Technical Chemistry.

Cleansing of Glass Laboratory Vessels. By A. MÜLLER (*Arch. Pharm.* [3], **20**, 841—844).—The use of sea or river sand is injurious, as the sharp fragments of quartz scratch the surface of the glass. Lead shot, which is an excellent mechanical cleanser, is condemned, because it leaves part of its substance on the glass, which has to be removed by dilute nitric acid. Its use is strongly condemned for cleansing beer and wine bottles. Clean wood-ash is recommended for domestic use, as it acts both mechanically, and chemically by its potash. Powdered rock-salt is also used. For glass vessels used in the laboratory, the author recommends a piece of india-rubber cut into the form of a tongue or other convenient shape, and fastened to a flexible wire as a handle. When great cleanliness is required, he rinses the vessels and dishes with potassium dichromate and sulphuric acid. The acid from the desiccators mixed with the dichromate from estimation of nitric acid answers the purpose. J. F.

Preparation of Silver Bromide Gelatin-emulsion. By J. B. OBERNETTER (*Chem. Centr.* [3], **13**, 687).—The author dissolves gelatin and silver nitrate together in water, filters, and leaves the liquid to solidify. The jelly is cut into convenient pieces, washed (thus far operations may be conducted in daylight), and then, in the dark, immersed in a solution of a bromide. After an hour or so, the pieces are well washed. Thus prepared, the emulsion is very efficient for photographic purposes. It can be applied by melting and pouring on the plate; or may be preserved any length of time after being treated with alcohol.

D. A. L.

Antiseptic Properties of Carbonic Anhydride. By H. KOLBE (*J. pr. Chem.* [2], **26**, 249—250).—The fact that putrefying meat has an alkaline reaction led to experiments on the effect of exposing meat, in suitable vessels, to the action of the vapour from the spontaneous evaporation of hydrochloric, nitric, and aqueous sulphurous acids respectively, the result being that meat was well preserved, but at the same time lost its original flavour, acquiring a taste similar to meat kept in vinegar. The author was thus led to try experiments with carbonic anhydride. The apparatus employed consists of a tinned-iron cylinder, at the top of which and outside is a channel partially filled with glycerol, into which the rim of the cover dips; in the side of the cylinder near the bottom and in the top of the cover tubes are soldered, which can be closed. The tube in the cylinder serves for the admission of carbonic anhydride, whilst the one in the cover is for the escape of the air. The meat is suspended on a tinned-iron hook, and a porcelain plate is put below the meat to catch whatever falls from it;

the cylinder is then filled with carbonic anhydride, and the tubes closed. A lump of beef, with fat alone weighing from 2 to 5 kilos., was experimented on at varying temperatures. After eight days, the meat had the same colour and odour as fresh meat; it had a slightly but decidedly acid reaction; the broth made from it had the same odour and taste as that made from fresh meat, and the cooked flesh was tender and soft. After 14 days, the outside had become grey; the interior, however, was red and juicy, and the meat was good. After three weeks, the meat was as good as after 14 days, but was softer and required less time for cooking and making broth. After five weeks, the meat was not quite free from putrid flavour. Carbonic anhydride therefore prevents putrefaction in beef to some extent, but this is not the case with mutton, veal, fish, lobster, oysters, and vegetables, which undergo change in carbonic anhydride after a short time; thus mutton, after eight days in the gas, began to be tainted.

A mixture of carbonic anhydride and carbonic oxide, such as that given off when oxalic acid is decomposed by sulphuric acid, acts also as an efficient antiseptic for beef; in fact, in this case the meat does not even become grey, but retains its red colour throughout. Small white spots of mould, however, are formed; but the meat underneath them is of the same red colour as the parts unaffected.   D. A. L.

Sinidor. (*Chem. Centr.* [3], **13**, 576.)—This is prepared by heating magnesium acetate with magnesia until the mass becomes slimy, or it can be made less pure by adding caustic alkali to a solution of neutral magnesium acetate. It is a basic magnesium acetate, and it is proposed to use it for destroying bad odours and for disinfecting and preserving organic substances.   D. A. L.

Carlsbad Salts. By E. HARNACK (*Chem. Centr.* [3], **13**, 670—671).—The preparation of the so-called "Sprudelsalz" has been conducted very imperfectly, the usual preparation being, in fact, principally crystalline Glauber salts. This state of things is now being improved, and the process employed is this:—The spring water is boiled, and the precipitate (iron, manganese, calcium, magnesium, and silica) filtered off, the filtrate is evaporated and saturated with carbonic anhydride from the spring to reconvert the carbonate into bicarbonates. The salts then have the following constitution, nearly approaching the natural proportions:—

Sodium bicarbonate	35·95 ⎫	36·34 per cent.	
Lithium bicarbonate....	0·39 ⎬		
Sodium sulphate	42·03 ⎫	45·28	,,
Potassium sulphate	3·25 ⎬		
Sodium chloride		18·16	,,
Sodium fluoride........		0·09	,,
Sodium borate		0·07	,,
Silica	0·03 ⎫	0·04	,,
Ferric oxide	0·01 ⎬		

A litre of the water yields $5\frac{1}{2}$ grams of salts; they form a pure

white very fine powder, containing very little moisture and no water of crystallisation. It is very soluble in water; a heaped-up tablespoon (about $5\frac{1}{2}$ grams) dissolved in a wine bottle (litre) of water, gives approximately the concentration of Carlsbad-spring water.

