It in the House of Lords, that the anticipation contained in a prior publication must give really the same full and sufficiently precise information which is required in a specification. If it were necessary in this case we should be prepared to adhere to and act upon that view of the law. But what we have got in this case is not one clear statement by one writer, but a mass of paragraphs exhumed by the industry of the defendants' advisers from a number of publications. We are of opinion that if it requires this mosaic of extracts from annals and treatises spread over a series of years to prove the defendants' contention, that contention stands thereby self-condemned. As for annals, in particular the annual registers of science, one knows that in every country every year thousands of facts, or supposed facts, find their way into them, coming like shadows and so departing, without leaving any permanent track behind them. And if it could even be shown that a patentee had made his discovery of a consecutive process by studying, collating, and applying a number of facts, disseminated in the pages of his works, his diligent study of such works would as much entitle him to the character of an inventor as the diligent study of the works of nature would do.

We have, in addition, this broad fact, that with all the knowledge supposed to be communicated by chemical publications, no one did before the patent make an ounce of salicylic acid through the use of caustic soda, or by this or any other process make salicylic acid at any practical price for general or commercial use.

The whole may be summed up thus: No one before the patentee had ever practically or theoretically taught the world how to make out of such abundant and cheap materials as soda, carbolic acid, carbonic acid gas, and hydrochloric acid, the rare and expensive thing, salicylic acid; no one had ever before taught the world the simple and fruitful chemical truth that all that was required to effect this wonderful transmutation was to make the carbonate of soda perfectly anhydrous and perfectly desiccated.

We now come to the second part of the case. Is there evidence that the defendant has infringed the patent for the plaintiff's invention? The defendant admits that he has obtained the article which he sells by Neustadt's process as patented by him. Now, the only distinction between the one process, as patented, and the other, is, that Neustadt begins with anhydrous carbonate of soda. The witnesses for the plaintiff say that there is now no other practical mode of obtaining it than the plaintiff's, and that they have no doubt that it is so obtained. The defendant, who must know how he obtains the materials, has given no evidence to the contrary. We are, satisfied, therefore, that the evidence of the plaintiff's witnesses in this respect is accurate, and that the defendant has imitated, and in fact adopted, the plaintiff's invention.

But in the course of the argument a doubt was suggested from the Bench whether, if a process is patented in England, and the patent is for the process only, and that process is imitated abroad, the importation of the product from abroad and the sale of it here, is an infringement of the patent. But it appears that very point was raised and decided by me, as Vice Chancellor, in the case of "Elmslie v. Bourchier," as far back as the year 1869, and that that case was approved of, adopted, and followed by the Court of Exchequer in the same year.

The question, therefore, is to be determined by the true construction of the letters patent themselves. It was on that construction of the letters patent that the case of "Elmslie v. Bourchier" was decided; and we see no reason to doubt the conclusion there arrived at, that the whole right granted by the Crown to make, use, exercise, and vend the invention within the United Kingdom, and the right to have and enjoy the whole profit, benefit, commodity, and advantage accruing and arising by reason of the said invention, includes a monopoly of the sale in this country of products made according to the patented process, whether made in the realm or elsewhere.

It may be added that the patent, in another part, expressly forbids any person, directly or indirectly, to make, use, or put in practice the invention. A person who makes or procures to be made abroad for sale in this country, and sells the product here, is surely indirectly making, using, and putting in practice the patented invention. Any other construction would, in fact, in the case of any really valuable invention of a process, render the whole privilege granted by the Crown futile. When the patent was an English patent only, an imitator would only have had to establish his factory on the other side of the border, and now such an imitator would only have to establish his factory, or use the chemical process at Boulogne or Ostend, and he would effectually deprive the inventor of the "whole profit, benefit, commodity, and advantage" of his invention. And the more valuable the invention, the more certain it would be that the prohibition in the letters patent would be so indirectly avoided, that is to say, evaded.

We are of opinion, therefore, and conclude that the plaintiff has established the validity of his patent, and the infringement of it, and that the appeal must be dismissed with costs.

A CONTRIBUTION TO THE KNOWLEDGE OF CHLORINE.

By V. MEYER and H. ZÜBLIN.

