## INDUSTRIAL CHEMISTRY.

F. H. THORP, REVIEWER.

**Some Recent Developments in Textile Processes.** BY ARON HAMBURGER. *J. Franklin Inst.*, **145**, 453.—A full account of Mercer's invention, as set forth in his patent claims, is given, and then follows a description of the processes of mercerizing cotton fibers as now practiced. The manufacture of artificial silk according to the methods of Lehner and Chardonnet is discussed. It is stated that the tetranitrocellulose is the basis of the artificial fiber. The uses of formaldehyde in the textile industries also receives passing notice. By injecting a gelatine solution into a formaldehyde solution, threads are produced having a silky luster. The use of gelatine solution, followed by formaldehyde treatment, is considered in relation to sizing in color printing and for water-proofing. Formaldehyde is being experimented with in making souple silks, to fix or render insoluble the sericine and so prevent loss of weight in the various processes through which the silk passes in finishing.

**The Technology of California Bitumens.** BY S. F. PECKHAM. *J. Franklin Inst.*, **146**, 45–54.—This paper consists of a résumé of investigations and reports by the author and others upon the California bitumens, most of the work having been carried on some years ago. The crude oils were found to contain nitrogenous bodies, soluble in acid, which on further study proved to be pyridine and chinoline. A substance supposed to be a crude paraffin was shown to be a solid olefine or naphthene. The author believes, from his experiments, that these oils contain proportionally large amounts of benzene, and that this explains the difficulty of making good illuminating oils from the crude.

**Ammonia and Its Sources.** BY BRUNO TERNE. *J. Franklin Inst.*, **146**, 127–137.—The recovery of ammonia from by-product coke ovens is first considered, and it is shown that the Otto and Semet-Solvay ovens have a firm establishment in this country. The author inclines to the opinion that the Semet-Solvay oven is quicker in operation than its competitors. Putting the average of ammonium sulphate recovered at 20 pounds per ton of coal coked, the daily loss in the 45,000 bee-hive ovens of this country is over 2,000 tons of sulphate. The Mond gas producer with ammonia recovery is mentioned and the yield of ammonium sulphate put at nearly 100 pounds per ton of fuel. The utilization of sugar-house waste by igniting the molasses with alkali-aluminate, as well as several other processes of similar character, has not yet yielded practical results. Nor is the problem of utilizing atmospheric nitrogen for ammonia yet solved. The results of Lord Rayleigh's, and Siemens and Halske's experiments on the oxidation of nitrogen by the influence of the electric spark, show that an alkali must be present to unite with the oxides at the moment of formation. The experiments of Russell and Frank on producing nitrides by heating calcium carbide and magnesium, aluminum, or zinc powder, and also the production of nitrides in the electric furnace by the methods of Mehner and Willson, are briefly considered; these electric methods are favorably looked upon. The production of nitrogen in the soil by the action of bacteria cultures is considered to be yet in the experimental stage. The utilization of garbage as a source of fertilizer and of grease is prominently brought out; it is shown that the garbage of New York and Brooklyn alone will add to the annual output 2,400,000 pounds of ammonia in the form of fertilizer.

**History of the Portland Cement Industry in the United States.** BY ROBERT W. LESLEY. *J. Franklin Inst.*, **146**, 324–348.—The principles of hydraulic cement making were discovered by Smeaton towards the end of the 18th century. The first natural cements made by calcining and grinding suitable argillaceous limestones was made by Parker in 1796; in 1824 Aspdin produced the first Portland cement from a mixture of chalk and clay, calcined at a high temperature, and ground to fine powder. The natural cement industry was early started in this country and has continued to thrive to the present time. Portland cement was first made here in 1870, and the industry has now reached large proportions. The improvement of the rotary kiln gave a great impetus to the industry, while the introduction of other labor-saving devices and improved grinding appliances, notably the Griffin mill and tube-mill, have enabled American cements to displace, to a considerable extent, those of foreign manufacture. The author discusses the materials and their handling for the making of the cement, the chemical analysis of certain type cements, as shown by tables for eleven domestic and ten foreign brands, the testing of cement, and the growth of the industry as shown by statistics.