The author recommends the following proportions for the artificial preparation of the salt, the other ingredients having no therapeutic value in his opinion.

Sodium bisulphate 100 parts, sodium bicarbonate 80 parts, sodium chloride 40 parts. The German Pharmacopœia gives 44, 36, and 18 parts respectively of these ingredients, besides 2 parts potassium sulphate. 6 grams of this mixture should be dissolved in 1 litre of water.   D. A. L.

Bauxite. By A. IVAN (*Chem. Centr.* [3], **13**, 575—576).—The author does not consider French bauxite superior to the Austrian. The former in the crude form contains 43 to 64·5 alumina, 1·5 to 40 ferric oxide, 0·0 to 0·45 chalk (calc. carb.), 4 to 38 silica and titanic acid, and 11 to 16 water.

The practical value of bauxite depends on the high amount of alumina in proportion to the silica; it is this which, after ignition, makes it hard and fire-resisting. Ignited bauxite constitutes artificial emery, which differs from the natural only in its containing less iron, which constituent can be extracted by acids from the former, but not from the latter. Natural bauxite should be exposed for 3 or 6 months to weathering influences, and should then be treated with hydrochloric acid to remove iron. As a powder, it does not bind readily, and also contracts considerably when heated to redness; to overcome the former defect it is mixed with some sort of cement, whilst the latter is remedied by mixing it with burnt bauxite powder (artificial emery). For the preparation of fire-resisting material it is mixed with fire-clay; for grindstones or millstones with clay; mixed with dolomite or magnesite, it forms an extremely solid and hard fire-resisting material. It may also be mixed with silicates, borax, lime, metallic chlorides, gypsum, &c. Besides the uses already mentioned, it may be used for plastering, for roofs, for all kinds of crushing, grinding, or polishing stones, &c., for tiles, fire-bricks, retorts, crucibles, and such like, and in several chemical industries.   D. A. L.

Calcination of Alunite. By P. GUYOT (*Compt. rend.*, **95**, 1001 —1003; compare this vol., p. 250).—When powdered alunite is roasted, the free alumina first loses its water and thus becomes soluble in acids. The alum and basic aluminium sulphates require more prolonged heating to render them soluble in water. The best results are obtained with about three hours' roasting at a temperature of 800°. Under these conditions there is a minimum loss of alumina rendered insoluble in acids by the action of heat.   C. H. B.

Glass, Enamels, Porcelain, Stoneware, and Refractory Clays. By G. WAGENER (*Dingl. polyt. J.*, **246**, 30—37, and 84—90).—*Composition of Porcelain Enamels.*—In former communications (Abstr., 1882, 563 and 1245), the author mentioned that enamels which fuse at the temperature of the porcelain or Bohemian glass furnace,

are of a neutral character, and consist of the silicates $K_2(Na_2)O,6SiO_2$, $Ca(Ba)O,2SiO_2$, $Mg(Fe,Mn,\&c.,)O,SiO_2$, $Al_2O_3,3SiO_2$, $K_2(Na_2)O,5SiO_2$, and CaO,SiO_2.   This opinion has been confirmed by the analysis of many enamels which contain practically the theoretical amount of SiO_2 for the formation of these compounds.   The relative amounts of these silicates are capable of much variation, the quantity of alkaline silicate, however, must be sufficient to completely fuse the mixture into a shining transparent mass without traces of devitrification. Porcelain may be considered as a difficultly fusible glass, being rendered opaque by the presence of crystalline or non-crystalline substances, such as $Al_2O_3,2SiO_2$, $Al_2O_3,3SiO_2$, and Al_2O_3,SiO_2.   The first refers to the Meissen, Sèvres, and Parian wares, containing 23—35 per cent. Al_2O_3 and 64—77 per cent. $Al_2O_3,2SiO_2$; they require a high temperature, and only yield glass with the greatest difficulty.   The author calls these alumina-porcelain.   The second series, comprising Berlin and similar porcelains, consists of glass free from alumina 25 per cent.; $Al_2O_3,3SiO_2$ 73 per cent.; and free silica 2 per cent. It is more easily fusible than the former, and owing to the difficulty of separating the enamel and mass, Berlin porcelain vessels will resist sudden and extreme variations of temperature without cracking on the surface.   This type the author proposes to call glass or silicate-porcelain.   Bohemian and Japanese, as well as most of the porcelains of commerce, belong to the third group; they contain an excess of SiO_2, can be burnt at lower temperatures, and may be called silica-porcelain.   The composition of stoneware closely resembles that of silica-porcelain, but the coloured varieties are different.

