term "volatile nitrogenous matters" is a very elastic one, and includes both virulent and harmless amine compounds. Of the former, those of phenol, toluol, etc., and of the latter, ethyl, etc. This is a part of the subject, however, that I trust to be enabled to further elucidate, while it suffices in the present communication to show that the volatile nitrogenous matters accompanying the other pollutants in a sewage contaminated water probably are injurious to health, and that in an examination of a water to determine its potability, their presence and amount should not be lost sight of.

N. Y. LABORATORY, 133 WATER ST.

ABSTRACTS.

Abstracts from the *Journal of the London Chemical Society:* *E. Waller, Ph.D.*

On the Estimation of Hydrogen Sulphide and Carbonic Anhydride in Coal Gas. By Lewis T. Wright. (Vol. XLIII. p. 267.)

Experiments with an absorption apparatus of the Frankland-Ward type showed that a manganese peroxide bullet introduced some gases with it mechanically, unless previously submitted to the action of a stream of coal gas for some hours, after which it removed a small amount of gas mechanically. Copper sulphate dried at 150° absorbed some gas mechanically. Copper phosphate moistened with syrupy phosphoric acid gave tolerably good results.

In experiments with absorption tubes, the amount absorbed being weighed, cupric sulphate was found to be objectionable for the following reasons : The sulphuric acid set free reacts with the hydrocarbons in the gas,—sulphurous acid will always form (whether the sulphate has been dried as recommended by Fresenius for four hours at 150°-160° or not.) The reagent also is not very sensitive to small amounts of H_2S. Ferric and manganic oxides are not sufficiently sensitive. Mercuric oxide steadily loses weight in a current of pure coal gas. Cupric phosphate was the most satisfactory. It was prepared by dissolving 2 lbs. Na_2HPO_4 (crystals ?) in 1 gallon of water and 2½ lbs. $CuSO_4$ 7 H_2O in 1½ gallons of water and mixing the solutions with vigorous stirring.

The precipitate was washed by decantation and then dried at 100°. Before using, this reagent requires to be completely "saturated" with pure coal gas, by slowly passing through the U tube containing it about 3 feet of gas free from H_3S.

The U tubes used were glass stoppered, and connected by tubes carrying stop cocks. The train used consisted of the meter next a 12 inch U tube containing pumice soaked in syrupy phosphoric acid—to remove ammonia next a tube filled with (neutral) calcium chloride, then a 6 inch tube, one leg of which was filled with the cupric phosphate, the other with neutral calcium chloride, and next a 6 inch U tube having one leg filled with moist soda lime, the other with calcium chloride. The results were slightly higher than when the same gas was caused to yield the H_2S & CO_2 together to soda lime.

Contributions to the Chemistry of the Cerite Metals. B. Brauner. (Vol. XLIII. p. 278).

Didymium oxide carefully purified, was converted into sulphate. The mean of five separate determinations gave an atomic weight of 145.42 for Di.

Another lot of didymium oxide when precipitated fractionally gave atomic weights ranging from 144.3 to 149.4, the last fractions giving the higher figures, indicating that previous determinations of the atomic weight 147.2 (Cleve) and 146.58 (Brauner) were probably high in consequence of the presence of at least one other element called provisionally (Di. gamma).

An examination of the absorption bands of a solution of the oxide having the highest atomic weight indicated the probability of the identity of this with samariun which probably has an atomic weight of 150.

Oxides of the yttrium metals, yttria, holmia, thulia, erbia and probably terbia, were found to exist in cerite.

Some Compounds of Antimony and Bismuth Containing two Halogens. R. W. Atkinson. (Vol. XLIII. p. 289).

The preparation of $Sb_2Cl_8K_6Br_6 + 3\ H_2O$,

$Sb_2Cl_6K_3Br_3 + 2\ H_2O$,

$Sb\ Cl_3K\ Br + H_2O$,

and $Bi\ Cl_3K_2Br_2 + 1\frac{1}{2}H_2O$,

are described, and analytical results given.

The first mentioned salt when heated to between 200 and 300°, loses antimonious fumes, the antimony carrying with it half the bromine and half the chlorine, which precludes the theory that the constitution of the salt is $2\ Sb.\ Cl_3\ 6\ K\ Br.\ 3\ H_2O$.

Crystallographic Examination of the Crystals of Antimonio Potassic Chloro Bromide. R. H. Solly. (Vol. XLIII. p. 293.) Examination of the crystals of the salt first described in the preceding paper.

On the Gases Evolved During the Conversion of Grass into Hay. P. F. Frankland and F. Jordan. (Vol. XLIII. p. 294.) The conclusions reached are :

1. That comparatively dry grass soon evolves considerable quantities of gas consisting almost wholly of carbonic anhydride, and accompanied by mere traces of hydrogen and hydrocarbons.

2. That the evolution of gas takes place with almost equal rapidity in atmospheres composed of air, carbonic anhydride, oxygen or hydrogen ; and that excepting when the atmosphere contains oxygen, in which case a notable proportion of nitrogen accompanies the carbonic anhydride, the composition of the gas evolved is much the same.

3. That when the decomposition of grass takes place under water, large volumes of gas are evolved which are characterized by the presence of a notable proportion of hydrogen. This hydrogen is doubtless due to the lactic fermentation induced by bacteria ; acetic, lactic, and probably propionic acids, together with bacteria, being found in the water in which the grass was immersed.

Note on an Aparatus for Fractional Distillation under Reduced Pressures. L. T. Thorne. (Vol. XLIII. p. 301.) Requires the accompanying illustration to be intelligible.

Notes on the Condition in which Carbon exists in Steel. Sir F. Abel and W. H. Deering. (Vol. XLIII. p. 303.)

First series of experiments. From one lot of steel (cold rolled) discs were taken, as received, after annealing, and after hardening. The process pursued in hardening and annealing are described. Treatment with a cold saturated solution of potassic dichromate to which $\frac{1}{20}$ of its volume of pure conc. $H_2S\ O_4$ had been added, left undissolved, dark particles appearing sparingly under the microscope, attracted by the magnet, containing in the case of the cold rolled, and annealed discs, iron and carbon in about the proportion of

Fe_6C_5, nearly all the carbon remaining in the residue. With the hardened disc only about one-sixth of the carbon remained in the residue, and the proportion of iron to carbon was much less with the others. The use of a larger proportion of H_2SO_4 in the bichromate solution seemed to break down the carbide, and dissolve the greater part of the iron.

