

## Technical Chemistry.

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**Photochemical Researches on the Use of Gases as Developers, and on the Influence of Physical Condition on Sensitiveness.** By M. MERGET (Compt. rend., xxvi, 1470-1472).

THE salts of gold, platinum, palladium, and iridium are reduced by certain gases in the presence of moisture, but not when dry. By mixing one of these salts with a substance which becomes deliquescent on exposure to light,\* and using the mixture for sensitising paper, a photograph is obtained, which after developing with the reducing gas—mercury vapour, iodine, sulphuretted hydrogen, or even hydrogen containing traces of foreign gases—is fixed by simple washing with water. Such photographs are said to be indestructible by any agent which does not attack the paper. Prints have even been obtained with copper salts, but the details are not given.

Moisture affects also the condition in which the metal is precipitated on the paper. When present in sufficient quantity to produce visible wetness, it causes the metal to separate as a homogeneous, perfectly transparent film; but when the plate is nearly dry, the metal is deposited in a pulverulent condition, giving a tone more or less deep. Gold salts in particular behave in this way, and by two exposures in different hygrometric conditions can be made to yield direct positives, which do not even require washing or any subsequent process. It is also found that by mixing soluble salts of platinum, silver, &c., with insoluble powders their sensitiveness to light is greatly increased.

M. J. S.

### A few Facts concerning Bleaching Powder.

By GEORGE E. DAVIS (Chemical News, xxvii, 225).

THE analyses of, and experiments relating to the manufacture of bleaching powder detailed in this communication, tend to show that it is practically impossible to raise the active chlorine in a sample higher than 40 per cent., even by the employment of a large excess of gas: that the active and total chlorine should be identical, any predominance of the latter being due to hydrochloric acid mechanically carried over from the chlorine still. It is exceedingly disadvantageous to allow a powder to gain a considerable excess of water, either through the intervention of very moist chlorine, or otherwise, since under these circumstances a maximum of even 35 per cent. active chlorine cannot be obtained, and a sample is ranked as indifferent, when from any cause its percentage falls below this number.

The author alludes to the various formulæ which have been proposed in connection with bleaching powder, but his analyses are not of such a nature as to lend material support to any particular formula.

J. W.

\* Poitevin's solution is mentioned; it appears to consist of ferric tartrate.

**A Productive Source of Ammoniacal Salts.** By B. TERNE  
(Dingl. polyt. J., cexviii, 386).

IN the neighbourhood of Chicago are the immense slaughter-houses of the American north-west. In the slaughtering season, from November to January, as many as 25,000 to 30,000 cattle are slaughtered in a single day. This number extends over about twenty establishments. A large quantity of refuse and useless flesh remains on hand, and is placed in a large iron boiler and boiled under a pressure of three to four atmospheres. The fat rises to the top, and beneath it is a liquid which might be called a solution of glue, if the continued boiling under pressure had not completely destroyed its binding power.

These tank-waters were found to contain from 105 to 118 grams per litre of gluey extractive matter. This, as already observed, is useless as glue; but the author also found that the liquid contains ammonia equal to from 5 to  $8\frac{1}{2}$  grams per litre of ammonium chloride.

W. S.

**English Glaze for Earthenware.** By H. SEGER  
(Dingl. polyt. J., cexvii, 234).

THE glaze is fixed on a light yellow piece of ware of great uniformity and porosity, and of a fire-proof clay. It is of a dark violet-brown colour, and somewhat translucent, of extraordinary lustre, and free from all flaws.

For analysis a piece of Burslem ware was taken, and a part was broken off where the glaze lay thickest.

The chemical analysis of this glaze gave in 100 parts by weight the following results:—

Silica .....	40·56
Alumina .....	6·07
Lead oxide .....	40·04
Ferric oxide.....	2·59
Manganese oxide.....	7·14
Lime .....	2·58
Alkalies and loss .....	1·02

100·00

In order to obtain a glaze of similar composition and properties to the above, the following mixture was taken:—

Quartz or glazing sand, 28 parts, silver litharge, 40 parts, pipeclay, 18 parts, best manganese oxide, 9 parts, chalk, 5 parts.

