War Has Taught Our Chemists Many Secrets

Need of Products Which Europe Cannot Now Supply Has Successfully Stimulated Experts to Produce Satisfactory Substitutes

THE National Exposition of Chemical Industries at the Grand Central Palace, opening on Sept. 25, for which exhibits are now being assembled, represents the mighty reflex of the European conflict. It will demonstrate how the goad of war rouses dormant industrial activity and latent ingenuity; how energy imparted by military necessity is transformed into driving power for the arts of peace.

As chemistry has its part in all manufacture, in agriculture, and, in fact, in every art, or trade or craft, the exposition will consist of object lessons on the relation between war and the so-called productive pursuits.

The first chemical exposition was held after the nations of the Old World had been at war for a year. It revealed the beginning of an effort to meet emergencies resulting from a lack of products formerly shipped to this country by foreign laboratories. The approaching exposition represents the results of matured research after two years, and it should prove a revelation to the United States. In connection with the display there will be held in this city conventions of the American Chemical Society, the Electro-Chemical Society, and the Technical Association of the Paper and Pulp Industry.

Manufacturers are not as communicative as they were before the war, yet there has been no move made abroad in finding substitutes and in cheapening processes—all growing out of necessity—which has not been utilized in the United States. Owing to their universal use, the dyestuffs have appealed chiefly to the popular imagination. The fact that Germany had practically a monopoly of the world's markets in coloring material stunted the dye industries elsewhere. But the American dye makers have not been idle, and their remarkable progress will be illustrated at the exposition.

In 1913, the year before the European War began, there were made in this country 14,337 tons of crudes from coal tar, including benzol, toluol, naphthalene, and phenol. The demand of the belligerents has swelled that quantity to 135,000 tons a year, according to estimates of the Department of Commerce. This production is helping an infant dye industry, but not as much as it would under normal conditions, owing to demands of the Allies for high explosives derived from these primary products.

Thirty-five companies in the United States are now engaged in manufacturing coal tar intermediates, of which they are marketing 15,000 tons a year. Six plants were turning out finished coal dyes in 1914, while in 1916 there are twenty-four of them, and they will market 15,000 tons this year. Several of the large aniline companies are now producing direct and sulphur blacks in large quantities.

Thousands of by-product coke ovens have been built in the United States under the stress of pressure for crudes, and the large industrial plants are conserving smoke and vapors which hitherto vanished into thin air. The manufacture of carbolic acid and similar products has grown enormously in the last few months. Such drugs as aspirin, acetanilid, and other medicinal products are now made in large quantities. Materials used by photographers, about which there was so much complaint at the beginning of the war, when European supplies were cut off, are now being obtained in reasonable quantities. Saccharin, hitherto regarded as an exclusively German product, is also made by American chemists.