Second series. Steel which had been melted from cemented blister steel and subsequently cold rolled and cross cold rolled, with annealing between the various rollings, was tested in a similar manner. The solutions used were :

Preparation 1. 0.8, the strength of Preparation 2.

2. Cold saturated solution of $K_2Cr_2O_7$ (99 grms. per litre) containing 0.9 grms. pure conc H_2SO_4 to each grm. of bichromate.

3. 0.44, the strength of Preparation 2.

4. 1.44 in one case and 1.65 in another, the strength of Preparation 2.

With the first three preparations 13.25 to 15.34 per cent. of carbide remained undissolved as a black powder attracted by the magnet, containing iron and carbon in the proportion for Fe_3C. Preparation 4. was evidently too concentrated for the carbide to resist decomposition by it.

The results (which are regarded only as preliminary) tend to confirm the view that carbon in steel exists as an iron carbide distributed through the mass.

On the Spectrum of Beryllium with Observations Relative to the Position of that Metal Among the Elements.

W. N. Hartley. (Vol. XLIII. p. 316.) A map of the spectrum is given. The conclusion is that "the spectrum of beryllium exhibits no marked analogy with the calcium, the magnesium or the aluminium spectra, all of which are members of well defined homologous series. There is nothing similar to the boron, the silicon or carbon spectra, nor to those of scandium, yttrium or cerium. The spectrum of lithium is the one most allied to that of beryllium in the number, relative position and intensity of lines. * * * I am therefore led to the conclusion that beryllium is the first member of a dyad series of elements, of which in all probability calcium, strontium and barium are homologues."

On a New Oxide of Tellurium. E. Divers and M. Shimosé. (Vol. XLIII. p. 319.) By heating the compound of sulphur trioxide and tellurium in vacuo, until decomposition ensues, SO_2 and a new oxide of tellurium were obtained. As thus prepared it resembles charred cork, but must be purified, by washing with dilute sodium carbonate, from sulphur oxides and tellurous acid. The oxide seems to be obtained in small quantities by the action of water on the sulphoxide, and also by pouring gradually the well-known purple red solution of tellurium in sulphuric acid into a large volume of water.

Its composition may be expressed by the name and formula *Tellurium monoxide* Te O, but its constitution is probably more complex than is thereby indicated. To prove the individuality of the compound, the action of reagents on, and the general properties of a mixture of pure tellurium with tellurium dioxide, were contrasted with those of the new oxide. The physical characters and action with reagents were altogether dissimilar.

On Tellurium Sulphoxide. E. Divers and M. Shimosé. (Vol. XLIII p. 323.)

The compound was discovered independently of R. Weber (Jour. Pr. Chem. XXIV. 218), the printed copy of his results having reached the author before their own research was completed. The properties of the substance were found to be as described by Weber with the exception that it was not found to be unstable as stated by him. The analyses indicated SO_3Te ; the formula also assigned by Weber, but the most of the results gave an excess of SO_3 probably present as an impurity. By prolonged heating in vacuo at 35° or almost instantaneously by heating to 90° the color changes from red to a bright fawn brown. This form has been called by the authors *beta* tellurium sulphoxide, as no change of composition occurs. Heated still further, to 130° the compound softens and shrinks, at 180° it begins to decompose SO_2 being evolved, the TeO described in the previous paper remaining. The decomposition is nearly complete at 230°.

On a New Reaction of the Tellurium Compounds. E. Divers and M. Shimosé. (Vol. XLIII. p. 329.) Sulphuric acid can hold in solution but small amounts of TeO_2 or its sulphate. But if this is poured upon zinc and the escaping hydrogen, containing hydrogen telluride, is passed into a solution containing tellurated sulphuric acid red tellurium sulphoxide makes its appearance in the liquid. By prolonged action of the current of gas, a brown compound, probably hydrogen pertelluride, precipitates, with formation of SO_2 which can be detected by passing the gas through potassium permanganate.

Abstracts from the Comptes Rendus, by A. Bourgougnon.

Action of Anhydrous Aluminium Chloride upon Acetone.

By E. Louïse. (No. 14, Oct. 2, 1882.)

Amongst the most volatile products found during the reaction, there is mesityl oxide, boiling point, 128°—130° C; composition $C_6H_{10}O$; vapor density, 3.51. The less volatile product contains Phoron, boiling point, 195°—196° C, composition $C_9H_{14}O$.

Upon some Combinations of Disulphide and Diselenuride of Tin.

By A. Ditte. (No. 15, Oct, 9, 1882.)

By the action of soluble sulphides upon the sulphides or selenurides of tin, crystallized salts analogous to stannates are obtained, in which selenium and sulphur take the place of oxygen.

Fermentation of Nitrates. By M. Gayon & Dupetit. (No. 15, Oct. 9, 1882.)

Upon the Reduction of Nitrates in the Soils.

By P. P. Dehèrain and Maquenne (No. 16, Oct. 16, 1882.)

Under certain circumstances nitrates are reduced in the soils with production of nitrous oxide gas. The reduction of nitrates occurs only in soils containing a large amount of organic matter. The nitrates are not reduced when the atmosphere of the soils contains oxygen.

On Alunite. By P. Guyot. (No. 16, Oct. 16, 1882.)

The composition of alunite, from the mines of "La Tolfa," is not constant; the amount of alumina and potassium sulphate being variable. Crystallized alunite sometimes contains 30 per cent. of base, whilst sometimes the quantity of silica is so large that the proportion of base is reduced to 17.5 per cent. The average composition of alunite generally corresponds to—

Alumina	27.60
Sulph. acid	29.74
Potassium Oxide	7.55
Water	11.20
Iron	1.20
Silica	22.71
	100.00

Chronic Poisoning by Antimony. By C. de Poncy and C. Livon. (No. 16, Oct. 16, 1882.)

Separation of Gallium. By L. de Boisbacdran. (No. 17, Oct. 23, 1882.)

Methods for the separation of ·gallium from tin and antimony.