In order to produce the uniformity and beauty of colour as in the English ware, the materials were melted into a frit first, and then ground finely. The burning of the frit can be easily accomplished in a potter's oven furnished with a cover.

W. S.

**Preparation of an Enamel suitable for Frosted Glass-making.**

By H. G. BENRATH (Dingl. polyt. J., cqvii, 402—405).

**Advantageous use of Manganese Liquors in Glass-making.**

(Dingl. polyt. J., cqviii, 396.)

By first neutralising the manganese still-liquors of the bleaching powder manufacturer with powdered limestone, running off the clear liquors, and precipitating with milk of lime, a thin muddy precipitate of manganese hydrate with excess of lime is obtained. This turns brown and nearly black on the surface, on exposure to air, and when dried and calcined, yields a dark brown and nearly black oxidised product, which may be substituted for the ordinary manganese dioxide for the use of the glass maker, the lime in no wise interfering, and the product being free from iron, which is precipitated in the neutralising operation,

W. S.

**Manganese, a Substitute for Nickel in German Silver.**

(Chem. News, xxvii, 249.)

UPON the authority of Dr. Percy, it is stated that manganese can be substituted for nickel in the manufacture of German silver without affecting the appearance or general character of the alloy, and that although this fact has been known to some manufacturers for many years past, the manufacture of the manganese alloy has not, for commercial reasons, been proceeded with.

Mr. J. Fenwick Allen, in a paper read before the British Association in 1870, gives detailed directions for the preparation of alloys of copper and manganese, and of copper, zinc, and manganese, upon the manufacturing scale. The former alloy, when the proportion of manganese ranged from 5 to 30 per cent., was found to be both malleable, ductile, and of great tenacity; it was brittle when hot, but in the cold it rolled with ease, and was highly elastic. The zinc alloy was capable of being rolled from hot to cold, and possessed some qualities of German silver, but not the best.

The metallurgy of manganese, as developed by Mr. Hugo Tamm, has been already noticed in this Journal, vol. xxv, page 1076.

J. W.

**Direct Preparation of Iron from its Ores.** By P. TUNNER

(Dingl. polyt. J., cqviii, 218—222).

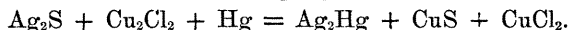
A CRITICAL description of Siemens' rotary gas-furnace for the direct preparation of malleable iron and cast steel from iron ores, already fully described in this Journal by the inventor (pp. 661—678 of this volume).

W. S.

**Obtaining Silver by Amalgamation, in Chile.**

(Dingl. polyt. J., ccviii, 396.)

THE old amalgamation process is greatly improved by the use of cuprous chloride, the reaction being represented as follows:—



In this case, therefore, no mercurous chloride is produced. If the ores contain silver chloride or bromide, a quantity of lead dissolved in mercury is added, equal to 25 per cent. of the silver present. Lead chloride is then formed, and the loss of mercury amounts to only 25 per cent. of the silver, instead of 150 per cent. which used to be lost. The ores are crushed by cast-iron wheels of four tons weight. A stream of water continually carries the finely ground ore away, and it collects in troughs.

Four tons of this ore are placed in rotating vessels  $1\frac{1}{2}$  meters diameter and 1·8 meters long. Into these are introduced 28 to 30 litres of cuprous chloride solution, prepared by saturating a cupric sulphate solution at 20° Baume, with common salt, and then boiling with copper turnings in wooden vessels, by steam. The solution is kept out of contact with the air. The vessels are rotated for a short time, in order to thoroughly mix the ore and solution, and a quantity of mercury is added equal to from 20 to 25 times the weight of silver contained in the ore, with further rotation. The silver amalgam is then washed out. It is contaminated with cupric sulphide and oxide. These are removed by water and solution of ammonium carbonate. The amalgam can then be subjected to distillation. If the ores do not contain over  $\frac{5}{10,000}$ ths of silver, the residue retains only  $\frac{1}{10,000}$  to  $\frac{2}{10,000}$ th. This operation may be used for most ores, but not for copper pyrites, blende, and such as contain free metallic arsenic, because in these cases the loss of mercury is considerable.

