indicate general trends to which there are individual exceptions on each side. No one can say in advance about any boy whether he will do well or badly in college. Family background and other external factors have to do with each case. But, by and large, the chances are that affluence will be a deterrent rather than an aid; that a professional occupation on the part of the boy's father will help; and that it makes no difference whether or not the father and mother, or either, graduated from college.

S. W. H.

Russian Potash Developments. An article appearing in a government publication of the Soviet Union states that the construction of new potash mines on the Upper Kama River is well under way. Two mines, No. 1 being developed by Soviet engineers and No. 2 by German potash specialists, are expected to be ready for exploration next spring. Effective exploitation of the Kama potash deposits involves several transport problems. Two-thirds of the potash mined, will, it is thought, be shipped down the Kama River, but this will be possible only after considerable dredging. Since an efficient fertilizer can be obtained only by mixing Kama potash with phosphates, it is very desirable to build a railroad connection between the Solikamsk potash deposits and the Kaigorod phosphate area. The railway connecting Usolie and Solikamsk, which is now under construction, will by no means solve the problem.—*Chem. Age*, **20**, 336 (April 6, 1929).

Japanese Ammonium Sulfate Situation. According to Japanese foreign trade statistics for 1926, Germany provided 300,000 tons, or 60 per cent of Japanese imports of ammonium sulfate, the United States taking second place with 20 per cent of the total, and Great Britain third, with 13 per cent. In 1927 the relation changed in favor of Great Britain, the German imports having declined to 81,673 tons, according to German statistics. Japanese production of ammonium sulfate is developing steadily. In 1927 it amounted to 180,000 tons, which was 34,000 tons more than during the preceding year. The total consumption is estimated at 500,000 tons. The future of the Japanese market for ammonium sulfate is influenced by the erection of large plants by the Japan Nitrogen Co., in Chosen, equipped for an annual production of 250,000 tons. These plants (like others in Japan) will work the Casale process. All the new plants, operating at capacity, would provide for the Japanese consumption of ammonium sulfate.—*Chem. Age*, **20**, 345 (April 6, 1929).

Furfurol is manufactured in the United States to the extent of 500,000 lb. per annum. The price is 10–17 cents a pound, as compared with a price of 30 dollars per pound before 1922, when it was a chemical curiosity. In that year the U. S. Department of Agriculture began to investigate its technical production from agricultural waste products.