Determination of the Atomic Weight of Thorinum. By L. F. Nilson. (No. 17, Oct. 23, 1882.)

The determinations have been made with the sulphate Th $(SO_4) + 9\ H_2O$. The average of six determinations gives the number 232.43. In another series of experiments four determination have given the number 232·3.

Upon the Reduction of Nitrates in Soils. By P. P. Dehérain and L. M. Maquenne. (No. 17, Oct. 23, 1882.)

Nitrates are not reduced in soils which have been heated. In the experiments the earth was placed in closed tubes and submitted to a temperature of 110°–120° C. When the soils contain vapors of chloroform, the nitrates are not reduced.

The nitrates are reduced when some fresh earth is mixed with earth which had been previously heated.

Separation of Gallium. By L. de Boisbaudran. (No. 17, Oct. 23, 1882.)

Separation of gallium from tin and antimony.

Chemical Studies on the Sugar-Beet. By H. Leplay. (No. 18, Oct. 30, 1882.)

A Rapid Method for the Determination of Salicylic Acid. By A. Rémont. (No. 18, Oct. 30, 1882.)

A modification of the process which consists in extracting salicylic acid with ether, and comparing the coloration given with perchoride of iron with the color obtained with standardized solutions of acid and the salt of iron.

Upon a Hydrate of Molybdic Acid. By F. Parmentier. (No. 19, Nov. 9, 1882.)

The yellow crystals deposited on the sides of the bottles containing solutions of ammonium molybdate in nitric acid are formed by a hydrate of molybdic acid $Mo\ O_3\ 2\ H_2O$ very sparingly soluble in water and acids.

Upon Monochlorinated Allylic Alcohol (Alpha) $CH_2=CCl\cdot CH_2$ (OH) and its Derivatives. By L. Henry. (No. 19, Nov. 6, 1882.)

Monocholorinated allylic alcohol (alpha) $CH_2-CCl-CH_2$ (OH) is obtained by the action of a diluted solution of potassium oxide upon epibichlorhydrin $CH_2-CCl-CH_2$ Cl. It is a colorless liquid, sp : gr : at 19°C 1.164 ; boiling point, 136°C. Soluble in water.

Derivatives.—Acetic ether $CH_2-CCl-CH-CH_2$ $(C_2H_3O_2)$ produced by the action of acetyl chloride, boiling point 145°C.

Bromhydric ether $CH_2=CCl$ CH_2 Br., produced with phosphor-tri-bromide, Ph Br_3 boiling point 120° C.

Sulphocyanate produced by the action of the chloride (alpha) $CH_2=CCl$ CH_2 I upon potassium sulphocyanate, boiling point 180°-181° C. Combined with ammonia it produces monochlorinates thiocinnamin, melting point 90°-91° C.

Chemical Studies of Sugar Beet. by H. Leplay. (No. 19, Nov. 6, 1882)

Upon the Reduction of Nitrates in the Soils, by P. P. Dehérain and M. Maquenne (No. 19, Nov. 6, 1882.) The authors have succeeded in determining the nature of the ferment reducing the nitrates in the soils. Some earth has been mixed with a solution of sugar (1 per cent.) and some potassium nitrates.

The gases evolved were composed of

Carbonic acid	80. 5.
Nitrous oxide	8. 2.
Nitrogen	11. 3.

The water collected with the gases had a strong odor of butyric acid and contained a large quantity of "bacillus amylobacter" these vibrios having most probably produced the fermention in the earth.

Chemical Studies on Sugar Beet, by H. Leplay. (No. 20, Nov. 13, 1882.)

Decomposition of Phosphate at a High Temperature, by H. Grandeau. (No. 20, Nov. 13, 1882.)

An inquiry into the conditions by which aluminium phosphate is decomposed at a high temperature by potassium sulphate.

Upon Œnocyanine, by E. J. Maumené. (No. 20, Nov. 13, 1882.

Œnocyanine is the coloring matter of black grapes and red wines, it is colorless in grapes before their maturation, it turns of a dark blue by exposure to air.

Decomposition of Hydrogen Dioxide by Fibrin, by A. Béchamp. (No. 20 Nov. 13, 1882.)

Pure fibrin freshly extracted from blood decomposes hydrogen dioxide, during this reaction the fibrin is modified, and after forty-eight hours of contact, it has no longer the power of decomposing hydrogen dioxide, if even put into contact with a fresh solution, it also has sustained a loss of weight.

A drop of hydrocyanic acid stops at once the decomposition of hydrogen dioxide by fibrin, and this acid is oxidized.

Researches on Lead Iodide, by M. Berthelot. (No. 21, Nov. 20, 1882.) Thermochemistry.

Production of Crystallized Uranates, by A. Ditte. (No. 21, Nov. 20, 1882.)

Sodium Uranate is obtained by the fusion in a platinum crucible of sodium chloride and green oxide of uranium, insoluble in water, easily soluble in soluble acids.

Calcium Uranate is produced by the reaction of calcium chloride upon green oxide of uranium. Strontium and barium uranates are produced by the same method. Yellow needles insoluble in water, soluble in diluted acids.

Mannitic Anhydride, by A. Faucounier. (No. 21, Nov. 20, 1882.)

Is obtained by dry distillation in a vacuum of mannite, it is a colorless liquid, boiling at 160·190° C, composition $C_6 H_{10} O_4$., very soluble in alcohol and water, insoluble in ether. Heated with acetic anhydride it gives $C_6 H_8 O_4 (C_2 H_3 O)_2$ a viscous liquid, nearly colorless, boiling point 197-198° C.

Phosphorus oxychloride is without action upon $C_6 H_4 O_{10}$, but phosphorus perchloride transforms it into $C_6 H_8 O_2 Cl_2$ having the form of hexagonal tables, very soluble in ether, less soluble in alcohol and benzine, insoluble in water, boiling point 143° C.

Chemical Studies on Corn, at different Stages of its Vegetation, by H. Leplay. (No. 23, Dec. 4, 1882.)

Upon a Method to Transform Tricalcic Phosphate into Chlorinated Compounds of Phosphorous, by T. Ribau. No. 23, Dec. 4, 1882.)

