THE SECRETION OF THE GASTRIC GLANDS.

a blind sac communicating with the exterior of the body. This enabled him to collect the secretion of the gastric glands I mis enabled min to contect the secretion of the gastric glands unmixed with that of the pyloric glands, and uncontami-nated by the saliva and other liquids which pass down the cesophagus. The secretion is a clear, strongly acid liquid, containing an unexpectedly small amount of mucus, and an average of 0.45 per context of cells methods. average of 0.45 per cent. of solid matter, partly organic, partly inorganic, the former consisting mainly of pepsine. The average acidity of the liquid is equivalent to 0.52 per cent. of hydrochloric acid, which is far higher than that of the mixed gastric juice, free from saliva, examined by Bid-der and Schmidt. Richet, from observations on the juice of a man with a gastric fistula, found that when fresh it con-tained only hydrochloric acid, while when kept for a time it developed an organic acid, probably sarcolactic. No such acid was observed to be produced in the secretion obtained from the dog. It was found that the introduction of nutrififteen to thirty minutes, and this continued until the stomach interview of the sails of the two metals. The precipitate must be repeatedly washed with a satu-fifteen to thirty minutes, and this continued until the stomach had completely emptied itself. But if indigestible substances with distilled water charged with pure hydrochlaries at the were introduced no secretion flowed from the same fit were introduced no secretion flowed from the sac for up-wards of an hour. Water was then given to the animal, and secretion commenced, but only lasted an hour and a

From these and other experiments, Professor Heidenhain concludes that mechanical stimulation of the stomach excites secretion only at the point of contact, general activity of the secretion only at the point of contact, general activity of the grandular apparatus requiring absorption for its production. If the composition of the secret liquid be examined at regular intervals during the digestive process, its acidity is found to remain pretty uniform, but the proportion of pepsine contained in it undergoes a peculiar and orderly series of variations. During the second hour it sinks rapidly to a minimum; towards the fourth or fifth hour it rises or a no point generally bigher then at first and remains at again to a point generally higher than at first, and remains at or near this point for a considerable time. These variations are quite independent of the amount of pepsine actually The secreting surface can pour out a liquid very rich in by heating the residue (obtained on evaporation) to reduces, pepsine at a time when its poverty in this substance is most which reduces it to the metallic condition, the rhodium strongly marked. No definite conclusion can at present be salt remaining decomposed. By the method above described the platinum is freed not derived at as to the cause of this phenomenon.—Pflügers By the method above described the platinum is freed not Archivi Academy.

MELTING POINTS OF THE ELEMENTS AND THEIR COEFFICIENTS OF EXPANSION BY HEAT.

By T. CARNELLEY.

A TABLE which the author has compiled shows that with five exceptions the coefficient of expansion increases as the melting point sinks. The five exceptions are arsenic, anti-mony, bismuth, tellurium, and tin; the three former of which belong to the same elementary group, and even these I fues such indium in a fine state of division with ten among themselves display a similar relation between their times its weight of lead, keeping it in a molten state for melting points and coefficients of expansion. Why these some hours, dissolve out the lead with nitric acid, subject meiting points and coefficients of expansion. Why these isome hours, dissolve out the lead with hitric acid, subject five bodies form an exception does not yet appear. It must, the residue to a prolonged digestion in aqua regia, and ob-however, be noted that they are all found on the ascending tain a crystalline mass composed of iridium, rhodium, ruthe-side of Meyer's Curve of the Elements (see his "Modern nium, and iron, in a condition suitable for my further treat-Theories of Chemistry"), whilst three of them, tin, antimony, ment. By fusion at a high temperature with an admixture and tellurium, follow immediately upon each other in the of bi-sulphate of potash, the rhodium is almost entirely re-above curve. Arsenic, antimony, bismuth, and tellurium moved, any remaining trace being taken up together with are all very brittle and belong to the same crystalline sys-tem; and bismuth and antimony are the only two known melted with ten times its weight of dry caustic potash, and pure elementary hodies which expand on congressing. Time pure elementary bodies which expand on congealing. Tin, in some of its compounds, displays an abnormal melting point, as will be shown in a future memoir. Both the melt-

PURIFICATION OF PLATINUM AND IRIDIUM.