**High Explosives and Smokeless Powders and Their Applications in Warfare.** BY HUDSON MAXIM. *J. Franklin Inst.*, **146**, 375–386, 457–464.—This paper is a discussion of the properties of various high explosives and a plea for their use in high-power guns and for large shells. Attention is directed to the well-known fact that increasing the density of an explosive diminishes its sensitiveness to detonating shocks; that guncotton in the fibrous state is readily detonated, but that, if dissolved and rendered hard and horny by evaporation of the solvent, it resists detonative influences. Fine granulation of such a material is necessary to insure complete burning, and this presents so much surface that dangerous pressures are reached in the gun if it be over four-inch caliber. A description of the Maxim-Schüpphaus smokeless cannon powder is given: A mixture of high grade guncotton containing a little soluble pyroxylin is rendered plastic with very little solvent and is molded into grains under heat and pressure; these grains, in drying, shrink but little and retain the shape of the die. Nitroglycerine may be added to the mixture, and is recommended in proportions of 10 to 25 per cent. The form of the grain is one of its chief features, it being multi-perforated, which is claimed to increase its ballistic power. The grain proposed for large charges is a cylinder six diameters long and pierced longitudinally by nineteen angular perforations. The exterior of the grain is coated with a non-combustible coating. Assuming, as an example, the 12-inch sea coast rifle, throwing a shell weighing 1,000 pounds at a velocity of 2,250 feet per second, on a pressure of 35,000 lbs. per square inch, it is claimed that a gun of 24-inch caliber and of same length as the 12-inch gun would show an average pressure just half that of the 12-inch gun; but the area of the base of the projectile being four times as great in this case, a shell of twice the weight of the 12-inch shell could be thrown at the same velocity. The additional weight could be made up of high explosive instead of the black powder now used. The last part of the paper deals with the economic and humane aspects of the "business of war."

**A Process of Fire-Proofing Wood To Be Used for the Wood-Work of War Vessels.** By C. J. Hexamer. *J. Franklin Inst.*, **147**, 65–70.—The process consists in saturating the pores of the wood with a solution of water-glass and then decomposing it with a solution of ammonium chloride, by which gelatinous silica is precipitated in the pores of the wood. Well-seasoned, kiln-dried timber is put into a chamber, capable of withstanding strong pressure, and which can be heated externally by steam. The chamber is sealed, the temperature brought to 60° C., and kept there. The air is exhausted as thoroughly as possible with an air-pump; the solution, previously heated to 60° C., is then sprayed into the chamber until the wood becomes saturated, then the vacuum is broken, and a pressure of ten atmospheres is applied and kept up for three hours. This forces the liquid through the mass. It is insisted that steaming the wood previous to saturating it is injurious and prevents the thorough penetration of the liquids.

**Methods for the Examination of Explosives.** By W. J. Williams. *J. Franklin Inst.*, **147**, 197–215.—The author first considers the "service tests," in which the stability of the powder under the influence of heat is determined. The powder is exposed to a temperature of 150° F. until indications of decomposition of the nitro-compounds are observed. Iodo-starch paper is used, which shows a brown or yellow color as soon as acids or nitrogen oxides are set free. The specific gravity is next determined by the use of mercury in a vacuum. The gravimetric density, or "ratio which the weight of the substance bears to the volume it occupies," is then determined in the DuPont gravimetric balance. The loss of weight, when heated at 130° F. for twenty-four hours, and the increase of weight when exposed to an atmosphere saturated with moisture for twenty-four hours, are also determined. The powder is then exposed in an air-tight box to great cold (—35° F. to —40° F.) for six hours, and any gain or loss in weight is noted. It is then exposed to the air for twenty-four hours and any gain or loss of weight determined. After each of these tests the powder is tested for the velocity and pressure when fired in the gun. The uniformity of granulation is determined by a set of sieves with circular perforations ranging from 0.10 to 0.03 of an inch in diameter. Lastly, the "fouling" capacity of the powder is found by burning it on a watch-glass and weighing the residue. The chemical tests are quite elaborate, including the determination of nitrogen by dissolving the powder in concentrated sulphuric acid, shaking with mercury, and measuring the volume of nitric oxide liberated. For nitro-substitution compounds, where this method cannot be used, a modified Kjeldahl or Gunning method is used. Moisture and volatile matter are determined by twenty-four hours' exposure in an air-bath at 50° C., followed by one day or longer in a vacuum desiccator over concentrated sulphuric acid or calcium chloride. The analysis of explosives is then explained, using guncotton as the type; then the analysis of a powder is explained. In an appendix the theory of the decompositions of guncotton, of nitroglycerine, and black powder is illustrated by reactions.