When a current of chlorine and carbon monoxide is directed upon a mixture of carbon and tricalcic phosphate, the phosphate is transformed at a low temperatureinto phosphorus oxichloride $P\ O.\ Cl_3$ with production of calcium chloride and carbonic dioxide.

$$P_2\ O_5\ (CaO)_3\ +2CO+4Cl=P_2\ O_5\ CaO+2CO_2+2\ Ca\ Cl_2.$$

This equation represents the final result of the reaction, but in reality it can be divided into two distinct phases. First, chlorine and carbon monoxide transform the tricalcic phosphate into metaphosphate and calcium chloride without production of free phosphoric acid.

$$P_2\ O_5\ (CaO)_3+2CO+4Cl=P_2\ O_5\ CaO+2CO_2+2CaCl_2.$$

Second, the gaseous mixture changes the metaphosphate into phosphorus oxichloride.

$$P_2\ O_5CaO+4CO+8Cl=POCl_3+4CO_2+CaCl_2.$$

Phosphorous oxichloride distilled over red hot charcoal is transformed into phosphorus trichloride.

$$PO\ Cl_4+C=PCl_3+CO.$$

A New Hydrocarbon, by E. Louïse. (No. 23, Dec. 4, 1882.) Benzylmesitylen is obtained by the reaction of benzyl chloride upon mesitylen in contact with anhydrous aluminium chloride.

Volta Prize. A prize of fifty thousand francs is offered and will be presented by the "Académie des Sciences," in December 1887, to the most successful discoverer of means tending to apply cheaply electricity as a source of light, heat, chemical action, mechanical power, transmission of dispatches or medical treatment. This concourse is open to the savants of all nationalities, and will close June 30, 1887.

Abstracts from *Berichte der Deutschen Chemischen Gesellschaft*, by Percy Neymann, Ph.B.

On the Preparation of Diphenyl—keton-oxide.—W. H. Perkin (vol. XVI. 339). In endeavoring to obtain the anhydride of salicylic acid this acid was heated with acetic acid anhydride. The acid is dissolved while acetic acid and acetic acid anhydride distil over. A thick liquid remained in the retort. When subjected to distillation a quantity of an oily substance passed over which solidified crystalline in the neck of the retort. This after being washed with alcohol and recrystallized from this gave figures from the analysis corresponding to the formula $C_{13}H_8O_2$. The product is evidently the same as that obtained by Merz and Weith by oxidation of methylen-diphenyl-oxide and that obtained by Richter by distillation of salicylate of potassium with phosphorus oxychloride.

On Sulphocyanpropimin.—J.Tscherniac and C.H.Norton (vol. XVI.p.345). When monochlor-aceton and ammonium sulphocyanate act upon each other in alcoholic solution, the sulphocyanate of a new base is formed.

$$2\ NH_4SCN + C_3H_5O\ Cl = NH_4Cl + H_2O + C_4H_6N_3S.HSCN.$$

Investigation has shown that this reaction takes place in two phases ; at first sulpho-cyan-aceton is formed :

$$NH_4SCN + C_3H_5ClO = NH_4Cl + C_3H_5—OSCN,$$

but this latter is caused to decompose by the presence of sulphocyanate of ammonia, a sulphocyanate $C_4H_6N_2S$. HSCN being formed while water is separated :

$$CH_2SCN.CO.CH_3 + NH_4SCN = (CH_2SCN.CNH.CH_3)HSCN + H_2\ O.$$

The authors propose the term sulphocyanpropimin for this new base $C_4H_6N_2S$.

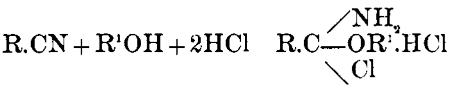
On Sulphocyanaceton.—J.Tscherniac and R.Hellon(vol.XVI.p. 348). 175 grms. of sulphocyanate of barium are dissolved in 525 grms. of alcohol and 100 grms. of monochloraceton are added. The mixture is left to itself several days and when no more precipitate forms this is filtered and washed with alcohol. The alcoholic solution evaporated on a water-bathe leaves crude sulphocyanaceton as a syrupy mass ; this is boiled with ten times its bulk of water and the water solution is left to itself for 24 hours. The clear supernatant liquid is decanted and evaporated on a water bath. An oily mass separates. Washing and drying over sulphuric acid finally gives the pure sulphocyanaceton. Its formula is $CH_2SCN.CO.CH_3$. It is an oil, only slightly colored when first made, but acquires a deep red color when exposed to the air.

On a New Industrial Method of Preparing Paper Pulp.—(Vol. XVI., p. 350.) G. Archibald. Wood or straw is cut in pieces, macerated with milk of lime transferred, to a digestor after

12 hours and saturated with sulphurous acid, at the same time applying a pressure of five atmospheres for one to two hours. The material is then washed with water and again treated under pressure with three per cent. calcium chloride and half per cent. aluminium sulphate. After these substances have been washed out, the pulp resembles cotton in appearance, and can be employed for manufacturing finer grades of paper at once. The process requires about three hours after the treatment with milk of lime. The process is patented in the United States and Canada.

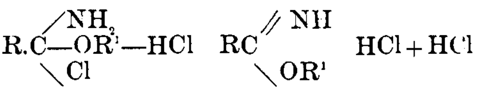
On the Occurrence of Methyl Alcohol in the Products Obtained from Colophonium by Dry Distillation.—(Vol. XVI., p. 351.) Werner Kelbe and J. Livoff. Among the products obtained by dry distillation of colophonium is a small quantity of a liquid containing considerable quantities of acetic acid and in very small quantities higher homologues of this acid. Based upon the fact that methyl alcohol is produced by the dry distillation of numerous organic substances this liquid was examined for and found to contain methyl-alcohol, but not in sufficient quantity for practical purposes.