W. S.

**So-called Zinc-caps for Bottles, Flasks, &c.**

By G. C. WITTSTEIN (Dingl. polyt. J., ccviii, 341).

THESE are so greatly contaminated with lead, that their composition in many cases would be most correctly expressed in saying that they consisted of lead containing zinc, rather than the reverse. The amounts of lead in caps covering champagne, liqueur, mustard, mineral water and beer flasks, were respectively 90·13, 91·33, 92·4, 93·1, 94·2 per cent. The danger is particularly great in the case of flasks containing liquids with free acids present, as if they are not completely emptied at once, and the cap replaced while a portion of the liquor remains, a drop or two of the slightly acid fluid is liable to come in contact therewith, and on standing to act upon the lead, bringing a portion into solution. The drop or two of lead solution on the cap is thus likely to be carried into the stomach of the next drinker from this flask. Cases of acute lead poisoning have thus been occasioned. The author has also detected lead largely present in tin-foil used to wrap cheese in.

W. S.

**Action of Low Temperatures on Wines and Spirits.**

By MEISENS (Compt. rend., lxxvi, 1585—1588).

WHEN cognac or rum is cooled to  $-30^{\circ}$ , it can be drunk from a wooden vessel without causing any violent sensation of cold. Below  $-35^{\circ}$  it becomes viscid, syrupy, and often opalescent. At  $-40^{\circ}$  or  $-50^{\circ}$  it solidifies, and in this state it seems to the tongue less cold than an ordinary ice. At  $-71^{\circ}$ , it produces a sensation similar to that caused by a liquid just too hot to be borne, and when it is placed upon the dry skin, it causes a slight burn.

When vin ordinaire is submitted to the action of a freezing mixture, the water contained in it solidifies. The liquid portion being separated from the solid by a centrifugal strainer, the solid part is found to contain but a trace of alcohol and organic matter, and develops fungus in a very short time. By using a screw-press, 25 per cent., and in the case of Burgundy 40 per cent. of the wine may be thus separated as water. This treatment is recommended as a means of enriching poor wines, and so rendering them capable of preservation.

B. J. G.

**Adulteration of Pepper.** By M. BOUCHARDAT

(Pharm. Jour. Trans. [3], iii, 993).

DURING the examination of a large number of samples of ground pepper, as sold in France, the author found the most common adulterant to be one prepared by drying and finely pulverising the parenchyma of potatoes which is left as a residue in the manufacture of starch. Other adulterants found were lentil flour, earthy matter, chalk and linseed cake.

J. B.

**New Process in the Manufacture of Stearin.**

By Professor BOCK (Dingl. polyt. J., ccviii, 230—233).

It is known that the neutral fats consist of small globules divisible into two parts, an outer covering, in the case of the animal fats, consisting of cellular matter, gelatin, fibrin, and albumin, and in that of the vegetable, of gum, vegetable albumin and cellulose. Each globule is filled with the peculiar fat, in more or less complete development.

A small quantity of tallow dissolved in ether, does not give, properly speaking, a solution; as, microscopically examined, the liquid is found to contain the little globules floating intact therein. They are found, however, to have increased in size from 60 to 100 per cent., and the contents have become transparent, this being the effect of endosmose. After careful evaporation of the ether, the tallow is obtained again, exactly as it was before the so-called solution.

The difficulties arising from the coagulated albumin have been overcome hitherto only by empirical methods. The coagulated albumin is soluble in strong caustic alkalis, as also in water or steam, of which the temperature exceeds  $160^{\circ}$ .