**Graphite: Its Formation and Manufacture.** BY E. G. ACHESON. *J. Franklin Inst.*, **147**, 475–486.—The history, distribution, and uses of natural graphite are first discussed, and then the methods proposed for the artificial production are outlined. The greater part of the paper is devoted to the author's process of forming graphite in the electric furnace, by the decomposition of a carbide. As raw material he employs coke, and he has found as a result of his experiments that the pure coke from petroleum stills will form little or no graphite, while the best yield is obtained from impure coke made from bituminous coal. Only a part of the coke is converted into graphite. The first operation is the formation of the carbide and the second is its decomposition. The theory of formation is explained, and the author states his conclusions from his own experiments, as follows : (1) Graphite is the form carbon assumes, when freed from chemical associations, under conditions of low pressure and protection from chemical influence. (2) Diamond is the form carbon assumes, when freed from chemical associations, under conditions of high pressure and protection from chemical influence. (3) Amorphous carbon is the form assumed when freed from chemical associations, under conditions of low or high pressure and exposure to chemical influences. It is also supposed that catalysis occurs, under certain conditions, during the transformation of amorphous into graphitic carbon. Then follows an account of the commercial operations under way for the development of the process for manufacturing graphite. It is also shown that a specific name for the new product is desirable, exception being taken to the word "artificial," since it conveys the impression that a cheap imitation is being palmed off as the genuine article. "Manufactured graphite" is also excluded, since it is now applied to the articles made of graphite.

**The Laboratory Production of Asphalts from Animal and Vegetable Materials.** By Wm. C. Day. *J. Franklin Inst.*, **148**, 205–226.—The author distilled a mixture of fresh fish (herring) and fat pine wood in an iron retort, and passed the products of distillation directly through a red hot iron tube and thence to a Liebig condenser. He obtained a yellowish-red aqueous distillate and a dark, nearly black, oil, most of which was lighter than water, although a part of it coming over towards the end of the process was heavier. The oil was dried and analyzed, and then distilled by itself in a glass retort. Five distillates were separated at 180°, 245°, 315°, and 340° C. and at 425° (estimated). There remained in the flask a black liquid which solidified, on cooling, to a mass resembling the natural gilsonite in composition and properties. Determinations of carbon, hydrogen, nitrogen, and sulphur, were made, and the solubility in carbon bisulphite, turpentine, ether, gasoline, and absolute alcohol was determined. All of the solutions showed a greenish fluorescence. The action of nitric acid on gilsonite and on the artificial product was similar. Basic compounds similar to pyridine and quinoline were obtained both from gilsonite and from the artificial product. Distillations of fish alone and of wood alone were made in the same apparatus and oil and water obtained. On redistillation this oil left a residue similar to maltha. On analysis it resembled natural elaterite. Basic substances were obtained from this oil similar to those from the gilsonite. The solubility was also studied. From the distillation of the wood a larger proportion of a strongly acid oil resulted. On redistilling, the same fractions were taken as previously, and the residue in the retort was a black liquid which solidified, on cooling, to a black mass, showing a purple color in thin edges. Tables of analyses and solubilities are given. No traces of basic substances could be found in these oils from wood alone. Comparative tables of analyses, specific gravities, and solubilites of gilsonite and elaterite, and of these artificial oils, are given. A lengthy discussion of the origin of natural asphalts and bitumens, and of petroleum, follows. The author inclines to the idea that no one theory can explain all of the known occurrences of different bitumens.

**What is Parianite? A Correction.** BY H. ENDEMANN. *J. Franklin Inst.*, **149**, 314.—The author explains an error, due to a misapprehension in Keller's contribution to the discussion of the paper by S. F. Peckham (*this Rev.*, **6**, 124). From the reading of the report it would appear that the author had made no attempt to isolate compounds of definite composition from asphalt generally, whereas he had merely neglected the petrolenes, these being the subordinate portion of asphalt. He has given his attention chiefly to the solids of asphalts.

**Recent Progress in the Aluminum Industry.** BY JOSEPH W. RICHARDS. *J. Franklin Inst.*, **149**, 451–459.—This is an abstract of a lecture before the Institute. But little is said concerning the metallurgy of aluminum, the greater part of the paper being devoted to its commercial uses. It is shown that alloys of aluminum are relatively cheaper than brass, bronze, or copper, considering the difference in specific gravity. The only metals that are cheaper than aluminum are iron, zinc, and lead. It is rapidly replacing brass and copper for artistic effects, while for culinary utensils, toilet articles, and novelties, its use is steadily increasing. For fruit-jar caps it is replacing zinc, although more expensive. For lithographic printing, aluminum plates are superseding the time-honored stone ; they give fully as fine work and may be used on cylinder presses, thus allowing much faster running. For electric conductors aluminum is replacing copper, and promises to seriously affect the copper industry in this respect. Powdered and leaf aluminum has entirely replaced silver for decorative uses, and is also proving useful in the reduction of refractory metallic oxides; in this way, manganese, chromium, tungsten, vanadium, uranium, boron, and molybdenum have been reduced and utilized in alloys for steel making.