On the Conversion of Nitrils into Imides. The Behavior of Hydrocyanic Acid and of Ethelencyanide to Hydrochloric Acid and Alcohol.—A. Pinner. (Vol. XVI., p. 352.) As previously described, when hydrochloric acid is introduced into a mixture of equal parts of a nitril and an alcohol an amido-chlorether is first formed:



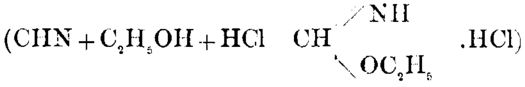
$$R.CN + R'OH + 2HCl \quad R.C\overset{NH_2}{\underset{Cl}{—OR'}}.HCl$$

this is, however, very unstable, soon loses a molecule of hydrochloric acid and is converted into the hydrochlorate of an imido-ether:



$$R.C\overset{NH_2}{\underset{Cl}{—OR'}}—HCl \quad RC\overset{NH}{\underset{OR'}{}} \quad HCl + HCl$$

At the time these investigations were made, the nitril of formic acid, hydro-cyanic acid, was also experimented upon, but the reaction ensued in a totally unexpected manner. By introduction of hydrochloric acid gas into an absolute alcoholic solution of hydrocyanic acid, free from water, energetic detonations took place, and by partial throwing out of the mass chloride of ammonium was produced in large quantities and not any form-imido-ether :



$$(CHN + C_2H_5OH + HCl \quad CH\begin{matrix} \diagup NH \\ \diagdown OC_2H_5 \end{matrix}.HCl)$$

but only chlorethyl, formic ether and the ethyl ether and amid of diethylglyoxylic acid were formed :

$$\underset{\text{ether.}}{CH(OC_2H_5)_2.COOC_2H_5} \text{ and } \underset{\text{amid.}}{CH(OC_2H_5)_2.CONH_2}$$

Recently the author has found the conditions and circumstances necessary to obtain the form-imido-ether and also the causes to which was due the prevention of formation of this ether in the previous experiments. The form amido ether

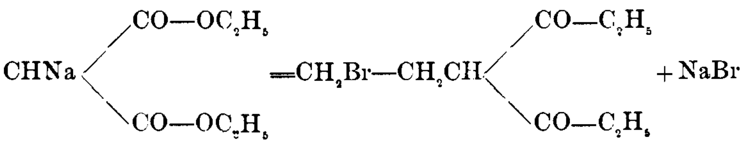
$$C\begin{matrix} \diagup NH \\ \diagdown OC_2H_5 \end{matrix}$$

is decomposed in very short time by alcohols ; hence in order to produce the form imido-ether it is necessary to avoid every excess of alcohol and to prevent any warming of the mass. The mass consisting of absolutely hydrocyanic acid and four times its weight of ether, free from water and alcohol, must be shaken continually while the dry gas is introduced. The gas is absorbed—when free acid appears the operation is stopped. The liquid will have taken up nearly two molecules of acid. The formo-chlor-amido-ether has been formed as chlorohydrate :

$$CH\begin{matrix} \diagup NH_2 \\ —OC_2H_5.HCl \\ \diagdown Cl \end{matrix} \quad CHN + C_2H_6O + 2HCl$$

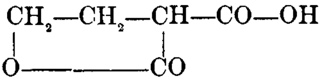
To prevent an accident the mass must remain in the surrounding cooling mixture for half an hour longer with continued shaking. During this time beautiful crystals will begin to be deposited, finally converting the entire contents into a crystalline mass. The author describes numerous derivatives and also the succinimido-ether and its derivatives.

On a New Unsaturated Acid Isomeric with Itaconic Acid. Rud. Fittig and Fr. Roeder. (Vol. XVI., p. 372). In order to obtain a general method for preparing lactonic acids and lactones of a given constitution ethlyen bromide (1 Mol.) was allowed to act upon sodium-malonic-acid-ether (1 Mol.). The reaction was supposed to take place :

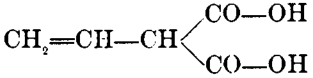


$$CHNa\left\langle\begin{matrix}CO—OC_2H_5\\ \\ CO—OC_2H_5\end{matrix}\right. = CH_2Br—CH_2CH\left\langle\begin{matrix}CO—C_2H_5\\ \\ CO—C_2H_5\end{matrix}\right. + NaBr$$

thus forming a bromidized ethyl-malonic-acid-ether and by saponification of this the carbon acid of butyro-lactane :



The crystalline acid obtained had the formula $C_5H_6O_4$ but from its salts it was found to be the isomeric unsaturated acid of the above lactonic acid.



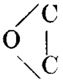
$$CH_2═CH—CH\left\langle\begin{matrix}CO—OH\\ CO—OH\end{matrix}\right.$$

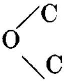
Microscopic Examination of Printed Cotton Goods.

(Vol. XVI,. p. 455). RICHARD MEYER. The author makes use of the microscope to ascertain whether the dye as such has been produced inside of the fibre or whether it has been employed already formed and fixed by means of albumen. Both methods can be employed for the same dye. For example, a method much employed is to impregnate the fibre with a soluble lead salt, to precipitate this as hydroxide, carbonate or sulphate and then to convert it into the fiery reddish-yellow, basic chromate of lead. In combination with steam dyes it may, however, be much more convenient to print the chrome-orange already precipitated with albumen and fix it by steaming. The method of detecting the difference the author gives thus : If the fabric is macerated using a needle so that the single fibres can be isolated, these will appear equally colored throughout their entire mass if they have been colored by a dissolved dye. The characteristic form of the fibre remains unaltered, and it can be plainly seen that the coloring matter is deposited equally in the interior of the fibre. When the albumen method has been used the fibre appears entirely without color. At various points dyed bits of coagulated albumen will appear gummed to the fabric, and some of these particles will be found isolated in consequence of the maceration.

New Methods of Forming Pyro-Sulphuryl-Chloride and Chloro-Sulphonic Acid. G. Billitz and K. Heumann. (Vol. XVI., p. 483). 140 grms. of chlorosulpho acid and 130 grms. of pentoxide of phosphorus were heated with the reversed condenser. After the evolution of hydrochloric and sulphurous acid ceased the mass was distilled at 135–150°. This sinks in water while chlorosulpho acid unites with water, accompanied by a hissing noise. 93 per cent. of the theoretical amount of pyrosulphuryl chloride were obtained. The formation of pyrosulphuryl chloride from chloro-sulpho acid by means of pentoxide of phosphorus agrees with the formation of pyrosulphuric acid from sulphuric acid by means of a dehydrating agent :

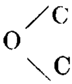
Contributions to the Knowledge of Hydroxylamin Reactions. E. Naegeli. (Vol. XVI., p. 494.) The author, by a series of experiments, finds it a valuable truth that hydroxylamin can be employed in general and easily whether in compounds which contain carbon, hydrogen and an atom of oxygen the group C=O or another group, such as



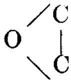


etc., is present. In order to determine by the *non-occurrence* of a reaction when hydroxylamin is employed that it contains no aldehyde-or ketone group, and on the other hand to accept the formation of an isonitroso compound as a proof of the presence of aceton or aldehydcarbonyl, it was necessary to try compounds of known constitution. This was done by the author and the law was found to be correct. All ketones so tested gave acetoximes ; but the compounds with the groups :

C—OH,

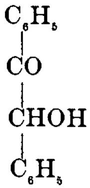


and

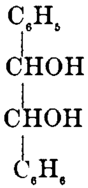


behaved indifferently to hydroxylamin such as alcohol, ether, ethylenoxyd.