In conclusion, the author tries to establish a method for determining the degree of refractoriness to heat shown by various earths from their chemical composition.   As the compounds $Al_2O_3,3SiO_2$, $Al_2O_3,2SiO_2$, and Al_2O_3,SiO_2, are only fused with difficulty, the proportion of these to that of the other silicates present, gives some indication as to the refractoriness.   D. B.

Weather-proof Cement Work.   By C. PUSCHER (*Chem. Centr.* [3], **13**, 573—574).—An object is soaked for 24 hours in solution of ferrous sulphate (1 part in 3 of water), and then dried in the air. The ferric oxide produced is chemically combined in the cement, and makes it denser, harder, heavier, and weather-proof, filling up most of the pores, and giving it an ochre colour.   Ornamental cement work is brushed over with the solution four times, and allowed to dry.   The cement work can be rendered extremely resisting by warming and then coating with a hot mixture of equal parts of paraffin and paraffin oil.   By treating twice with a 5 per cent. soap solution, drying and polishing, the surface is made efficient for oil painting.   Chalk objects and room walls treated in this manner will stand any amount of washing.   Light ochre colour can be obtained by adding alum to the ferrous sulphate; and various shades of green by painting with chrom-alum.   D. A. L.

Application of Electricity in Metallurgy.   By F. FISCHER (*Dingl. polyt. J.*, **246**, 27—30).—The successful application of thermo-

electricity for the determination of metals suggested its use for metal-lurgical purposes. Thus, Bunsen (*Annalen*, **82**, 137 and 128, 154) prepared magnesium electrolytically from magnesium chloride, by the aid of his zinc-carbon elements, whilst for the preparation of magnesium by means of sodium, Sonstadt (*ibid.*, **170**, 115; **174**, 439) recommends the use of the double salt $KMgCl_3$, the metal being subsequently purified by distillation in a current of hydrogen. For a similar purpose, Reichardt (*ibid.*, **176**, 141, and **188**, 74) uses the mineral carnallite, and other investigators tachydrite, the former being specially suitable for the electrolytic preparation of magnesium. The production of aluminium, according to Bunsen (*ibid.*, **133**, 273), by electrolising the double chloride of sodium and aluminium, melting at 200°, is of great importance. The practical difficulty of separating the deposited aluminium from the saline mixture is said to be surmounted by properly regulating the temperature; it is moreover essential to use vessels made of lime or magnesium, where possible, as aluminium absorbs silicon from clay vessels, and is rendered brittle.

D. B.

Toughened Glass. By T. LUBISCH (*Chem. Centr.* [3], **13**, 687). —In this process the red hot object is dipped into a warm bath, consisting of water and starch, or gum, kept at 100°, and is taken out again when the red glow has almost gone; it is then allowed to cool in an oven, kept at a slightly lower temperature than the object. Any glass object can be treated by this method; and the glass can be cut by a diamond or ground, &c., with sand, and is quite as tough as glass prepared by the " oil-process." D. A. L.

Bromine Amalgamation Process. By H. ARNOLD (*Dingl. polyt. J.*, **246**, 154).—The silver in combination with sulphur, antimony, and arsenic is converted into silver bromide by means of bromine. The pounded ore is heated with steam in closed pans, and after the addition of bromine, the action is continued for a few hours. The mixture is then subjected to amalgamation by the usual pan or vat process. Experiments made at Leadville gave a yield of 82 per cent. silver, whilst by the ordinary amalgamation process only 46 per cent. is obtained. This process is said to be specially suitable for ores containing both silver and gold. D. B.

Roasting of Zinc-blende and Neutralisation of the Evolved Gases with Calcium Sulphide Solution. By KOSMANN (*Chem. Centr.* [3], **13**, 668).—In certain blends which contain as much as 20 per cent. of sulphur, it is not advisable to absorb the sulphurous anhydride evolved in roasting by Schnabel's process with zinc oxide, for then 25 parts of ore would require $12\frac{1}{2}$ parts of zinc oxide, rendering the process too costly. A better method is to send a spray of calcium sulphide solution into the gases from the furnace by means of steam under 5 atmospheres pressure; in this way from 50 to 58 per cent. of the sulphurous anhydride is absorbed. With improved appliances better results may be obtained. It is recommended first to

absorb the sulphurous acid by Freytag's method by sulphuric acid, and then to treat with calcium sulphide.   D. A. L.