THE researches of C. Meyer and of one of the present writers on the behavior of chlorine and iodine at high temperature prove the occurrence of a decrease of density to the extent of one-third of the normal value as quite universal in the case of iodine, while as regards chlorine, the like phenomenon is demonstrated only in one special case, that is when the chlorine is applied in the nascent state. The experiments on chlorine were not, like those on iodine, performed with the free element, but with one of its compounds, platinous chloride, which evolves chlorine gas during the experiment, so that the latter is always in the nascent state. It appeared, therefore, important to examine how preformed free chlorine would behave at the same temperature; or, in other words, to determine the vapor density of free chlorine gas at a red heat.

A porcelain vessel, maintained at a yellow heat in a Perrot furnace, was completely filled with pure dry chlorine, which had been evolved from hydrochloric acid and manganese peroxide, and successively purified by water, sulphuric acid, and phosphoric anhydride. After the chlorine had remained for some time in the apparatus, and had assumed the temperature of the furnace, it was expelled by means of a current of carbonic acid, led into a solution of potassium iodide, and its quantity was determined by titrating the liberated iodine with a decinormal arsenite solution. The porcelain vessel, still at the same heat, was filled with dry air, and this, also, after having assumed the temperature of the furnace, was expelled from the apparatus by means of a

stream of carbonic acid, collected in a graduated tube over potassa lye, and its volume was determined in the usual manner. Thus were ascertained, *a*, the quantity of chlorine, *b*, the quantity of dry air contained in one and the same porcelain vessel at the same temperature, forming the needful data for calculating the density of the chlorine. The relatively small quantities of air or of chlorine contained in the handle of the apparatus which projects out of the furnace and in the short and narrow entrance and exit tubes, were determined separately and deducted from the total quantities of air (respectively chlorine), so that only such portions of air or chlorine as were in the ignited parts of the apparatus were taken into account. The apparatus at a yellow heat contained:

Chlorine, 0.06529 grm., 0.06706 grm., 0.06670 grm.
Air, 0.02539 grm. (mean of three determinations).

Hence the density of chlorine was found as 2.57, 2.63, 2.64, or in the mean 2.61. This number agrees satisfactorily with the value calculated for $\text{Cl}_2 = 2.45$, while when operating with nascent chlorine from platinous chloride at low temperatures, a similar value (2.42 and 2.46) was obtained, but at a yellow heat the numbers 1.65, 1.66, 1.66, 1.67, 1.60, 1.62, corresponding to 1.63, the value calculated for $\frac{1}{2}\text{Cl}_2$.

From these experiments there follows the interesting result that the dissociation of chlorine to molecules of the magnitude $\frac{1}{2}\text{Cl}_2$, which takes place on the employment of nascent chlorine at a yellow heat, does not appear at the same temperature when ready formed free chlorine is used; while, on the other hand, iodine, even when applied as a free halogen, undergoes the conversion into $\frac{1}{2}\text{I}_2$, and at a decidedly lower temperature.

What may be the cause of the different behavior of nascent and of free chlorine cannot for the present be ascertained. It may perhaps be sought in the less stable state which bodies are apt to show during the nascent state. But it is also possible that other and more mechanical causes may occur, upon which the authors will enter in a future memoir.

They wish to point out for the present that the existence of chlorine Cl_2 , and of chlorine $\frac{1}{2}\text{Cl}_2$, at one and the same temperature, as these experiments prove, is distinctly analogous to the fact that oxygen and ozone, which in their respective densities show the same relation as the two modifications of chlorine, can exist at the like temperature and even side by side.

The above-mentioned experiments were completed when the authors received information of the researches of M. Crafts (*Comptes Rendus*, xc., p. 183), on the density of the halogens at ignition temperatures. His results agree with theirs most perfectly. M. Crafts also found for iodine the density $\frac{1}{2}\text{I}_2$, but for chlorine, which he introduced into the apparatus in the free state, Cl_2 .—*Berichte der Deutschen Chem. Gesellschaft*.

LONDON CHEMICAL SOCIETY PAPERS.