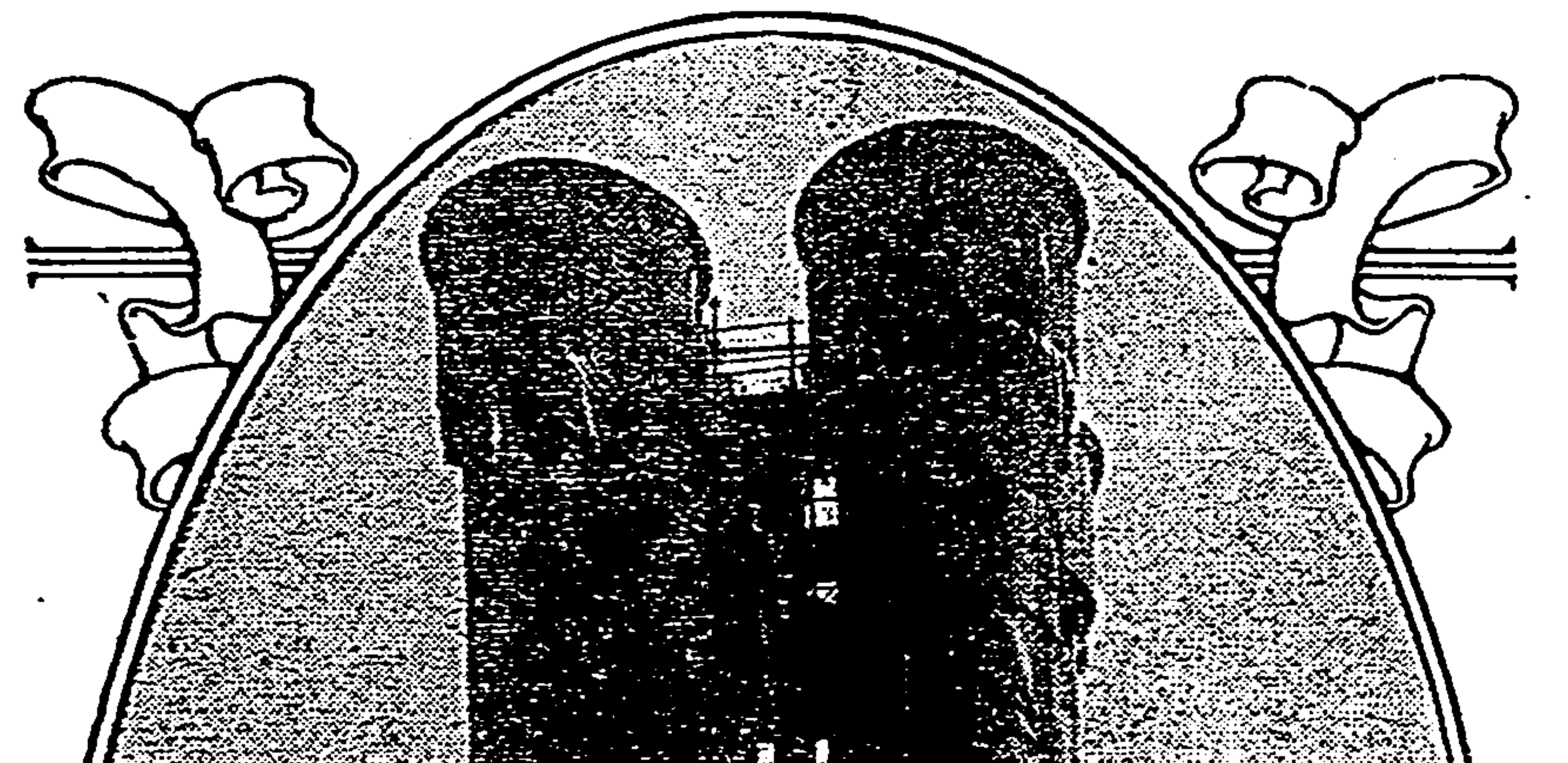
Next to dyestuffs, the greatest need of the United States in the chemical realm has been potash. The German supply could be made cheaply, for the country's great deposits consist of a practically soluble ore. American chemists have been experimenting in many directions to find a substitute for use in fertilizers. Towns and settlements have sprung up in regions where there is a workable amount of potash. The town of Hoffland, in Nebraska, grew from a bare field into a village of several thousand inhabitants because potash-bearing rocks were found in its neighborhood. With potash quoted at $500 a ton, chemical towns are likely to develop bonanzas. In the exposition there will be products and apparatus connected with this new industry.

Such firms as the Armours and the Swifts are getting potash from the seaweeds of the Pacific, the brines of the Great Salt Lake in Utah, the deposits of alumite; even the waste from the manufacture of Portland cement is being utilized. Despite all this ingenuity on the part of chemical engineers, it is, of course, impossible for them to meet the enormous demand of the nation's industries. For instance, the glass and fertilizer factories have had their output largely decreased since they have been unable to draw upon the unlimited resources of the German potash fields.