Roessler's Method for the Separation of Gold, Silver, Lead, and Copper from Sulphides by Air-blast. (*Chem. Centr.*, [3], **13,** 543.)   The sulphides are melted in a graphite crucible in a blast furnace; by means of a suitable arrangement of tubes air is blown on to the surface of the molten mass; the sulphur burns off as sulphurous anhydride (which is converted into sulphuric acid), and a mixture of gold and silver is precipitated and removed in the first place; by further treatment an alloy of copper and silver, or lead and silver. These simple alloys are treated in the usual manner for the separation of the metals.   Complicated alloys are mixed with an excess of sulphur, and treated as sulphides.   This process may be used for the extraction of lead or copper from sulphurous ores, and in fact for many purposes. A blast furnace is not positively necessary, any suitable arrangement will do.   Any volatile metals or products can be collected in a cooling chamber.   D. A. L.

Separation of Copper from Lead by Refining in Freiberg. (*Chem. Centr.* [3], **13,** 570—571.)—The first separation is by the Pattinson process, a lead of the composition " *a* " yielding 5·1 per cent. of dross of the composition " *b*."

	Ag.	Pb.	Cu.	Bi.	As.	Sb.	Sn.
a ..	0·544	—	0·940	0·066	0·449	0·82	0·21
b ..	0·17	62·40	17·97	—	2·32	0·98	0·04

	Ni and Co.	Fe.	Zn.	S.	O.	Slag, &c.
a	0·055	0·027	0·022	0·2	—	—
b	1·09	0·43	0·07	4·0	1·87	8·66

The dross is fused with borax, by which means a regulus consisting of three layers is obtained, containing respectively per cent.—

	Ag.	Cu.	Pb.	Ni.	As.	S.
c	0·34	1·79	96·50	0·08	0·75	—
d	—	37·60	25·68	8·60	27·0	—
e	—	47·70	32·80	0·25	1·15	17·72

The author is of opinion that the separation of the copper depends on the amount of sulphur and arsenic with which it combines, and not on the formation of a lead-copper alloy.   D. A. L.

Modification of the Hunt-Douglas Process for the Extraction of Copper.   (*Chem. Centr.*, **13,** 684—686.)—By the Hunt-Douglas process about two-thirds of the copper is extracted as cuprous chloride, thereby greatly diminishing the amount of iron required for its precipitation, whilst the remaining third is in the state of cupric chloride: theoretically therefore the amount of iron required to precipitate a given weight of copper is only two-thirds that used in other processes, but in practice it is much less, from the absence of

ferric salts; moreover, a still further saving of iron is effected by reducing the cupric chloride in solution to cuprous chloride by the action of copper sulphide, and the silver can then be precipitated by metallic copper. The process has its drawbacks however, inasmuch as in treating the ore with the ferric chloride solution, ferric hydroxide is precipitated, which chokes the filter; moreover, before the silver can be precipitated, the whole of the cupric chloride in solution must be reduced to cuprous chloride, which occasions much loss of time; and if the ore is rich in copper, the quantity of liquor in this case is necessarily very large, on account of the sparing solubility of cuprous chloride: Claudet's method of precipitating the silver with an iodide is not applicable, as insoluble cuprous iodide is formed.

In order to overcome these difficulties, Sterry Hunt has modified his process in the following manner:—The copper sulphate solution obtained by extracting roasted pyrites or by the treatment of copper ore with dilute sulphuric acid is mixed with sodium chloride in the proportions of somewhat less than 1 mol. NaCl to 1 mol. $CuSO_4$, sulphurous acid is now passed into the solution, when almost the whole of the copper is precipitated as cuprous chloride, the reaction taking place in two stages, thus:—

$$2CuSO_4 + 2NaCl = CuSO_4 + CuCl_2 + Na_2SO_4;$$
$$CuSO_4 + CuCl_2 + SO_2 + 2H_2O = Cu_2Cl_2 + 2H_2SO_4.$$
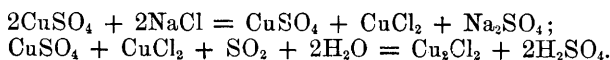
The excess of sulphurous acid is removed by some of the prepared copper solution, and after the cuprous chloride has been separated, the dilute sulphuric acid is used for extracting copper from suitable ores or from copper slags. If the ore contains zinc, nickel, or cobalt, these gradually accumulate in the sulphuric acid liquor, and may be recovered when this is rich enough. The cuprous chloride is washed and reduced by iron, or where economical reasons prohibit the use of iron, the cuprous chloride may be converted into the oxide by boiling with milk of lime and then smelted. The ferrous or calcium chloride formed can be used instead of sodium chloride in the treatment of a fresh quantity of copper sulphate solution. The sulphurous acid is obtained by the roasting of pyrites ores.

If the ore contains no silver, it is of no moment whether the sodium chloride is in such proportions as to decompose one-half of the copper sulphate present or more; in the latter case excess of cupric chloride is formed, and on treatment with sulphurous acid, hydrochloric acid goes into solution as well as sulphuric acid. If silver is present, however, this is partly dissolved by the excess of cupric chloride, and is again precipitated with the cuprous chloride, causing the amount of silver extracted from the residue of the ore to be less than it should be.

