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Thomas Young M.D. For. Sec. R.S.

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The Map that I am preparing, which traces every stream and vale up to its very origin, and shows its connection with the hard and soft, and porous and water-tight strata, and with the principal faults and tilts of the same, in its vicinity, will, as I trust, somewhat elucidate this difficult subject: on which I much wish to hear the observations of others of your able correspondents, and am,

Sir, your obedient humble servant,

Ram's Head Inn, Disley, Cheshire,

JOHN FAREY.

July 15, 1809.

\* \* In our last vol. p. 263, line 1, *the bases to* should have been *the bassets* of three or four different strata &c. *Basse's, crop, &c.*, are mining terms for the out-burst or appearance of a stratum on the surface.

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IX. *A numerical Table of elective Attractions ; with Remarks on the Sequences of double Decompositions.* By THOMAS YOUNG, M.D. For. Sec. R.S.\*

ATTEMPTS have been made, by several chemists, to obtain a series of numbers, capable of representing the mutual attractive forces of the component parts of different salts ; but these attempts have hitherto been confined within narrow limits, and have indeed been so hastily abandoned, that some very important consequences, which necessarily follow from the general principle of a numerical representation, appear to have been entirely overlooked. It is not impossible, that there may be some cases, in which the presence of a fourth substance, besides the two ingredients of the salt, and the medium in which they are dissolved, may influence the precise force of their mutual attraction, either by affecting the solubility of the salt, or by some other unknown means, so that the number, naturally appropriate to the combination, may no longer correspond to its affections ; but there is reason to think that such cases are rare ; and when they occur, they may easily be noticed as exceptions to the general rules. It appears, therefore, that nearly all the phænomena of the mutual actions of a hundred different salts may be correctly represented by a hundred numbers, while, in the usual

\* From Philosophical Transactions for 1809, Part I.

manner of relating every case as a different experiment, above two thousand separate articles would be required.

Having been engaged in the collection of a few of the principal facts relating to chemistry and pharmacy, I was induced to attempt the investigation of a series of these numbers; and I have succeeded, not without some difficulty, in obtaining such as appear to agree sufficiently well with all the cases of double decompositions which are fully established, the exceptions not exceeding twenty, out of about twelve hundred cases enumerated by Fourcroy. The same numbers agree in general with the order of simple elective attractions, as usually laid down by chemical authors; but it was of so much less importance to accommodate them to these, that I have not been very solicitous to avoid a few inconsistencies in this respect, especially as many of the bases of the calculation remain uncertain, and as the common tables of simple elective attractions are certainly imperfect, if they are considered as indicating the order of the independent attractive forces of the substances concerned. Although it cannot be expected that these numbers should be accurate measures of the forces which they represent, yet they may be supposed to be tolerable approximations to such measures; at least, if any two of them are nearly in the true proportion, it is probable that the rest cannot deviate very far from it: thus, if the attractive force of the phosphoric acid for potash is about eight tenths of that of the sulfuric acid of barita, that of the phosphoric acid for barita must be about nine tenths as great; but they are calculated only to agree with a certain number of phænomena, and will probably require many alterations, as well as additions, when all other similar phænomena shall have been accurately investigated.

There is, however, a method of representing the facts, which have served as the bases of the determination, independently of any hypothesis, and without being liable to the contingent necessity of any future alteration, in order to make room for the introduction of the affections of other substances; and this method enables us also to compare,  
upon

upon general principles, a multitude of scattered phænomena, and to reject many which have been mentioned as probable, though doubtful, with the omission of a very few only which have been stated as ascertained. This arrangement simply depends on the supposition, that the attractive force, which tends to unite any two substances, may always be represented by a certain constant quantity.

From this principle it may be inferred, in the first place, that there must be a sequence in the simple elective attractions. For example, there must be an error in the common tables of elective attractions, in which magnesia stands above ammonia under the sulfuric acid, and below it under the phosphoric, and the phosphoric acid stands above the sulfuric under magnesia, and below it under ammonia, since such an arrangement implies, that the order of the attractive forces is this; phosphate of magnesia, sulfate of magnesia, sulfate of ammonia, phosphate of ammonia, and again phosphate of magnesia; which forms a circle, and not a sequence. We must therefore either place magnesia above ammonia under the phosphoric acid, or the phosphoric acid below the sulfuric under magnesia; or we must abandon the principle of a numerical representation in this particular case.