By distillation and by the autoclave method, with or without the

old-fashioned lime saponification, the difficulty of the albumin is overcome by the very high temperature employed.

In the acidifying operation, very improperly called "acid saponification," no decomposition takes place. For forty years it has been imagined that a compound acid, a sulphostearic acid, was formed. After complete acidification the fat, washed with water, remains still neutral fat. After the acidification with concentrated sulphuric acid, no trace of glycerin compound is found, because the first hydrate, viz., an acid of 66° Baumé, yields no water to the glycerin requisite for the formation of glyceryl hydroxide. With the temperature considerably raised, formation of acrolein takes place during the acidification, denoting the destruction of the glyceryl.

The benefit obtained by the acidification results from the corrosion and rupturing of the albuminous cells; this is attended also with partial carbonising. Being ignorant of what actually takes place during this process, the owners of different works have used innumerable modifications of the acidifying process, in the belief that each possessed the most valuable secret for the formation of the compound acids.

Frémy's recommendation "that the action of the acid be only momentary," is a sound one, as too great excess either as to time, quantity, or temperature, leads to decomposition of the *enclosed* fat in part, as well as of the envelopes.

After the due amount of acidification, the neutral fat is, so to speak, stripped of its clothing, or *this cellular structure* is so far corroded as to give free egress to the contents. The fat is now in a condition fit for decomposition, which is accomplished after a few hours, with the acid mixture chemically necessary, 4 to 4½ per cent., and with the required amount of water. The crystallisation and other usual signs show that the decomposition is completed.

After running off the glycerin-water, the fat acids are found more or less dark coloured. They are now distilled, when the melting point of the product is found to vary from 49° to 51°, according to the quality of the tallow employed.

The essence of the new method is in dispensing with the distillation. The object of this distilling operation with superheated steam is the removal of the black colour caused by the presence of partially carbonised albuminous cells which are suspended in the fat acids, and will not settle because their specific gravity is almost identical with that of the liquid in which they are suspended. The author overcomes this difficulty by submitting the substance to an oxidation, whereby the specific gravity of the cellular particles is raised from about 0.9 to 1.3. Thus the coloured particles are precipitated, and the fat acids are ready for being washed. The further treatment by cold and warm pressure is the same as by all other methods.

After five years' experience of this improved method, it is found that the following results are obtainable:—

From tallow, after complete decomposition, 95 per cent. of the fat acids are obtained, which lose by oxidation and washing 2 per cent. The glycerin amounts to 6⅔ per cent. of the tallow at 23° Baumé, and is completely free from organic acids.



The oleic acid is in all respects like that obtained by lime saponification, but richer in concrete acids, and much sought after by soap-makers and cloth manufacturers. The stearic acid is quite similar to that furnished in the lime saponification, but much harder, and has a melting point  $58^{\circ}$  to  $60^{\circ}$ .

The stearin obtained consists of 55 to 60 per cent. of the tallow. Other advantages of this process are that it may be used in the hottest summer without danger, seeing that it is worked with steam in open vats; and the avoidance of high temperatures prevents the danger of injurious effect upon the fat acids. The wages are small and the apparatus cheap and easily repaired; the method likewise answers for vegetable as well as for animal fats, and is employed to the greatest advantage for the former when combined with distillation.

W. S.

### Lubricating Oils, especially Rosin-oil.

(Dingl. polyt. J., cccviii, 237.)

"*Vulcan oil*" is the distillate of Virginian petroleum which passes over almost at the last, and has a sp. gr. from 0.870 to 0.890. This, whilst warm, is acidified with 6 per cent. of fuming sulphuric acid in a lead vat, then drawn off from the acid, and washed with water to the complete removal of the acid. The product is then mixed with 5 per cent. of rape-oil. Also that oil which distils over in the petroleum distillation after the illuminating oil (until of sp. gr. 0.860) passes over, is taken separately, until it solidifies when dropped upon a cold metal plate, and with this 5 per cent. of crude rape-oil is mixed.