The advantages of this modification of the process are that the silver is not dissolved along with the copper, no ferric hydroxide is formed, the copper is purer, and the amount of iron used is considerably diminished, less than 50 pounds of iron being required for each 100 pounds of copper produced. The one drawback is the large quantity of sulphurous anhydride required, which is costly when not derived from the ore itself. C. E. G.

Improvements in the Manufacture of Iron. (*Dingl. polyt. J.*, **246**, 99.)—This paper gives an outline of the improvements made in the production of iron during the past 20 years.   D. B.

Iron Industry. (*Dingl. polyt. J.*, **246**, 95—99, and 148—152.)— Referring to the preparation of puddled iron of second quality, Tiemann mentions that roasted spathic iron ore is not used, black band, mill furnace-slag, and bog-iron ore being worked very largely, whilst calcareous iron-stone from the oolites of Lorraine is but little used.   The Ilseder-Hütte produces pig-iron from the oolitic iron-ores occurring in great abundance in the neighbourhood of the foundry; it is chiefly worked into puddled iron and steel.   The following is the composition of the most important of these ores:—.

	Fe.	Mn.	SiO$_2$.	Al$_2$O$_3$.	CaO.	MgO.	P$_2$O$_5$.
I.	40·78	5·27	10·70	4·76	5·09	0·44	1·2—1·82
II.	43·91	3·68	4·87	1·00	8·96	—	—
III.	30·80	3·40	3·90	1·00	21·61	—	—

The iron industry of Lorraine and Luxemburg has been developed during the last 15 years owing to the abundant occurrence of oolitic calcareous iron-stones belonging to the jurassic formation.   These ores contain 26—50 per cent. iron, 0·15—0·6 manganese, 3—22 silicic acid, 2—40 lime, and 0·3—0·8 phosphorus.

Lürmann's form of slag worked in a furnace with closed front (*ibid.*, **194**, 106, 475; **217**, 460), and the introduction of Whitwell and Cowper's apparatus (*ibid.*, **197**, 315; **205**, 98; **229**, 246) may be regarded as novelties in the production of puddled iron.

According to Schilling, the manufacture of spiegeleisen on a large scale was not commenced until the introduction of the Bessemer and Siemens-Martin processes.   After discussing the production of spiegeleisen and the progress made in working it, Schilling mentions that for the preparation of spiegeleisen containing a large percentage of manganese (19—21 per cent.) the same process as that for ordinary spiegeleisen is used.   The progress made in the German manufacture of specular iron and ferromanganese is due to the improvements in the working appliances, whereby a product of uniform composition is obtained.   Hilgenstock discusses the preparation of Bessemer pig-iron for the last 17 years.   The following table gives the composition of German Bessemer iron from various localities and at different times:—

	Si.	Mn.	S.	P.	C.	Cu.
January, 1867	4·216	6·195	0·029	0·097	—	—
April, 1867	1·842	3·450	—	0·124	—	—
September, 1868	4·383	6·115	0·045	0·088	$\left\{\begin{matrix} 2·850 \\ 0·550 \end{matrix}\right.$	$\left.\right\} 0·220$
October, 1868	3·689	5·970	0·060	0·085	$\left\{\begin{matrix} 3·217 \\ 0·760 \end{matrix}\right.$	$\left.\right\} 0·181$
March, 1871	3·800	7·130	—	0·078	—	—
April, 1871	2·000	10·580	—	0·110	$\left\{\begin{matrix} 3·500 \\ 0·780 \end{matrix}\right.$	$\left.\right\} 0·080$

	Si.	Mn.	S.	P.	C.	Cu.
May, 1871	3·218	6·336	0·029	0·065	4·069	—
February, 1872	1·500	2·870	—	0·240	—	—
November, 1873........	4·050	5·650	—	0·076	—	—
October, 1874........	2·360	3·384	—	0·083	—	—
October, 1874........	1·390	4·920	—	0·102	—	—
September, 1875........	2·700	7·100	trace	0·090	—	—
November, 1875........	2·520	5·810	0·010	0·055	—	0·176
November, 1875........	1·990	4·010	0·030	—	—	0·220
September, 1877	1·920	3·890	—	0·085	—	—
January, 1878	2·220	3·370	0·040	0·093	—	0·180

Referring to the preparation of pig-iron according to the Thomas-
Gilchrist process, Hilgenstock mentions that not only is the furnace
room required less per ton of iron, but the cost of production is much
below that of Bessemer pig-iron.

In conclusion, it is stated that, with due regard to the great progress
in the iron industry during the last 15 or 20 years, the question under
what conditions the largest yield of white iron is obtained from the
blast furnace still remains unsolved.   D. B.