An alloy of these metals is used in the manufacture of the the methods he employed for preparing the metals in a state of purity. The following is an abstract:

The six metals (of which platinum is the chief) usually found more or less in association, present characteristics of interest beyond their metallurgical utility, which are, perhaps, worth alluding to. It is, for instance, a curious fact that the group should consist of three light and three heavy metals, each division being of approximately the same specific gravity—the heavier having (in round figures) just double the design of the light access double the density of the lighter series.

Thus we find osmium, iridium, platinum, forming the first division, of the respective specific gravities of 22:43, 22:39, 21:46; whilst ruthenium, rhodium, and palladium are represented by the figures 11 40, 11 36, 11, the average densities of the heavy and light divisions thus being respectively 22.43 and 11.25.

But a more interesting and important classification is what designate as a fi may more important view of their relative properties of stability. | duced into the receiver. In this operation the chlorine pre-Thus platinum, palladium, and robatilizable in a state of oxide; iri- oxide, which, after being collected, washed, and dried, is dium, osmium, and ruthenium forming the second or placed in a porcelain or glass tube, and subjected to the lower class, their oxides being more or less readily vola- combined action of oxide of carbon and carbonic acid obtilized. The oxide of iridium is affected at 700° to 800° C., and gently heated. entirely decomposed at 1,000°, whilst osmic and hyporuthe-nic acids are volatilized at the low degree of 100°, the latter exploding at 108°. The chlorides of these metals can be sublimed at different temperatures (as also the protochloride of platinum).

The metallic residue now obtained will be found in the state of an amorphous black powder (a form most suitable PROFESSOR HEIDENHAIN succeeded in separating a con-siderable portion of the fundus of the stomach in a dog from its connection with the rest of the organ, and forming it into soluble in nitric acid. After digesting this compound in weak aqua regia, an immediate dissolution takes place of the platinum and lead, leaving the iridium still impure, but effecting a complete separation of the platinum. To the chloride of platinum and lead after evaporation is

added sufficient sulphuric acid to effect the precipitation of the whole of the lead as a sulphate, and the chloride of platinum, after dissolution in distilled water, is treated with an excess of chloride of ammonium and sodium, the excess being necessary in order that the precipitated yellow double salt may remain in a saturated solution of the precipitant; the whole is then heated to about 80°, and allowed to stand for some days; the ammonio-chloride of platinum will settle down as a firm deposit at the bottom of the vessel, whilst if any rhodium, as is generally the case, is present, the surface liquor will be colored a rose tint, occasioned by a combination of the salts of the two metals.

This is necessary for its purification. The small quantity of the double salt which will be taken up and held in solu-tion is of course recovered afterwards. Rhodium may still From which is deduced exist in the washed precipitate, which must therefore not be reduced to the metallic state until its separation is completed, and this is the best effected by mixing with the dried compound salts of chloro-platinate and chloro-rhodiate of ammonia, bi-sulphate of potash with a small proportion of bi-sulphate of ammonia, and subjecting to a gradual heat brought by degrees up to a dull red in a platinum capsule, over which is placed an inverted glass funnel. The platinum is thus slowly reduced to a black spongy porous condition freed from water, nitrogen, sulphate of ammonia, and hydrochloric acid, the rhodium remaining in a soluble state as bi-sulphate of rhodium and potash, which can be dissolved out completely by digesting in boiling distilled water; a small quantity of platinum will

only from rhodium, but from all other metals with which it may have been contaminated, and is brought to a state of absolute purity, of the density 21.46, the highest degree obtainable.

IRIDIUM.