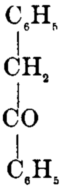
On Benzil. Max Wittenberg and Victor Meyer. Vol. XVI., p. 500.) The constitution of benzoïn and its nearest relatives are usually expressed as follows :



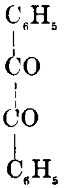
$C_6H_5-CO-CHOH-C_6H_5$



$C_6H_5-CHOH-CHOH-C_6H_6$



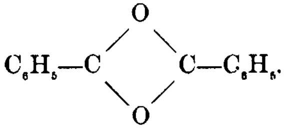
$C_6H_5-CH_2-CO-C_6H_5$



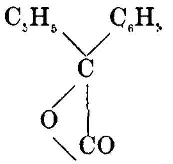
$C_6H_5-CO-CO-C_6H_5$

Benzoïn. Hydrobenzoïn, Desoxybenzoïn. Benzil.

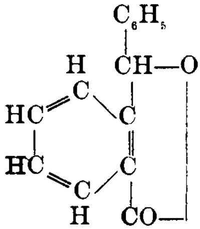
of these, however, only that of Desoxybenzoïn can be assumed to be correct with certainty. The authors state that the formula in common use for benzil is incorrect, C_6H_5-CO-CO-C_6H_5, as also the older formula :



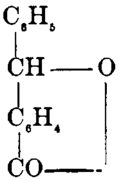
Based on a number of experiments, the authors conclude about as follows : "By the investigations we think it proven that benzil contains but one carbonyl group. If we hence assume the formulæ just given for benzil to be incorrect we are still not capable of replacing either of them by a formula which we could rely upon. We would mention, however, that the formula formerly in use,



coincides with what we have found in reference to the position of the oxygen, and we will also not admit that our investigations could also be of considerable value if benzïl was considered as a lactone, probably of the following formula :

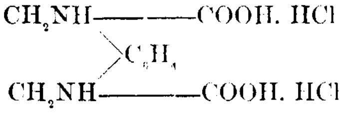


or abbreviated

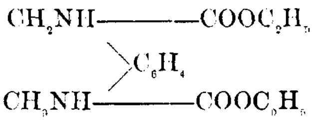


But against this formula also much can be said.

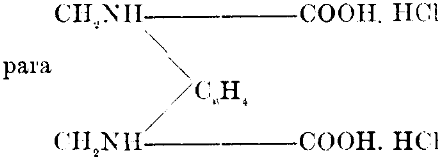
Action Chloro-acetic Ether on Primary diamines. J. ZIMMERMANN and M. KNYRIM. (Vol. XVI, p. 514.) By the action of chloroacetic-ether on meta-phenylen-diamine, meta-phenylen-diglycocoll-ether and phenylen-diamin hydrochloride are produced. If phenylendiglycocoll-ether is heated with strong hydrochloric acid with the reversed condenser or in sealed tubes at 100° crystals will separate on cooling. The analysis of these corresponds to the formula;



which is phenylen-diglycocoll hydrochloride. The para-phenylendiamin was also acted upon by chloroacetic-ether and the compound



was treated with hydrochloric acid in the same manner, giving



On M-nitrophenyl Mustard Oil. H. Standemann. (Vol. XVI., p. 548.) Meta-nitro-sulpho-carbanilid,  $CS\begin{matrix}NHC_6H_5\\NHC_6H_4NO_2\end{matrix}$ was dissolved in hot acetic acid anhydride; water was added, and the mixture boiled for a short time. An oil separates, which deposits crystals upon cooling. The reaction which by simple decomposition would yield phenyl-mustard oil, nitro-phenyl mustard oil, nitro-acetanilid or acetic acid and nitro-anilin, and acetanilid or anilin acetate respectively, seems to be a more complicated one in consequence of secondary reactions. If glacial acetic acid is added to the solution containing the deposited oil, crystals are obtained, more rapidly by the addition of little water. By pressing they are separated from adhering phenyl-mustard oil and are obtained pure by distilling with steam. They melt at 58°, and at that temperature emit the odor characteristic of all mustard oils. The analysis corresponds to the formula $CSNC_6H_4NO_2$.

On Nitro-derivatives of Resorcin. P. G. W. Typke. (Vol. XVI., 551). Diacetyl-resorcin was taken as a starting point. It was prepared by allowing 80 grms. of acetyl-chloride and 50 grms. of resorcin to act upon each other under a reversed condenser. The boiling point is 275°C.

Dinitro-resorcin was prepared by stirring diacetyl-resorcin into four or five times its volume of fuming, strongly cooled nitric acid, and then pouring the mixture upon ice. The nitro-compound separates as a white amorphous powder. This, after washing, pressing, extracting with alcohol and drying at 100°C., was saponified by boiling with 30 per cent. hydrochloric acid under a reversed condenser. In order to separate this new compound from styphnic acid all was dissolved in a large quantity of hot water. On cooling the dinitro resorcin separated in fine needles. They melt at 212.5°C. They are best purified by crystallizing from boiling acetic ether. The analysis gives the formula $C_6H_2(NO_2)_2(OH)_2$. Mono-brom-di-nitro-resorcin, $C_6HBr(NO_2)_2(OH)_2$ is prepared from dinitro resorcin in glacial acetic acid solution and an excess of bromine.