Combustion of Coal Gas, by L. T. WRIGHT. Some years ago the author was much struck by the powerful odor, suggestive of ozone, which he noticed when coal gas was consumed in a Bunsen burner in an atmosphere charged with the nitrogen oxides evolved from fuming nitric acid. During some experiments on the estimation of sulphur in gas the author passed the products of combustion of a Bunsen burner through solutions of iodine, and noticed that after the iodine solution had been bleached, and the current of gas stopped, free iodine appeared after some time in the solution. This reaction was attributed to nitrous acid, and was completely prevented by adding sodium bicarbonate to the iodine solution; the sulphur could then be determined by burning half a cubic foot of gas. In 1877 the author proved that nitrous acid was produced by the combustion of coal gas in ordinary air, but that if the gas and the air were both freed from ammonia no nitrous acid was formed (*Chem. Soc. Journ.*, 1879, *Trans.* 42); the futility of the ordinary methods of washing gases was also proved. The author has never had the least difficulty in obtaining a blue reaction with paper moistened with iodide of potassium and starch, when coal gas is burning in a Bunsen burner. Since reading Mr. Ridout's paper on the production of ozone, read before the society a few weeks back, further experiments have been made, and the author concludes that ozone is not formed by the combustion of coal gas, and that while ordinary gas burned in air usually gives the blue color with starch and iodide of potassium, no reaction is obtained when ammonia and its compounds have been completely removed previous to combustion.

Polysulphides of Sodium, by H. CHAPMAN JONES. These bodies were usually prepared by the direct union of sodium and sulphur. The author establishes the existence of Na_2S_8 , which, on heating, gives off sulphur, and leaves Na_2S_6 , it being extremely difficult to obtain the substances pure. The body Na_2S_8 seems to be the highest sulphide procurable; in a body containing more sulphur than the penta-sulphide the excess of sulphur seems to be merely dissolved. An aqueous solution of Na_2S_8 , when gently warmed, evolves sulphureted hydrogen; the penta-sulphide cannot, therefore, be satisfactorily prepared by boiling a lower sulphide with excess of sulphur; on boiling the above solution no sulphur is precipitated, $\text{Na}_2\text{S}_2\text{O}_3$ and SH_2 being formed. The author has examined the action of cadmium carbonate and other cadmium salts on the penta-sulphide, and concludes that the precipitate consists of cadmium sulphide and sulphur, the latter being removable by carbon disulphide. The penta-sulphide is believed by the author to be a tetra-thio-sulphate; he hopes to be able to prepare the di- and tri-thio-sulphates, and has obtained on several occasions a substance (giving a dark green solution having an absorption-band) which may be one of these bodies. In conclusion, the author gives some properties of a black residue which is uniformly left when sulphur is burned, but has not examined the substance, as Dr. T. Cross (*Berl. Ber.*, 1879, 788) is already investigating the subject.

Reflection from Copper, and on the Colorimetric Estimation of Copper by Means of the Reflection Cuprimeter, by T. BAYLEY. The author has shown that the light reflected from metallic copper contains all the elements of white light, but that the region of the spectrum to the red side of the D line is more intense than in the spectrum of the reflection from a white surface of equal illumination; the light transmitted by dilute solutions of cupric salts is deficient in those rays which the spectrum of reflection has in excess. It follows that if we look at a copper surface through a sufficient thickness of cupric sulphate solution, the metal appears silver-white, for the solution absorbs the excessive rays which make the copper red. Upon these facts the construction of the "reflection cuprimeter" is based. The direct light from the sky is reflected from a mirror of copper through two

vertical tubes, closed at the bottom by plates of glass. The sheaves of light were concentrated by lenses on two layers of tissue-paper moistened with glycerine. The level of the liquid in the tubes can be adjusted by means of an aspirator. A standard solution of copper is made by dissolving one gramme of copper in nitric acid, adding excess of sulphurous acid, and diluting to a liter. It was found that a depth of 8.01 centimeters of this solution gave the silver-white tint to the copper reflector. Iron does not interfere if reduced to the ferrous state. The degree of accuracy is shown by analyses. The apparatus is made by Messrs. Jackson, 65, Barbican.

Pyrene, by WATSON SMITH and G. W. DAVIES. The crude material was obtained from Dr. Schuchardt, and consisted of a dark brown crystalline mass. This was purified by solution in petroleum spirit and crystallization. Crystals were light yellow; melted at 149°. A drawing of the crystals and a determination of the angles of the faces are given. The crystals are monoclinic. Analysis gave the formula $\text{C}_{14}\text{H}_{10}$. Vapor-density was found to be 6.912, calculated 6.999. The authors used Victor Meyer's method and a lead bath. They recommend smoking the glass, dipping into the melted lead in a luminous gas-flame; this prevents cracking and the adherence of the lead.