In practice, the purest iridium which can be obtained from its ordinary solution (deprived of osmium by long of amboiling in aqua regia and precipitated by chloride monium) will almost invariably contain traces of platinum, rhodium, ruthenium, and iron.

three times its weight of niter, in a gold pan or crucible; the process being prolonged for a considerable time to effect the complete transformation of the material into iridiate and ing points and the coefficients of expansion may be periodic rutheniate of potash, and the oxidation of the iron; when functions of the atomic weight. I cold, the mixture is treated with cold distilled water. The iridiate of potash of a blue tinge will remain as a deposit almost insoluble in water, more especially if slightly alkaline, and also the oxide of iron.

This precipitate must be well washed with water charged standard weights and measures. In a paper recently com-municated to the Royal Society, Mr. G. Matthey describes ings are no longer colored, and then several times with distilled water.

The blue powder is then mixed with water strongly charged with hypochlorite of soda, and allowed to remain for a time cold, then warmed in a distilling vessel, and finally brought up to boiling point until the distillate no longer colors red, weak alcohol acidulated with hydrochloric coid acid

The residue is again heated with niter and potash water charged with hypochlorite of soda and chlorine, until the

last trace of ruthenium has disappeared. Further, to carry out the purification, the blue powder (oxide of iridium) is redissolved in aqua regia, evaporated to dryness, redissolved in water, and filtered. The dark colored solution thus obtained is slowly poured

into a concentrated solution of soda and mixed with hypochlorite of soda, and should remain as clear solution without any perceptible precipitate, and subjected in a distilling apparatus to a stream of chlorine gas, should not show a trace of ruthenium when hydrochloric acid and alcohol are intro tained by means of a mixture of oxalic with sulphuric acid The oxide of iridium is reduced by the action of the gas leaving the oxide of iron intact; the mass is then heated to redness with bi-sulphate of potash (which will take up the iron and any remaining trace of rhodium), and after sub-jecting it to many washings with distilled water, the residue is washed with chlorine water to remove any trace of gold, and finally with hydrofluoric acid, in order to take out any silica which might have been accidentally introduced with the alkalies employed or have come off the vessels used The iridium, after calcination at a strong heat in a charcoal crucible, is melted into an ingot.

ment of the ice the most careful examination failed to detect or rhodium that may have been present. These metals are ful flame of oxygen and common gas for a considerable anything wrong in the breast, and she is now quite well and subsequently extracted from the mother liquors, the hitrate time, I recast and forged the mass at an intense white heat of lead by crystallization, and the remaining metals by well under a steam hammer, the highly polished surfaces of known methods. when sufficiently reduced the alloy was passed through bright polished steel rollers, cut into narrow strips, and again slowly melted in a properly shaped mould, in which it was allowed to cool. I thus obtained a mass of suitable shape for forging, perfectly solid, homogeneous, free from fissures or air holes, and with a bright and clean sur-face. face

A piece cut from the end of a mass so prepared was presented to the French Academy of Science, and gave the following results:

Weight in air	116 [.] 898 grms.
" water	111.469 ~
Showing a density of	21.516

thus proving that the necessary processes of annealing at a high temperature had caused it to resume its original density.

The analysis gave-

	1	2
Platinum	89.40	89.42
Iridium	10.16	10.22
Rhodium	0.18	0.16
Ruthenium	0 10	0.10
Iron	0.06	0.06
	99·90	99·96

Pr	oportion.	Density at zero.	Volume.
Iridio-platinum, at 10 per cent	99.33	21 575	4.603
Iridium, in excess	0.53	22.380	0 010
Rhodium	0.18	12.000	0.015
Ruthenium	0 10	12.261	0.008
Iron	0.06	7.700	0.008
	99 .90		4.644
Density at zero, calculated after		nalysis,	21.510
Density at zero, calculated after	No. 2	**	21.515

which coincide perfectly with the practical results obtained.

MM. Deville and Mascart find the coefficient of dilatation to be from 0° to 16° C. 0.00002541.

ON ULTRAMARINE. By M. T. MOREL.

THE qualities which are commercially required in ultramarines are a deep and brilliant shade, fineness, coloring power, resistance to acids, and resistance to alum. All the trials made on this subject are simply comparative, and refer to a sample which has already been chosen as a standard.