Millions of electric light bulbs are used in the course of a month, and in the glass used in their manufacture large amounts of potash are incorporated. The research men of the lamp factories, however, have found that soda, which is allied to potash, can be made to replace it in the vitreous flux. In fact, it has been found even to be superior to the old potash glass, which seems destined to drop out of use in the electric light trade.

Therefore the war has indirectly given an impetus to the making of soda derived from the ordinary salt—sodium chloride. Just as Germany has beneath its soil practically inexhaustible supplies of potash, so from 1,000 to 3,000 feet beneath the soil of Michigan, Ohio, and Western New York there are beds of salt from 30 to 400 feet in thickness. The exhibits at the Grand Central Palace will include demonstrations of processes which will cast a new light on the possibilities of industrial chemistry, well seasoned with salt.

The ingenuity of Americans in utilizing their native resources is shown in the growth of the manufacture of scientific and chemical glassware. The United States now has a product which it offers freely as the equal of the Jena quality. The chemical engineers here have been forced to find a substitute for the Prussian porcelains, which the Germans made by combining clays brought from all parts of the globe. Some of the material was even imported from this country. The laboratories of the United States would have suffered if the development of new glass and porcelains for scientific use had not gone ahead. The American manufacturers are now in a position to produce high quality glass for use in lenses for microscopes, cameras, and field glasses.



Giant Towers of Steel for Collecting Benzol.

The German quest for food substitutes has had a far-reaching effect on the production of organic chemicals in the New World. One company will show a new line of organic chemicals which are compounded from hydrocarbons and gases. Products which had their origin in petroleum, bone oil, and the distillation of wood will appear in a new guise through modern thaumaturgy.

When the chemical engineers meet to discuss their experiences the "Chemical Potentialities of the South" will be carefully considered in view of their importance to the nation. Dr. Charles H. Herty, President of the American Chemical Society and the Chairman of the Advisory Committee of the Exposition, dealt with the subject as follows in a recent number of the Manufacturers' Record:

What a wonderful picture presents itself if the imagination is given full play and the South is viewed as it will be some day when industrial chemistry has assumed its full rôle in its development. Today the newspapers are suffering from a scarcity of wood pulp, and yet we are daily wasting in our lumbering operations sufficient material to supply the world's needs; industrial alcohol from this waste points the way to relief in the great need for another liquid fuel. Ammonia from our coal or from our free air, suitably joined to the phosphoric acid from the phosphate beds of Florida, Tennessee, and South Carolina, offers a concentrated fertilizer to our farmers; possible potash and ammonia blast furnace waste products await recovery for the further enrichment of agriculture, raw materials for cement manufactures, clays for all varieties of ceramic industries, low grade ores of many kinds, needing only the discovery of proper methods of treatment to make them leap in values; high ores of all sorts, aluminium, copper, iron, zinc, and manganese; great deposits of petroleum, sulphur, salt, asbestos, and fuller's earth; naval stores from our pine forests; an unequaled supply of almost pure cellulose from our cotton fields; the still greater possibilities which lie ahead in the cottonseed industry; the water powers still awaiting development for electro-chemical industries—mere mention of these thrills the hearts of those who love and believe in the South.

The amount of barium used in painting and the industrial arts which the South has contributed in the last few months is enormous. Before the war the United States imported 40,000 tons of the element in various forms. The States of Kentucky, Virginia, Tennessee, and Missouri have developed large supplies of it, and there have been established in Tennessee large plants for the conversion of the mineral into crude products. Besides the rich stores of barytes which the South has yielded, are kaolin, bauxite, a source of aluminium; talc, zinc, dolomite, manganese, and feldspar.

The solution of the nitrate problem for the South is largely a matter of water power, for the material can be obtained from the air. A Scandinavian process for the manufacture of nitric acid from this source is being used in South Carolina by the Southern Power Company, of which James B. Duke is the head. When water power is especially abundant, as in flood times, the plant is operated with great economy, and from four to five tons of nitric acid are produced each day.