**Influence of Charcoal on the Amount of Phosphorus in Pig-
iron.**   (*Dingl. polyt. J.*, **246**, 101.)—It is well known that iron pre-
pared with charcoal from ores containing small quantities of phos-
phorus shows a larger percentage of phosphorus than corresponds with
the amount in the ore employed.   By the use of charcoal, Tamm found
that the percentage of phosphorus was increased by 0·01, whilst
Särnström recently analysed two samples of wood charcoal containing
0·016 and 0·005 per cent. phosphorus respectively.   D. B.

Steel from Pig-iron containing Phosphorus, at Creusot.   By
DELAFOND (*Chem. Centr.* [3], **13**, 667—668).—Steel can be readily
made from iron containing phosphorus, either in the Bessemer pot or
in a reverberatory furnace, by using a lining of lime mixed with mag-
nesia.   By this means the phosphorus is got rid of as much as
possible ; the silica is almost entirely eliminated, and large quantities
of the sulphur are driven off.   The process is most successful in a
reverberatory furnace.   This "basic" steel is purer and more homo-
geneous than "acid" steel, and its tenacity is more uniform than that
of the latter.   Samples from both show them to be statically and
dynamically alike.   There are, therefore, two processes for the manu-
facture of steel—one with acid the other with basic lining.   The latter
is the best when a reverberatory furnace can be used ; in the con-
verter, however, it gives way to the former, for the alkaline coating
cannot deal with large quantities of silica.   Some of the analytical
results are given below :—

Constituents.	Per cent. in crude iron.	Per cent. in " acid " steel.	Per cent. in " basic " steel.
Carbon............	3·0	0·40	0·43
Silicon............	1·30	0·30	trace
Manganese	1·5 to 2	0·66	0·76
Phosphorus	2·5 to 3	0·075	0·060
Sulphur	0·2	0·040	0·029

	In slag from decarbonising.	In slag from dephosphorising.	Basic lining.
Silica	22·0	12·0	7·7
Lime ⎱ .... Magnesia ⎰	47·0	54·0	{ 53·0 { 35·8
Manganese and iron oxides	11·0	11·0	—
Phosphoric acid..............	12·0	16·0	—
Sulphuric acid	5·0	5·0	—

D. A. L.

Influence of Sulphur and Copper on the Working of Steel.
By WASUM (*Chem. Centr.* [3], **13**, 666).—The author finds that steel
is not made red-short, even when it contains as much as 0·862 per
cent. copper, besides 0·233 carbon, 0·091 silicon, 0·050 phosphorus,
0·709 manganese, and 0·060 sulphur. Neither do copper and sulphur
together make it red-short, unless the amount of the latter is suffi-
cient by itself to do so; 0·1 per cent. sulphur may be regarded as
harmless.   D. A. L.

Galvanising and Nickeling of Iron in Cleveland, Ohio.
(*Chem. Centr.* [3], **13**, 541—542.)—The sheets of iron are washed in
dilute sulphuric acid, and then with water; any inequalities are thus
removed, and the plates are immersed in ordinary hydrochloric acid,
after which they are dried in a hot oven. The zinc is melted in a
large iron pan, along the middle of which an iron screen is fixed, so
that it just dips into the bath and extends about 3 inches above the
rim; the surface of the zinc is thus divided into two sides—in the one
is placed ammonium chloride, in the other wet sand. The iron plates
hot from the oven are dipped one at a time perpendicularly into the
ammonium-chloride side, and are pushed under the iron screen into
the other side, whence they are drawn out by tongs and pulleys. Drops
of zinc are removed by touching with an iron rod. When they are com-
pletely removed from the bath, the sand is wiped off and the plate is
finished. The nickeling is conducted in wooden tanks lined with
asphalt; the solution used consists of ¾ lb. nickel-ammonium sul-
phate dissolved in 1 gallon of water. The object to be nickeled, after
it has been made *perfectly* clean by washing respectively with potash
and dilute hydrochloric or sulphuric acid and scouring with pumice-
stone, is suspended in the bath by means of thin iron wire from a cop-
per bar which is connected with the negative conductor of a dynamo-
electric machine, whilst from another copper bar, connected with the
positive conductor, a nickel plate is suspended in the bath, care being
taken that the nickel plate does not touch the object. After 10—15
minutes under the influence of the current, the object becomes suffi-

ciently nickeled, and is withdrawn, washed first with cold and then with warm water, and subsequently well dried. Care must be taken to regulate the current, as if it is too strong the deposited nickel will be dull, whilst if it be too feeble the deposit will be granular. The polisher is a disc of wood covered on the surface with a piece of leather which has been immersed in thin lime-water, rolled in emery powder, and dried.   D. A. L.