**Aluminum: Considered Practically in Relation to Its General Application in the Arts and Mechanics.** BY JOSEPH A. STEINMETZ. *J. Franklin Inst.*, **150**, 272–284.—This is a somewhat more extended, but similar, article to that by Richards (see above). The use of aluminum in the metallurgy of steel is noted, and also its use for making patterns. For models and salesmen's samples, the lightness of the metal makes it well adapted. The difficulty of soldering it is mentioned and some of the causes of failure pointed out. The statistics of the industry are given. An instance of the failure of aluminum for bath-tub making, owing to corrosion by soap and alkali, is shown ; and for plumbing fixtures the metal is generally unsuitable. The metal finds use in making steam-jacketed pans for sirup, honey, fruit-juices, etc. The uses of the metal for electrical work and for cooking utensils, and its employment in ship building, are fully explained. Aluminum powder and its uses are considered; among these, it is mentioned that it can replace magnesium for flash-lights in photography.

**The Occurrence of Fuller's Earth in the United States.** By David T. Day. *J. Franklin Inst.*, **150**, 214–223.—The characteristics of the material are first considered. The different specimens of earth vary in composition, and no definite mineral substance of distinctive character can be found in all varieties. Any form of clay, which is capable of absorbing considerable quantities of liquids, which crumble in water and diffuse readily, and which will remove grease from wool or coloring-matters from oils, is a fuller's earth. The developments in the United States are then mentioned, and it is shown to be widely distributed. The conditions of its occurrence and its preparation for market are explained. The methods of using it for bleaching mineral and vegetable oils are stated, and it is suggested that, since the oils of different density in such a mixture as crude petroleum percolate through it at different rates, the first runnings being of lighter color and of lower specific gravity than those which follow, there is a possibility of separating such oils without fractional distillation, and hence without the production of decomposition-products. A table of analyses of a number of samples of the earth is also given.

**The Influence of Science on Modern Beer Brewing.** By Francis Wyatt. *J. Franklin Inst.*, **150**, 190–214 ; 299–320.—The author begins with a history of the development of the brewing industry. With the coming of the chemist into the brewing industry it was found that malt contained more diastase than is needed to hydrolyze its own starch, and that some of the troubles of the brewer were due to excessive quantities of nitrogenous bodies in soluble form in the beer. Hence came the use of raw grain to utilize the diastase and, by creating a greater mass of material, to diminish the proportion of proteids in the beer. The nature of the water used was also early recognized as important and its complete analysis is now customary. It is generally asserted that the sum of the quantities of earthy sulphates and carbonates should never exceed 100 parts per 100,000. Iron in quantities greater than 0.5 part per 100,000, is objectionable and should be removed. But a moderate amount of permanent hardness is desirable in the water, and by adding hardening salts soft waters may be improved. The bacteriological examination of the water is briefly explained. The properties and constituents of malt are considered and figures given showing the decrease of diastatic power, as influenced by the kilning process. The influence of temperature on the mashing process is explained, and it is shown that chemists have taught the brewers to use care in attaining a proper temperature in the mash. The use of starchy or saccharine materials, called malt-substitutes or malt-adjuncts, is now general and has resulted in an improved quality of the beer; cereals are specially prepared for this use, while grape-sugar and glucose have long been favorite materials. Raw cereals must be gelatinized at high temperatures to liberate the starch from the cells, before being subjected to the action of the malt at the lower temperature of the mash-tub. Hops are now subjected to analysis; the percentage of water and tannin are determined, as well as the condition and quantity of the lupulin and the amount of extract yielded to petroleum ether, chloroform, and water. Yeast and its properties and the effects of wild yeast and bacteria are then described. The author states the theory of alcoholic fermentation as formulated by Pasteur, and also the new theory of Buchner, that the decomposition of sugar into alcohol and carbonic acid gas is independent of vital action, being produced by a functional product of the yeast cell, an enzyme, which is excreted during its growth, and called zymose. A method for its preparation is given, and it is described as a clear but opalescent yellow fluid with the odor of yeast and a minimum specific gravity, 1.0416. A description of a modern brewing plant is given, and the changes which take place during the mashing are considered. An outline of the brewing process follows, and analyses of the wort with and without raw grain, and of the finished beers from these worts are shown. It is demonstrated that the character of the components of both beers is identical; that the differences in their composition are only those intentionally created, and that the modern scientific brewer may change the nature of his beers at will; that he can foretell the result to be obtained by the use of any process he may adopt. The chief points to be looked for in the worts are then clearly stated. The effect of reduced temperatures in precipitating soluble nitrogenous bodies of the albumose and peptone types is explained. Statistics of the industry in the United States since 1868 and a recapitulation of data in the paper, close the article.