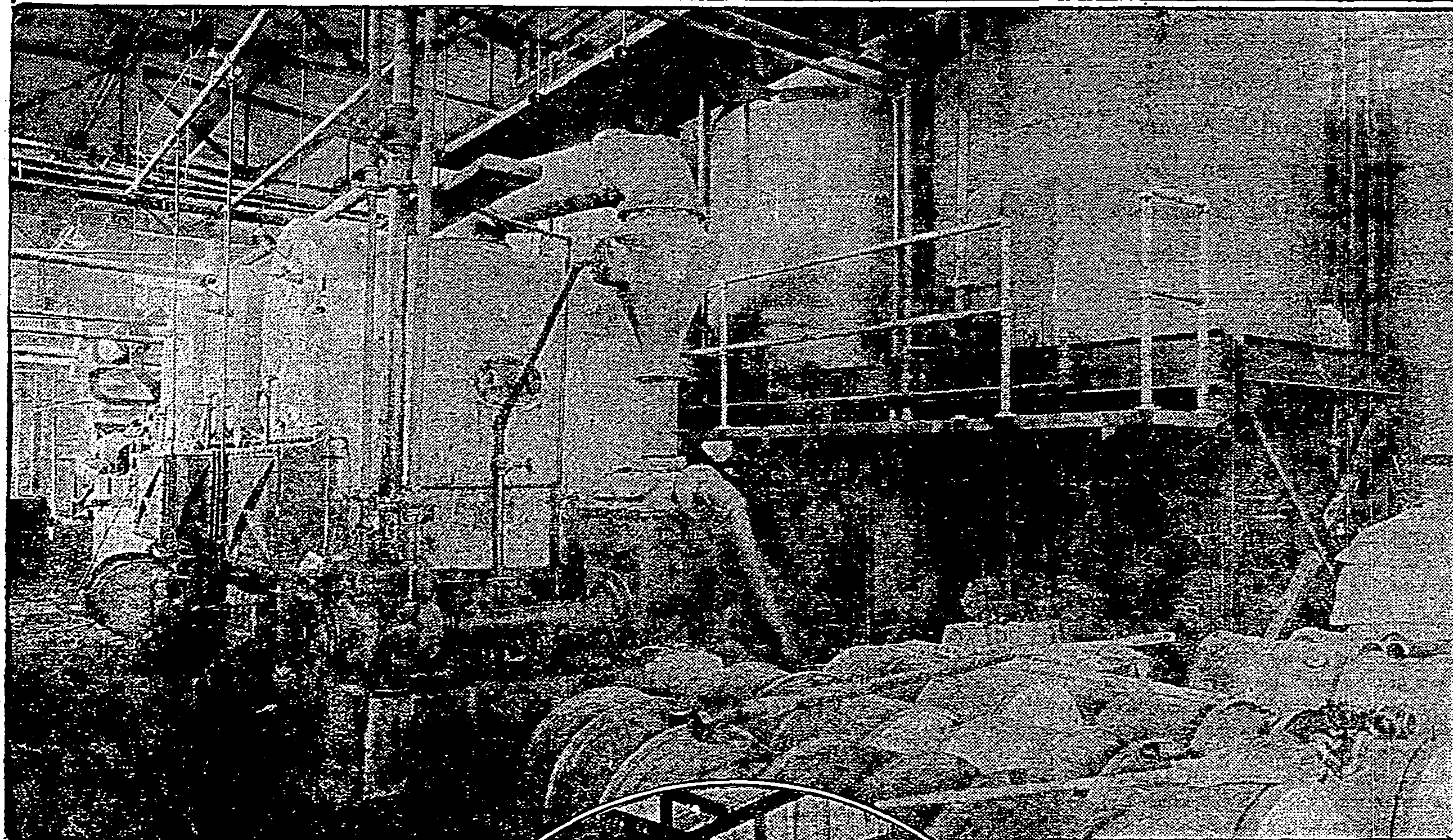
One of the nation's great needs in time of war would be nitrates for explosives, and it has been suggested that quantities of the Chilean product be brought here by the Government and stored. The derivation of nitrogen from the air has, however, reached far more than an experimental stage, and under the stimulus of military necessity it would be possible to obtain supplies of this element by the fixation of the atmosphere. It is known that several large organizations, such as the General Chemical Company of this city, have been obtaining atmospheric ammonia and nitrogen compounds, and that their laboratories have been busy with problems which are the direct outcome of the war.