In the second place, there must be an agreement between the simple and double elective attractions. Thus, if the fluoric acid stands above the nitric under barita, and below it under lime, the fluuate of barita cannot decompose the nitrate of lime, since the previous attractions of these two salts are respectively greater, than the divellent attractions of the nitrate of barita and the fluuate of lime. Probably, therefore, we ought to place the fluoric acid below the nitric under barita; and we may suppose, that when the fluoric acid has appeared to form a precipitate with the nitrate of barita, there has been some fallacy in the experiment.

The third proposition is somewhat less obvious, but perhaps of greater utility: there must be a continued sequence in the order of double elective attractions; that is, between any two acids, we may place the different bases in such an order, that any two salts, resulting from their union, shall

always decompose each other, unless each acid be united to the base nearest to it: for example, sulfuric acid, barita, potass, soda, ammonia, strontia, magnesia, glycina, alumina, zirconia, lime, phosphoric acid. The sulfate of potass decomposes the phosphate of barita, because the difference of the attractions of barita for the sulfuric and phosphoric acids is greater than the difference of the similar attractions of potass; and in the same manner the difference of the attractions of potass is greater than that of the attractions of soda; consequently the difference of the attractions of barita must be much greater than that of the attractions of soda, and the sulfate of soda must decompose the phosphate of barita: and in the same manner it may be shown, that each base must preserve its relations of priority or posteriority to every other in the series. It is also obvious that, for similar reasons, the acids may be arranged in a continued sequence between the different bases; and when all the decompositions of a certain number of salts have been investigated, we may form two corresponding tables, one of the sequences of the bases with the acids, and another of those of the acids with the different bases; and if either or both of the tables are imperfect, their deficiencies may often be supplied, and their errors corrected, by a repeated comparison with each other.

In forming tables of this kind from the cases collected by Fourcroy, I have been obliged to reject some facts, which were evidently contradictory to others, and these I have not thought it necessary to mention: a few, which are positively related, and which are only inconsistent with the principle of numerical representation, I have mentioned in notes; but many others, which have been stated as merely probable, I have omitted without any notice. In the table of simple elective attractions; I have retained the usual order of the different substances; inserting again in parentheses such of them as require to be transposed, in order to avoid inconsequences in the simple attractions: I have attached to each combination marked with an asterisk the number deduced from the double decompositions, as expressive of its attractive force; and where the number is inconsistent with the  
corrected

corrected order of the simple elective attractions, I have also inclosed it in a parenthesis. Such an apparent inconsistency may perhaps in some cases be unavoidable, as it is possible that the different proportions of the masses concerned, in the operations of simple and compound decomposition, may sometimes cause a real difference in the comparative magnitude of the attractive forces. Those numbers, to which no asterisc is affixed, are merely inserted by interpolation, and they can only be so far employed for determining the mutual actions of the salts to which they belong, as the results which they indicate would follow from the comparison of any other numbers, intermediate to the nearest of those, which are more correctly determined. I have not been able to obtain a sufficient number of facts relating to the metallic salts, to enable me to comprehend many of them in the tables.

It has been usual to distinguish the attractions, which produce the double decompositions of salts, into necessary and superfluous attractions; but the distinction is neither very accurate, nor very important: they might be still further divided, accordingly as two, three, or the whole of the four ingredients concerned are capable of simply decomposing the salt in which they are not contained; and if two, accordingly as they are previously united or separate; such divisions would however merely tend to divert the attention from the natural operation of the joint forces concerned.

It appears to be not improbable, that the attractive force of any two substances might, in many cases, be expressed by the quotient of two numbers appropriate to the substances, or rather by the excess of that quotient above unity; thus the attractive force of many of the acids for the three principal alkalies might probably be correctly represented in this manner; and where the order of attractions is different, perhaps the addition of a second, or of a second and third quotient, derived from a different series of numbers, would afford an accurate determination of the relative force of attraction, which would always be the weaker, as the two substances concerned stood nearer to each other in these orders

orders of numbers ; so that, by affixing, to each simple substance, two, three, or at most four numbers only, its attractive powers might be expressed in the shortest and most general manner.