**Water-Softening Plant at the Lorain Steel Company's Blast-Furnaces.** By N. O. Goldsmith. *Power*, **20**, No. 10.—This is mainly a description of the mechanical plant for an intermittent settling process of water purification. It includes an analysis of the water of Black River, Ohio, and also a series of analyses of the water before and after treatment for a period of three months, showing the reduction in the amount of lime and magnesia by treatment. A table of the cost of precipitating 1,000 grains of different impurities with different reagents is also included.

**Note: On Carborundum.** By CHAS. F. MABERY. *J. Am. Chem. Soc.*, **22**, 706.—Attention is here called to the fact that the U. S. Circuit Court of Appeals has decided in favor of the patent of A. H. and E. H. Cowles, Dec. 24, 1884, and against that of E. H. Acheson, thus determining the question of priority for the incandescent method of reducing ores and other substances.

**Portland Cement—Sketch of Materials and Process.** By S. B. NEWBERRY. *Eng. Record*, **42**, 436–438.—The subject is discussed under the heads: Introduction, Materials, Proportions of Ingredients, Mixing, Burning, Grinding. The three general classes of hydraulic cements, Portland cement, Natural cement, and Puzzalona or slag cement are defined. The materials for Portland cement are considered in detail and several analyses of carbonate of lime and clays used for cement are included. Under the proportions of ingredients the formula of Le Chatelier is given together with the author's formula based on his own experiments; thus from the formula

$$X(3CaO.SiO_2) + Y(2CaO.Al_2O_3),$$

he deduces the following rule for calculating the amount of lime required for any particular clay of which an analysis has been made: Multiply the percentage of silica by 2.8 and the percentage of alumina by 1.1; add the products; the sum equals the number of parts of lime required for 100 parts of clay. An example of the use of the formula is given. The author's experiments show that magnesia forms with clay no products having hydraulic properties, hence in calculating cement mixtures only the silica, lime, and alumina are considered. The methods of mixing are briefly explained, the semi-wet process being considered preferable. Under burning, the four types of kilns used for Portland cement are discussed. In this country the rotary kiln is preferred owing to its low labor account, but it is very wasteful of fuel. Le Chatelier's theory of the changes caused by the burning is stated, and the peculiar effect of sudden cooling of the hot clinker is noted. For grinding the clinker, the Griffin mill and tube-mill have generally replaced buhr-stones in this country. The fineness is such that 92–93 per cent. will pass a No. 100 sieve. It is claimed that the average tests of American cements are higher than those of English or German make.

**The Michigan Alkali Co.'s Plant for Manufacturing Portland Cement from Caustic Soda Waste.** BY B. B. LATHBURY. *Eng. News*, **43**, 373. **The Raw Materials for the Manufacture of Portland Cement.** *Editorial*, *Eng. News*, **43**, 376.—These two articles are in a measure complementary ; the first is chiefly devoted to the engineering features of cement manufacture, but it includes analyses of the "waste" employed and also of the clay and of the limestone from which the lime is prepared for use in the causticizing plant. The second article is a compilation of facts relating to the materials, including tables of analyses of them and of representative foreign and domestic cements from various sources.

**How to Calculate the Proper Cement Raw Mixture from the Given Raw Materials.** BY W. MICHAELIS, JR. *Cement and Eng. News*, **9**, 21.—This is chiefly a review of the work of W. Michaelis, Sr., in determining the "Hydraulic Modulus." A formula is given, and the use of this modulus in calculating the ratio of clay to chalk from the analyses of the raw materials is illustrated by an example.