Another lubricating oil from petroleum is the "opal oil." This oil, of sp. gr. 0.850 to 0.870, is acidified like "vulcan oil," and mixed with 10 per cent. of rape oil.

For parts of machinery which move with great rapidity, as railway axles, spindles, &c., lubricating oils from petroleum cannot be used. "Rosin oil," when specially purified, is far the best for this purpose. Its strong odour, as also the liability to separate rosin when warm, are removed as follows:—100 pounds of dry thick rosin-oil are heated in a pan till of thin fluidity. The fire is then removed, and three pounds of fuming sulphuric acid are gradually dropped in, with constant stirring. After a half an hour's mixing, the oil is left to stand for twelve hours, and is then drawn off by a siphon into a wooden vat. It is then washed with hot water, drawn off after twelve hours' settling, and the washing is repeated till the water runs off without acid reaction. The water is at first added hot to the oil without mixing, as long as it flows off milky. After several days' separation, a dark yellow, faintly odorous rosin-oil is obtained without blue reflection. This oil, mixed with olive or rape oils, may be used advantageously for lubricating the heavy parts of machinery.

To obtain the oil perfectly free from odour, and of clear yellow tint, the dark yellow rosin oil is run into a flask or globe, and to 100 pounds of rosin oil 1 pound of water is added. The whole is well shaken, and gradually 8 pounds of hydrochloric acid diluted with 10 pounds of water are mixed in. To this 1 pound of red lead and

5 pounds of dilute hydrochloric acid are added, and the whole is frequently shaken. After some days the oil is drawn off, washed with water till free from acid, and set in the sunlight for about eight days in a flask. Thus treated it becomes of a light yellow tint.

The yellow rosin oil when mixed with one-third rape or olive oils, yields a good lubricating oil for all machine purposes. It does not deposit rosin in the slightest. It can also be mixed with petroleum. Mixed with rape oil, it appears in the trade as an adulterant for olive oil.

W. S.

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**Yellow on Woollens previously Coloured with Aniline Dyes.**  
(Dingl. polyt. J., ceviii, 238.)

THE aniline colours are, as is known, destroyed and reduced by zinc dust, whereas the so-called "xanthine" resists the reducing action. Thus it is possible to print woollen fabrics yellow which are previously coloured with aniline tints. The following mixture and process are recommended for the purpose:—

40 grams xanthine are dissolved in 50 grams of water; also 250 grams of zinc-dust are stirred up in 500 grams of water; 30 grams of sodium bisulphite are dissolved therein; and both solutions are mixed.

After the printing the goods are wrapped up in paper and damped.

W. S.

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**Dyeing of Felt with Aniline Colours.** (Dingl. polyt. J., ceviii, 239.)

FOR the dyeing of felt hats, aniline colours can be used in every case. The colouring matter is used repeatedly to make the tint satisfactory. If the dyeing follows the fulling the felt is not penetrated so easily, but the hair can be directly dyed and the dyed hair fullled. For this purpose a solution of the dye is made in boiling water, then allowed to cool, and filtered. A pan with water heated to 30° is prepared, and into this the necessary quantity of dye is introduced, stirred up, and the hair moistened, and enclosed in a basket is placed in the bath. The bath is repeatedly heated to 60°, and the basket agitated therein continually. Fresh colouring matter is introduced when the hair has absorbed a certain amount, the basket being for the instant removed.

When the hair is fully dyed the basket is removed and the hair allowed to cool, and it is then well rinsed. Mixtures of aniline colours may be used for particular tints with good effect.

For *brown* the bye-products from fuchsine are employed, which are known in the trade as "cerise," "merron," &c. These give with indigo-carmin and picric acid, with addition of a little sulphuric acid, splendid brown shades. For the preparation of the favourite "Bismark" a solution of Manchester brown can be used, which is toned down by addition of indigo-carmin, picric acid, and fuchsine.

W. S.