I have thought it necessary to make some alterations in the orthography generally adopted by chemists, not from a want of deference to their individual authority, but because it appears to me that there are certain rules of etymology, which no modern author has a right to set aside. According to the orthography universally established throughout the language, without any material exceptions, our mode of writing Greek words is always borrowed from the Romans, whose alphabet we have adopted : thus the Greek vowel  $\Upsilon$ , when alone, is always expressed in Latin and in English by Y, and the Greek diphthong  $\text{OY}$  by U, the Romans having no such diphthong as OU or OY. The French have sometimes deviated from this rule ; and if it were excusable for any, it would be for them, since their *u* and *ou* are pronounced exactly as the  $\Upsilon$  and  $\text{OY}$  of the Greeks probably were : but we have no such excuse. Thus the French have used the term *acoustique*, which some English authors have converted into “acoustics ;” our anatomists, however, speak, much more correctly, of the “acoustic” nerve. Instead of glucine, we ought certainly, for a similar reason, to write glycine ; or glycina, if the names of the earths are to end in *a*. Barytes, as a single Greek word, means weight, and must be pronounced bárytes ; but as the name of a stone, accented on the second syllable, it must be written barites ; and the pure earth may properly be called barita. Yttria I have altered to itria, because no Latin word begins with a Y.

*Table of the Sequences of the Bases with the different Acids.*

In all mixtures of the aqueous solutions of two salts, each acid remains united to the base which stands nearest to it in this table.

SULFURIC ACID.

Barita	Barita	Barita	Barita	Barita	Barita	Barita	Barita	Lead
Strontia	Potass	Potass	Potass	Potass	Potass	Potass	Potass	Mercury
Lime	Soda	Soda	Soda	Soda	Soda	Soda	Soda	Iron
(Silver ?)	Ammonia	Strontia	Strontia	Strontia	Strontia	Strontia	Ammonia	{ Potass
(Mercury ?)	Strontia	Ammonia	Ammonia (4)	Ammonia (5)	Ammonia (6)	Soda	Strontia	{ Soda
Potass	Magnesia (3)	Magnesia	Magnesia (4)	Lime	Magnesia ?	Magnesia	Magnesia	{ Magnesia
Soda	Glycina	Glycina	Glycina	Glycina	Glycina	Glycina	Glycina	{ Lead
{ Zinc	Alumina	Alumina	Alumina	Alumina	Alumina	Alumina	Alumina	{ Zinc
{ Iron	Zirconia	Zirconia	Zirconia	Zirconia	Zirconia	Zirconia	Zirconia	{ Copper
{ Copper	Lime	Lime	Lime	Lime	Lime	Lime	Lime ?	
Magnesia								
Ammonia (1)								
Glycina								
Alumina								
Zirconia								
NITRIC	MURIATIC	PHOSPHORIC	FLUORIC	SULFUROUS	BORACIC	CARBONIC	(NITROUS)	(PHOSPHOROUS) (ACETIC)

(1) Ammonia stands above magnesia when cold. (2) A triple salt is formed. (3) Perhaps magnesia ought to stand lower. (4) A compound salt is formed, and when hot, magnesia stands above ammonia. (5) Fourcroy says, that sulfate of strontia is decomposed by borate of ammonia. (6) With heat, ammonia stands below lime and magnesia.



NITRIC  
ACID.

Barita	Potass	Barita	Potass	Barita (10)	Potass
Potass	Soda	Potass	Soda	Potass	Soda
Soda	Ammonia	Soda	Ammonia	Soda	Barita (10)
Strontia	Magnesia	Ammonia	Magnesia	Ammonia	Ammonia (7,11)
Lime	Glycina	Magnesia	Glycina	Magnesia	Magnesia (?)
Magnesia (?)	Alumina	Glycina	Alumina	Glycina	Strontia
Ammonia (?)	Zirconia (9)	Alumina	Zirconia	Alumina	Lime
Glycina	Barita	Zirconia	Barita	Zirconia	Glycina
Alumina	Strontia	Strontia (9)	Strontia	Strontia	Alumina
Zirconia	Lime	Lime	Lime	Lime	Zirconia
MURIATIC	PHOSPHORIC	FLUORIC	SULFUROUS	BORACIC	CARBONIC

## NITRIC AND MURIATIC ACIDS.

(7) A triple salt is formed. (8) Fourcroy says, that the muriate of zirconia decomposes the phosphates of barita and strontia. (9) According to Fourcroy's account, the fluuate of strontia decomposes the muriates of ammonia, and of all the bases below it; but he says in another part of the same volume, that the fluuate of strontia is an unknown salt. (10) According to Fourcroy's account of these combinations, barita should stand immediately below ammonia in both of these columns. (11) With heat, the carbonate of lime decomposes the muriate of ammonia.