**Chemical Industry of Germany.** BY R. GUENTHER. *U. S. Consular Rep.*, **64**, 186.—The chief features of this report are a table of German imports and exports of chemicals for the years 1898 and 1899, and a table of exports to the United States in 1898. The United States then imported $8,383,000 worth of chemicals, exclusive of a large number of chemicals whose value is not stated.

**Cellulith.** BY R. GUENTHER. *U. S. Consular Rep.*, **64**, 461. —This is a short description of the method of making cellulith from paper pulp. The finished product, which has a specific gravity of 4.5, has the consistency of horn, and when incorporated with sawdust and lampblack, resembles ebonite.

**Silver-Mounted Ware a Menace to Health.** BY WALTER SCHUMANN. *U. S. Consular Rep.*, **64**, 374.—A Franfort newspaper is quoted to the effect that the silver on the mountings on certain glass and porcelain wares is applied by a galvanoplastic process, using baths strongly charged with potassium cyanide. It is claimed that the poison enters the fine cracks and crevices of the glazed ware, remains there, and is a source of danger in the use or handling of the articles. A case of poisoning is stated to have been traced to such a source. These goods are stated to be chiefly exported to the United States.

**New Substitute for Gutta Percha.** *U. S. Consular Rep.*, **64**, 369.—The composition of the new substitute is secret. At ordinary temperatures the substance is hard and firm, but not brittle; it may be hammered without breaking. It softens on warming, but is not affected by water.

**Chemical Foods in Germany.** BY O. J. D. HUGHES. *U. S. Consular Rep.*, **64**, 23.—This contains a short list of the more important artificial food-products containing albuminose bodies.

**New German Glass.** *U. S. Consular Rep.*, **64**, 131.—"Theophilus glass" is the name of a new material which, like the "Tiffany glass of this country," is intended for artistic uses.

**Composition of the Ashes of Some Raw Tanning Materials.** BY WM. K. ALSOP AND J. H. YOCUM. *J. Am. Chem. Soc.*, **20**, 338–340.—Tables are given showing the composition of the tanning material and giving complete analyses of its ash. The materials examined were chestnut-oak bark, hemlock bark, quebracho wood, and oak-bark extract.

**Killing Weeds with Chemicals.** BY L. R. JONES AND W. A. ORTON. *Vt. Agr. Expt. Sta. Rep.*, **1899**, 182–188.—The authors have tried the effects of salt, copper sulphate, potassium sulphide, sodium arseniate, arsenious oxide mixed with sal soda, kerosene, crude carbolic acid, and some other substances, in killing weeds in gravel walks, tennis courts, and other dry beaten soils. About 8 gallons of solution were applied to each square rod of area, the weeds chiefly present being knotweed, grasses, plantain, dandelion, and others. Knotweed was hardest to destroy. Salt requires heavy application, in the dry form, and is liable to be washed onto neighboring lawns and borders; crude carbolic acid is quick and powerful, but not enduring. Arsenical compounds, especially sodium arseniate, are effective, but their use depends upon convenience and expense.

**Analyses of Fertilizers.** *Mass.* (*Hatch*) *Agr. Expt. Sta. Rep.*, *1899*, 108–122; *Bull.* **65**; *N. H. Agr. Expt. Sta. Bull.*, **69**; *N. Y. Agr. Expt. Sta. Bull.*, **173**, 531–552; *Vt. Agr. Expt. Sta. Rep.*, **1899**, 148–150; *W. Va. Agr. Expt. Sta. Bull.*, **63**, 115–152; *Wis. Agr. Expt. Sta. Bull.*, **81**; *N. Da. Agr. Expt. Sta. Rep.*, **1899**, 13–14; *Wash. Agr. Expt. Sta. Bull.*, **40**; *N. J. Agr. Expt. Sta. Rep.*, **1899**, 17–85; *Me. Agr. Expt. Sta. Bull.*, **60**, 23–30; **66**, 117–132; *Mass. State Board Agr. Rep.*, **1899**, 131-169; *Md. Agr. Coll. Quart.*, **1900**, 67; *R. I. Agr. Expt. Sta Bull.*, **60**, **67**, **70**, 73; *S. C. Agr. Expt. Sta. Bull.*, **53**, **54**; *Ky. Agr. Expt. Sta. Bull.*, **85**, **88**.

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## GEOLOGICAL AND MINERALOGICAL CHEMISTRY.

C. H. WARREN, REVIEWER.

**Action of Ammonium Chloride upon Analcite and Leucite.** BY F. W. CLARKE AND G. STEIGER. *Am. J. Sci.*, **159**, 117–124. —The article records the results of an investigation on the action