Ash of the Wood of Two Varieties of the Eucalyptus, by WATSON SMITH. The two varieties were the red and blue gum trees, *E. rostrata* and *E. globulus*. The wood is remarkably hard, and gives rise to a powerful aromatic odor when planed. Specific gravity of *E. rostrata* is 0.8112, of *E. globulus* 0.752. Ash, respectively, 2.25 and 2.01 per cent.; K_2O and Na_2O , 12.9 and 25 per cent.; CaO , 43.8 per cent.; 35.08 per cent., with small quantities of iron, alumina, etc. The author suggests the use of a decoction of the leaves of *E. globulus* as tea.

SEPARATION OF GOLD BY QUARTATION WITH ZINC.

By C. A. M. BALLING.

THE author criticises Jüptner's method (*Zeitschrift für Anal. Chemie*, 1879, p. 104), and points out certain defects. On melting the zinc with the alloy in an open porcelain crucible the former is partially oxidized, the film of oxide hindering the contact of the metals. If the fusion is performed under a layer of resin, the vapors become ignited and the resin is often burnt away before the fusion is effected. Even in a covered crucible the resin is also soon volatilized, whilst particles of carbon are deposited on the lid and the sides, and falling back into the crucible contaminate the alloy. The finer particles of carbon render the solution in nitric acid turbid, and cannot be entirely removed by washing. The author, therefore, modifies the process as follows: He used cadmium, which is more readily fusible for quartation, instead of zinc, and takes potassium cyanide as a cover. The metals unite readily under the melted cyanide at the heat of a Bunsen spirit lamp, and a homogeneous regulus is soon obtained. The regulus, when cold, is placed in a beaker, and the potassium cyanide is dissolved in water. The solution is poured away and the metal is washed with water. It is then introduced into a flask and boiled once with nitric acid of specific gravity 1.20, and then thrice with nitric acid of specific gravity 1.30. The cadmium is completely dissolved. Two and a half parts of this metal suffice for quartation. The granule of gold retains the form of the original metal and is transferred to a small crucible for ignition.—*Oest. Zeitschrift Berg. u. Hüttenw.*

SPECTROSCOPIC NOTES.

By HERMANN W. VOGEL.

THE author recommends chemists who have no Bunsen flame at command to use as a substitute the flame of hydrogen, with which he has succeeded in obtaining the spectra of the earths and alkalis. He also gives instructions for the detection of cobalt along with iron and nickel. Cobalt salts, dissolved in alcohol and mixed with potassic sulpho-cyanide, give a blue liquid with a most characteristic spectrum. This reaction became more important after Zimmermann had shown that the sulpho-cyanides of cobalt and nickel are precipitated by sodium carbonate, which the corresponding iron compound is not. Upon these facts the author founds the following method for detecting cobalt in presence of nickel and iron: The solution in which the iron must be present in the ferric state is mixed with an excess of ammonium sulpho-cyanide, and then with sodium carbonate, till the blood-red color has changed to a yellow. The whole is then filtered, and the filtrate shaken up in a test-tube with a mixture of equal volumes of amyl alcohol and ether. This mixture takes up the cobalt sulpho-cyanide from the aqueous liquid and floats on the top as a blue stratum, in which the absorption-band may be found between C and D.

DR. RICHARDSON, F.R.S., ON THRIFT IN RELATION TO FOOD.*

IF we take the twenty-five millions of people, who at this time form the population of England and Wales, and, dropping the millions, place them in our minds as a family of twenty-five persons, variously engaged, we arrive at a very comprehensible and important series of facts. The family easily divides itself into its component parts. We see six members of it—five out of six of whom are women—engaged in the domestic life. We see one—a man—actively engaged in commercial affairs, buying, selling, lending, and conducting transport service. We see two fully occupied in agricultural pursuits, cultivating land, growing food produce, and tending domestic animals. We see six—four of whom are men, two women—carrying out purely industrial pursuits, working at mechanical manufactures, weaving, preparing foods and drinks, or working on animal, vegetable, or mineral productions. We see eight, as scholars going to school, or as children at the nurse's breast, the futures of the great family. We see one, of indefinite life, doing no active work whatever, but tolerated by the community, or helped by it. These make up twenty-four of the family. Lastly, we find one man, the twenty-fifth, standing at the head of the family, directing all its affairs. This man governs, defends, teaches. He is the legislator, the soldier and sailor, the policeman, the clergyman, the lawyer, the doctor, the artist, the journalist, the author, the professor, the schoolmaster. This man owns, practically, all the land, rules all the industry, and is, in fact, as much the head of the family, as the head itself is the chief of the body.

This is the family of the English people proper, living in England and Wales. The question is, how the one man

* Delivered at the Mansion House, London, March 12, 1880.