Diamido-resorcin chloride $C_6H_2(OH)_2(NH_2)_2 2HCl$ is prepared by reducing dinitro-resorcin at water-bath temperature by means of tin and hydrochloric acid. Oxidation probably gives rise to a di-imido-resorcin $(HO)_2C_6H_2.(NH)_2$.

The constitution of di-nitro-resorcin could not yet be determined.

On the Action of Bromine in Alkaline Solutions on Amines. A. W. Hofmann. (Vol. XVI., p. 558.) If the hydrochloric acid solution of a primary monamine of the fatty series is treated with an alkaline solution of bromine, mono-alkylated brom-nitrogens are produced, which contain two atoms of bromine. The reaction was at first tried on the methyl and ethyl series and the compounds CH_3NBr_2 and $C_2H_5NBr_2$ were prepared and investigated ; the experiments were then extended to amines of the propyl and pentyl series, two amylmines, the sextylamin and octylamin all have given analogous derivatives.

If an alkaline bromine solution is permitted to act upon a secondary amine of the fatty series, the primary alkylamin is formed by the separation of alkylenbromide if the secondary amin contains two alkyl groups. But if a secondary amine in which a double group of atoms has taken the place of two hydrogen atoms of the ammonia, is treated with bromine, an alkylenated brom-nitrogen is formed which contains only one atom of bromine. The formation of piperidin and coniïn derivatives has been studied.

$C_5H_{10}NBr$ and $C_8H_{16}NBr$.

The latter is especially interesting, and it was found by separation of hydrobromic acid, analogous bases are formed. This transformation may be perfected by acids or bases, and bases of the same composition, but of different properties, are produced.

If an acid is permitted to act upon the coniïn derivative $C\,H_{16}NBr$ a base of the formula $C_{18}H_{15}N$ is formed. It is very much like coniïn but boils at 150°C., which is 10° less than coniïn. It is a tertiary while coniïn is a secondary base.

Alkalies convert the brom-coniïn into a base of the same composition but it is a secondary base, $C_8H_{14}NH$, and boils at 173°C. By reduction of these bases coniïn, and finally octylamin and octane are formed. These new compounds complete the desired series of amines with eight carbon atoms. There are known :

Collidin	$C_8H_{11}N$
Tropidin	$C_8H_{13}N$
New Coniïn Derivatives	$C_8H_{15}N$
Coniïn	$C_8H_{17}N$
Octylamin	$C_8H_{19}N$

The reactions with piperidine are more complicated. They have not been fully studied.

An Easy Method of Preparing Paraffines. B. Koehnlein. (Vol. XVI., p. 560.) In comparing the interchanges taking place between organic and inorganic halogen compounds an easy method was found by which the homologues of marsh gas, the hydrocarbons $C_nH_{2n}+{}_2$ could be prepared.

2.5 grms. of pure chloride of aluminium free from chlorine and water, and 9.6 grms. of pure dry N-propyl-iodide in the proportion $AlCl_3+3C_3H_7I$ were mixed in a tube. The air was exhausted, the tube drawn to a fine capillary point and heated several hours to 130°-140°C. On cooling three substances could be distinguished On opening the tube a gas was ejected with great force. In a second experiment this gas was caught and proved to be pure propane.

2.40 grms. $AlCl_3$ and 0.88 grms. of C_4H_9I heated in sealed tube to 120°C gave pure butane.

2.58 grms. $AlCl_3$ and 9 grms. C_2H_5I heated five hours to 140°–150°C. gave pure ethane.

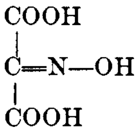
More investigations are in progress.

Some Observations on Piperidin and Pyridin. A. W. Hofmann. (Vol. XVI., p. 586.) The remarkable transformation of coniïn by the action of bromine (see above) gave cause to investigate the action of bromine on piperidin, and several experiments were successful, it being possible to prepare pyridin directly.

The aceto compound was used for a starting point. If a mixture of 1 mol. of the aceto compound is heated with 2 mol. bromine very gently, the temperature rises without more application of heat, and a colorless liquid distils over, leaving a syrupy residue. The distillate boils between 80° and 200°C., and is a mixture of acetylbromide and its bromine substitution products.

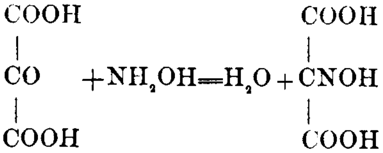
If from the residue the bases are liberated by alkali and driven off with steam, an aqueous distillate smelling strongly of pyridin is found floating a basic oil layer carrying crystals. These when pressed and purified from alcohol have the melting point 112°C. They were found to be bibrom-pyridin. If pyridin was formed it was to be looked for in the aqueous distillate. Caustic potash separated an oil having the pungent odor of pyridin. The dried distillate boiled at 110°–120°, and was a mixture of pyridin and piperidin. They were separated by fixing the piperidin as an aceto compound. The base now distilled between 112° and 116°C, and no longer became heated with acetic anhydride. It was almost pure pyridin.

On the Constitution of Nitroso-Malonic Acid. Victor Meyer and A. D. Mueller. (Vol. XVI. p. 608). It has been found by the authors that nitroso-malonic-acid is an iso-nitroso compound, having the formula :



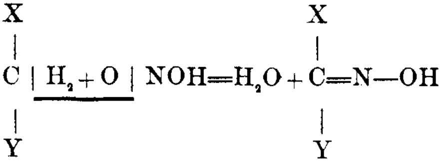
$$\begin{array}{l} COOH \\ | \\ C{=}N{-}OH \\ | \\ COOH \end{array}$$

and that it could be formed from mesoxalic acid and hydroxylamin:



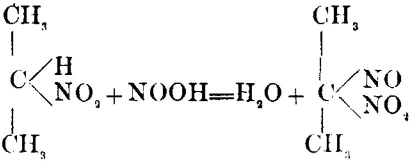
$$\begin{array}{l}\mathrm{COOH}\\ |\\ \mathrm{CO}\\ |\\ \mathrm{COOH}\end{array} + \mathrm{NH_2OH} = \mathrm{H_2O} + \begin{array}{l}\mathrm{COOH}\\ |\\ \mathrm{CNOH}\\ |\\ \mathrm{COOH}\end{array}$$