Argentine. By C. PASCHER (*Chem. Centr.* [3], **13**, 540).—Argentine is reduced tin used for stamping fabrics and paper. A very dilute—60 litres of water to 120 grams of the salt—and strongly acid solution of a tin salt is reduced by metallic zinc, and the spongy tin is collected, without pressing, on a sieve, well washed with water, and dried at a gentle heat. It is then rubbed fine in a pestle, put through a hair sieve under water, and mixed with the necessary quantity of starch-paste, when it is ready for use. The same water may be used several times for the solution and precipitation, and the zinc chloride solution when sufficiently concentrated may be used for soldering, or to clean iron ware before tinning. Finely divided antimony can be prepared in a similar manner. To tin metals, except lead, the precipitated tin, without starch, is stirred into a hot concentrated solution of ammonium chloride to a magma, and this is spread on the metal, which is then heated until the tin melts; in about a minute the tinning is complete, and the article is washed with water and polished with chalk. By using a mixture containing from 5 to 10 per cent. of the precipitated antimony, and 5 per cent. of ammonium chloride, along with the argentine made into a magma with water, a white covering of Britannia metal can be obtained. Zinc goods may be tinned by painting with concentrated solutions of tin-salts containing 5 per cent. ammonium chloride, then drying and heating until the reduced tin fuses, and so on until the tinning is complete, which is rendered evident by a grey instead of a bright deposit forming. A mixture of zinc-dust, tin, and ammonium chloride may be used for tinning iron.   D. A. L.

Application of Aluminium Palmitate. By K. LIEBER (*Dingl. polyt. J.*, **246**, 155).—Basic aluminium palmitate has the property of thickening ethereal or fatty oils, and has therefore been recently used for chemical cleaning and for the preparation of lubricators. As a cleaning agent it facilitates the application of benzene, prevents its rapid volatilisation, and decreases the risk of fire. It forms an excellent material for converting easily melted lubricating oils into solid lubricators at a small cost, and that without affecting the lubricating property of the oil.   D. B.

Preparation of Thiocarbonates for the Destruction of Phylloxera. By F. SESTINI (*Gazzetta*, **12**, 476—482).—The use of potassium thiocarbonate as a remedy against phylloxera is preferable to that of free carbon bisulphide, inasmuch as the latter is very injurious to the vine itself, but the high price of the potassium salt has hitherto

stood in the way of its extensive application. Various cheaper substitutes have, however, been proposed, and the author of the present paper recommends a mixture of the thiocarbonates of potassium and calcium, prepared by agitating together in a reflux apparatus at the temperature of 60° C., 200 g. CS_2, 200 K_2CO_3, 1000 water, and 200 quick-lime previously slaked with 100 g. water. After agitation for 10 hours the liquid is left to cool, and is then found to contain 1050 g. K_2CS_3, holding in combination 80 g. CS_2 and 650 g. CS_2 containing 150·55 g. combined CS_2. The product is pasty and may be kept in earthen jars and transported in wooden casks, like those used for the carriage of petroleum. The cost of preparing 100 kilos. solution of K_2CS_3 containing 8 per cent. CS_2 and 65 kilos. $CaCS_3$ containing 10·7 per cent. CS_2, is 25 lire (= 16s. 8d.).   H. W.

New Dyes. (*Dingl. polyt. J.*, **246**, 200—201.)—By the action of diazo-compounds on resorcinol and its homologues, compounds of the general formula $R.N_2.C_6H_3(OH)_2$ are obtained, from which by the further introduction of a diazo-group, compounds of the formula $R.N_2.C_6H_2(OH)_2.N_2.R$ can be produced. They form anhydrous yellow and brown dyes.

For the preparation of azo-dyes from methylnaphthalene, the latter is converted into amidomethylnaphthalenesulphonic acid, and then into the corresponding diazo-compound. By the action of β-naphthol and its sulphonic acids on this, dyes are obtained. Yellowish-red dyes can also be obtained from methylnaphthalene by converting it into methylnaphthol, and acting on this with diazosulphanilic acid, diazonaphthalenesulphonic acid, or with amidoazobenzenedisulphonic acid. Methylnaphtholsulphonic acid gives red dyes with the diazo-compounds of the hydrocarbons.

A blue dye is obtained by heating methyl orange with an excess of hydrogen ammonium sulphide at 105—110°, and subsequent oxidation of the product with ferric chloride.   A. K. M.

Meat Extract from South America. By NIEDERSTADT (*Arch. Pharm.* [3], **20**, 580—582).—Extract of meat prepared under Liebig's directions has been followed by various similar preparations; the sample examined by the author is from St. Elena, in the Argentine Republic, an establishment under the direction of Dr. Kemmerich. The extract has a fine meaty smell, and the taste of freshly roasted meat; it dissolves in water to a clear brown liquid, and is free from fatty and gelatinous matters, which the author believes assists its keeping properties. The nitrogenous and proteïn matters consist of creatine, syntonine, sarcosine, fibrin, &c., and, in the author's opinion, directly available for the formation of blood, muscle, and nerve substance. Analyses by three chemists are given.