Both the South and the West have in the last few months been producing zinc in greater quantities. The new electrolytic process of one Missouri company is producing fifteen tons of pure zinc a day. Most of this is sent abroad to war munition factories. No one has ever thought of the United States as a tungsten-producing country, yet in the first six months of 1916 a supply was forthcoming in this country greater than that produced by any other nation for a year. The supply of the tungstic oxide was 3,291 short tons, valued at $9,113,000.

The demand for aluminium for war purposes was stimulated to such an extent that several American plants were established soon after the conflict began, and before many months their output was being shipped to the Allies. There have come into use many aluminium alloys, such as Ormiston metal, albidur, weidrum, antherium, all of which have special merits for casting.

Wherever he turns, the industrial chemist feels the spur of that necessity which follows in the wake of a scarcity of products heretofore plentiful. Take, for instance, the question of fusel oil,

The New York Times
Published: September 17, 1916



Phenol Plant for Refined Coal Tar Chemical Works.

Digging Out Finished Naptholine.

which enters largely into the manufacture of the lacquer used for metal goods and hardware. Owing to the decrease in the importation of fusel oil, some chemists have been obliged to make lacquer which contains 40 per cent. of this solvent instead of 75 per cent., while others have succeeded in producing a mixture from other fluids. At the same time the American distilleries have succeeded in adding largely to their output of fusel oil.

The first solvent used in manufacturing artificial leather was amyl acetate, made from fusel oil. This so-called leather is a fabric coated with soluble cotton and other ingredients. When the price of fusel oil went up the makers of the artificial leather, which is in demand for upholstering and automobiles, practically dropped the use of the oil and introduced other solvents as a result of experiments made for them by industrial chemists.

Much has been said about industrial preparedness, which, after all, is another manifestation of the power of war to search the weak spots of nations. The stress of providing munitions for the European conflict and the inquiries as to how far the United States was prepared to meet the issue should she be involved in war showed that, despite rosy statements about American efficiency, there was no solidarity among the great corporations of the country. They could not have been called into service along the lines of industrial preparedness. It was the influence, therefore, of a conflict far from our shores which caused groups of manufacturers to become acquainted with the resources of one another.

Countless reforms in "shop practice" have been instituted on account of processes developed in the munition works of England, the foundries of France, and the chemical laboratories of Germany. American invention has been stimulated along many lines. The reports of the Patent Office show that in 1915 alone sixty-eight machines were patented for the making of munitions. Without doubt the impetus given to mechanical and chemical processes of all kinds will be revealed to the full when the war is over and the ingenuity called into play will be required elsewhere.

Many new machines used in trade processes will be shown at the exposition, in addition to new chemical products. An idea of the exposition's influence in practical and scientific circles may be gained by scanning the names of the Advisory Committee, which consists of Charles H. Herty, President of the American Chemical Society; Raymond F. Bacon of the Mellon Institute of Pittsburgh; L. H. Baekeland, inventor of Baekelite and a well-known research chemist; Berhard C. Hesse, consulting chemist; A. D. Little, R. P. Perry, William Cooper Proctor, E. F. Roeber, George D. Rosengarten, T. B. Wagner, Utley Wedge, and M. C. Whitaker.