From this and other points the authors conclude that nitrogen compounds which are produced by the action of nitrous acid on the CH_2 group are always iso nitroso-compounds. They are produced according to the equation:



$$\begin{array}{l}\mathrm{X}\\ |\\ \mathrm{C}\\ |\\ \mathrm{Y}\end{array} \underline{|\,\mathrm{H_2} + \mathrm{O}\,|}\ \mathrm{NOH} = \mathrm{H_2O} + \begin{array}{l}\mathrm{X}\\ |\\ \mathrm{C{=}N{-}OH}\\ |\\ \mathrm{Y}\end{array}$$

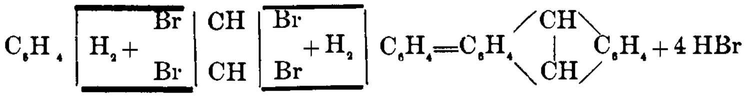
But if nitrogen compounds are formed by the action of nitrous acid on the group CH, when this is connected with a radical which can be easily removed, such as carboxyl, iso nitroso compounds are formed with the group C=N—OH; but if nitrous acid acts upon CH groups which have radicals which are not easily removed, actual nitroso-compounds are formed containing the group C—NO. All aromatic nitroso compounds and the pseudo nitroles of the fatty series, the first representative of which is formed according to the equation:



$$\begin{array}{l}\mathrm{CH_3}\\ |\\ \mathrm{C}\Big\langle\begin{array}{l}\mathrm{H}\\ \mathrm{NO_2}\end{array}\\ |\\ \mathrm{CH_3}\end{array} + \mathrm{NOOH} = \mathrm{H_2O} + \begin{array}{l}\mathrm{CH_3}\\ |\\ \mathrm{C}\Big\langle\begin{array}{l}\mathrm{NO}\\ \mathrm{NO_2}\end{array}\\ |\\ \mathrm{CH_3}\end{array}$$

belong to this category.

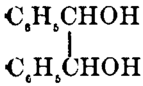
A New Synthesis of Anthracene. R. ANSCHUETZ AND F. ELTZBACHER. (Vol. XVI. p. 623.) According to the experience with aluminium chloride synthesis, it seemed probable that by the action of aluminium chloride on the two isomeric tetra-brom-ethanes—in benzol solution the term isomeric tetra-phenyl-ethanes would be formed. Owing to an uncertainty whether the tetraphenylethane experimented upon was one and the same at all times, or whether there were two different ones, the authors undertook to study the action of aluminium chloride upon a benzol solution of acetylentetrabromide. From the product of the reaction a substance is easily isolated which proved to be anthracene in place of the expected tetra-phenyl-ethane. The reaction could probably be assumed as follows :



$$C_6H_4\left|\begin{array}{r}Br\\ H_2+\\ Br\end{array}\right|\begin{array}{c}CH\\ \\ CH\end{array}\left|\begin{array}{l}Br\\ \quad +H_2\\ Br\end{array}\right| C_6H_4{=}C_6H_4\begin{array}{c}\diagup CH\diagdown\\ |\\ \diagdown CH\diagup\end{array}C_6H_4+4\,HBr$$

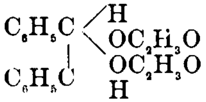
The investigations are to be continued.

On the Action of Acetyl-Chloride on Benzaldehyde in Presence of Zinc Dust. C. Paal. (Vol. XVI. p. 636.) The compound formed was formerly given the formula $C_9H_8O_2$. When reduced with hydriodic acid and amorphous phosphorous it is converted into dibenzyl $C_{14}H_{14}$ and distilled over zinc dust it forms stilben $C_{14}H_{12}$. Sodium amalgam was made to act upon an alcoholic solution of the substance at 70°-80°. The purified product melts at 138°C. and by analysis is found to be identical with hydrobenzoïn



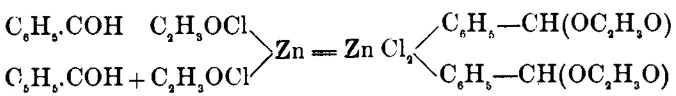
$$\begin{array}{l}C_6H_5CHOH\\ \quad\ \ |\\ C_6H_5CHOH\end{array}$$

The compound $C_9H_8C_2$ reduced is decomposed, forming hydrobenzoïn and acetic acid. This makes the assumed formula very improbable, and pointed more to the hydrobenzoïn-diacetate.



$$\begin{array}{l}C_6H_5C\begin{array}{l}\diagup H\\ \diagdown OC_2H_3O\end{array}\\ \qquad\ |\\ C_6H_5C\begin{array}{l}OC_2H_3O\\ H\end{array}\end{array}$$

The formation of this compound by this method can probably be explained by the equation—

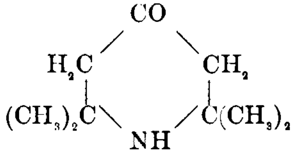


$$\begin{array}{l}C_6H_5.COH\quad C_2H_3OCl\\ C_6H_5.COH+C_2H_3OCl\end{array}\!\!\!>Zn = Zn\,Cl_2\!<\!\begin{array}{l}C_6H_5{-}CH(OC_2H_3O)\\ C_6H_5{-}CH(OC_2H_3O)\end{array}$$

Some benzoic acid is also formed, showing that same oxidation also takes place.

On the Oxidation of Piperidin. C. Schotten. (Vol. XVI. p. 643.) Piperidin when treated as its urethane with fuming nitric acid produces a saturated amido acid $C_4H_9O_2N$, which differs from the coniïn acid by C_3H_6 in the same manner as piperidin differs from coniïn by minus the group C_3H_6. Intermediate products of oxidation are formed, which are also described.

Note on Triacetonalkylamin. Emil Fischer. (Vol. XVI. p. 640.) Heintz gives the formula—



If this is correct the alkylamin produced by reduction must be an hydroxylated tetramethylpiperidin. In order to prove this it was tried by abstracting water from triacetonal kylamin to convert it into a base of the piperidin series containing no oxygen. The reaction with a mixture of penta-chloride of phosphorous and oxychloide of phosphorous is very complicated. The reaction with conc. sulphuric acid is more simple. The free base forms a well crystallized hydrate with water. The analysis of the hydrochloriate gave figures corresponding approximately to the formula $C_9H_{17}N.HCL$.