	Fresenius.	Bischoff.	Niederstadt.
Organic matter	61·13	62·42	66·07
Inorganic (ash)	20·99	20·69	20·08
Moisture	17·88	16·89	13·85
Nitrogen	9·55	8·30	8·02
Fat and gelatin	absent	absent	absent
Soluble in alcohol	68·43	72·98	69 60
Insoluble in alcohol	—	—	16·55

Composition of Ash.

Ferrous oxide	trace	0·22	0·32
Lime..........................	0·43	0·52	1·76
Magnesia......................	2·86	3·89	2·03
Soda..........................	11·63	11·51	11·32
Potash	44·26	41·79	44·04
Chlorine	8·34	9·46	8·36
Sulphuric acid	1·77	1·54	1·62
Phosphoric acid	32·35	32·55	32·12
Silicic acid	0·24	0·82	0·31
	101·88	102·30	101·88
Deduct oxygen for chlorine	1·88		1·88
	100·00		100·00

J. F.

American Storax. By F. A. Flückiger and W. v. Miller (*Arch. Pharm.* [3], **20**, 646—648, and 648—651).—Flückiger considers that the storax from Asia Minor is identical with that from the Mexican *Liquidambar styraciflua*, but when growing in the United States the tree does not give so good a yield. The gum then appears in the market as "sweet gum," is mixed with benzoic acid, and is harder than the ordinary *Styrax liquidus*. Miller has made analyses of American storax, and found it to contain a styrolene, whose bromine compound melted at 73°; besides the styrolene, oxygenated compounds were present, viz., styracin and phenylpropyl cinnamate. E. W. P.

Alteration of Syrup of Tolu. By Malenfant (*J. Pharm.* [5], **6**, 466—473).—Syrup of tolu, when prepared by heating the balsam with water for four hours in the water-bath, is perfectly odourless at first, but after a time acquires a benzene-like odour. The author shows by experiments that this is due to the decomposition of the ethereal cinnamates present, these yielding first cinnamic acid, which is then further decomposed into cinnamene and carbonic anhydride. Cinnamic acid when boiled either with distilled or with ordinary water for several hours, shows no sign of decomposition, but if left at rest for a month or six weeks, it acquires the persistent odour above referred to. If, however, the acid is simply left in contact with *cold* water for the same time, without previous boiling, no alteration takes place. E. H. R.

Adulteration of Cochineal. By J. Löwe (*Dingl. polyt. J.*, **246**, 90—92).—According to the mode of killing the insect, cochineal is found in commerce either in the form of white dusty or of brownish-black shining granules. Both qualities are often adulterated to a considerable extent, the former, however, being generally adulterated. The addition of mineral matter is detected by an ash determination, real cochineal containing not more than 0·5 per cent. In order to retain their natural appearance, samples of cochineal when adulterated are exposed to the action of moist air, whereupon they swell up and become sticky. The adulterant is then dusted over the granules in quantities of 10—12 per cent. After re-drying, the original appearance returns, and without chemical investigation it is impossible to distinguish these samples from the natural colouring matter.   D. B.

Prevention of Boiler Incrustation. By BAUDET (*Chem. Centr.* [3], **13**, 576).—A mixture of 15 pts. sodium thiosulphate, 10 pts. rain-water, and 10 pts. glycerol, is added to the water.
D. A. L.

Liquid Carbonic Anhydride as a Fire Extinguisher. By W. RAYDT (*Chem. Centr.* [3], **13**, 671—672).—The author's apparatus consists of an iron cylinder filled with liquid carbonic anhydride, and a large water vessel which is connected with the carbonic anhydride reservoir in such a way that the gas when set free must pass through and force out the water, and thus a solution of carbonic anhydride can be directed on the fire. It has been found efficient. Liquid carbonic anhydride occupies 450 times less space than the gas, therefore a 100-litre cylinder would hold 45,000 litres of carbonic acid gas.
D. A. L.

Analysis of Petroleum-coke. By A. LIDOFF (*Jour. Russ. Chem. Soc.*, 1882, 323—324).—In the manufacture of gas for lighting purposes by distillation of crude petroleum, a peculiar kind of hard, very difficultly combustible glistening coke of a steel-grey colour is found in the retorts. Its sp. gr. is 1·829. This coke has the following percentage composition:—Water (hygroscopic) = 0·24 per cent., hydrogen = 0·65, carbon = 94·27, ash = 4·52. The ash contains in 100 parts:—

Fe_2O_3.	CaO.	SiO_2 (sand).
76·71	5·48	15·07

besides a little soda and carbonic acid. From these data it will be seen that this coke is purer, denser, and less combustible than ordinary coke from coal, and the author recommends it for the manufacture of carbon electrodes, especially for electric lighting purposes. The presence of ferric oxide is due to the corrosive action of petroleum vapour at high temperatures on the cast-iron retorts.   B. B.