Shade.-The two samples are placed side by side upon white paper, by means of a spatula (at a north window). one of the samples is darker than the other, this is hest ascertained by crushing a small quantity of this upon the other.

Fineness can scarcely be recognized except by feel. Only two other methods are known which may be used, and both are apt to lead to inaccurate results.

It has been proposed to stir up the ultramarine in water, and note the time which it takes to settle. But this time varies for one and the same ultramarine, according to the manner of manipulation, and often a very fine ultramarine settles more rapidly than a coarse one of another make. Ultramarines may also be diluted with white powders,

comparing the intensity of the blues thus let down. This method does not indicate absolutely the fineness, but is, properly speaking, a measure of the coloring power. We may draw from it useful indications; thus, in general, the finer an ultramarine the more it retains its blue shade when diluted with white. This observation is applicable only when the ultramarines do not differ too much in tone.

Coloring power is best recognized by mixing with a certain quantity of a white powder, the finer the better, such as kaolin. One part of the blue is mixed with six parts of the white, and the ultramar ne thus let down is compared with the standard sample, which has been treated in the same manner. To have results exactly comparable, it is presessary manner. To have results exactly comparable, it is necessary to do all the weighings at once, as both ultramarine and kaolin absorb moisture from the air. The tints obtained may be either of a pure blue, or of a greenish, a violet, or a rose blue, according to the nature of the sample. Thus the comparison of the difference hatween a violet blue and a reddy (What is the difference between a violet blue and a reddish rose blue?)

Resistance to acids is a necessary quality for ultramarines, which have in their use to come in contact with liquids which are either acid or capable of becoming so. curs in the pigment style of printing, where the albumen and other materials which serve to fix ultramarine upon the fiber are rapidly decomposed and turn acid. To come as close as possible to the actual condition of the case, the trial is made with a solution of oxalic acid, which is one of the products of the decomposition of albumen. A standard so-lution is made by dissolving 1³/₄ oz. of crystalline oxalic acid in 35 fluid ounces of water.

PLATINUM.

The preparation of this metal in a state of purity is an operation of extreme delicacy. I commence by taking ordi-nary commercial platinum; I melt this with six times its weight of lead of ascertained purity, and after granulation, dissolve slowly in nitric acid diluted in the proportion of 1 volume to 8 of distilled water. The more readily to insure dissolution, it is well to place the granulated alloy in porce lain baskets such as are used in the manufacture of chlorine gas for holding the oxide of manganese. When the first charge of acid is sufficiently saturated, a fresh quantity should be added until no more action is apparent; at this stage the greater part of the lead will have been dissolved out, together with a portion of any copper, iron, palladium, remelting and retaining in a molten condition under a power-

ALLOY OF IRIDIO-PLATINUM.

Operating upon a charge of 450 ounces of platinum and In the paper trade coloring power is the first condition 55 ounces of iridium, I commenced by melting these metals required. The greatest possible fineness is needful to avoid together and casting into an ingot of suitable shape, which I blurs. If much alum is used the resistance of the sample to then cut into small pieces with hydraulic machinery. After alum should be tried.

The one-hundredth part by measure of this solution is put into a test tube along with 7.7 grains of the ultramarine, and is well shaken up, while the change which ensues is com pared with what takes place in a portion of the standard ultramarine similarly treated.

Resistance to Alum.-Formerly for ultramarine used in the paper manufacture resistance to alum was the first consider-ation. Now it is found that, if the paper is manufactured ation. under right conditions, the most delicate ultramarines are not affected.

Still, if it is desired to measure this resistance, we make a saturated solution of alum, and pour $1\frac{1}{2}$ -hundredth parts of 35 fluid oz. thereof into a test tube, along with 7.7 grains of the sample under examination, making, of course, a comparative experiment with the standard sample. It is necessary to shake up frequently, lest the ultramarine should form a

It is generally believed that an ultramarine which resists alum will resist acids equally well. This is an error: the resistance to alum is quite different from the resistance to acids.

In printing fineness is a main point, especially for dak