## PHOSPHORIC ACID.

Barita	Lime	Barita	Potass	Barita
Lime	Barita	Lime	Soda	Lime
Potass	Potass	Potass	Barita	Potass
Soda	Soda	Soda	Lime (13)	Soda
Strontia	Strontia	Strontia	Strontia	Strontia
Magnesia	Magnesia	Ammonia (12)	Ammonia	Magnesia
Ammonia	Ammonia	Magnesia	Magnesia	Glycina ?
Glycina	Glycina	Glycina	Glycina	Alumina
Alumina	Alumina	Alumina	Alumina	Zirconia
Zirconia	Zirconia	Zirconia	Zirconia	
FLUORIC	SULFUROUS	BORACIC	CARBONIC	(PHOSPHOROUS)

(12) According to Fourcroy, the phosphate of ammonia decomposes the borate of magnesia. (13) Fourcroy says, that the carbonate of lime decomposes the phosphates of potass and of soda.

## FLUORIC ACID.

Lime	Lime	Potass
Potass	Barita	Soda
Soda	Strontia	Lime
Magnesia	Potass	Barita
Ammonia	Soda	Strontia
Glycina	Ammonia	Ammonia (14)
Alumina	Magnesia	Magnesia
Zirconia	Glycina	Glycina
Strontia	Alumina	Alumina
Barita	Zirconia	Zirconia
SULFUROUS	BORACIC	CARBONIC

(14) According to Fourcroy, the carbonate of ammonia decomposes the fluuates of barita and strontia.

SULFUROUS ACID.

BORACIC ACID.

Barita	Potass	Lime	Zirconia	Potass
Strontia	Soda	Strontia	Alumina	Soda
Potass	Barita (15)	Barita	Glycina	Lime
Soda	Strontia	Zirconia	Ammonia	Barita
Ammonia	Ammonia	Alumina	Magnesia	Strontia
Magnesia	Lime	Glycina	Strontia	Magnesia
Lime	Magnesia	Magnesia	Soda	Ammonia
Glycina	Glycina	Ammonia	Potass	Glycina
Alumina	Alumina	Soda	Barita	Alumina
Zirconia	Zirconia	Potass	Lime	Zirconia
BORACIC	CARBONIC	(NITROUS)	(PHOSPHOROUS ?)	CARBONIC

(15) Fourcroy says, that the sulfite of barita decomposes the carbonate of ammonia.

Table of the Sequences of the Acids with different Bases.

BARITA.				STRONTIA.				LIME.				POTASS SODA	MAG- NESIA.	
Sulfuric	S	C	S	S	C	S	P	S	C	P	P	P	MAGN. = AMM.	S B N C M P P F F SS
Nitric	N	S	P	N	SS	P	S	P	P	F	F	F	GLYCINA	
Muriatic	M	P	SS	M	F	SS	SS	SS	F	B	B	SS	ALUMINA	
Phosphoric	SS	SS	N	SS	P	F	F	F	B	SS	C	S	ZIRCONIA	
Sulfurous	P	N	M	C	B	B	B	B	SS	S	SS	B	Each with every subsequent base in this order	
Fluoric	C	M	F	B	S	C	C	N	S	C	S	N		
Boracic	B	F	B	F	M	N	N	N	M	N	N	M		F SS SS S B N C M AM
Carbonic	F	B	C	P	N	M	M	C	N	M	M	C		
STRONTIA	LM	PT	MG	LM	PT	MG	AM	GL	PT	MG	AM	GL		
		SD	AM		SD			AL	SD			AL		
			GL					ZR				ZR		
			AL											
			ZR											

The comparative use of this table may be understood from an example: If we suppose that the nitrate of barita decomposes the borate of ammonia, we must place the boracic acid above the nitric, between barita and ammonia in this table, and consequently barita below ammonia, between the fluoric and boracic in the former: hence the boracic and fluoric acids must also be transposed between barita and strontia, and between barita and potass; or if we place the fluoric still higher than the boracic in the first instance, we must place barita below ammonia between the nitric and fluoric acids, where indeed it is not impossible that it ought to stand.

## Numerical Table of elective Attractions.

BARITA.		STRONTIA.		POTASS.		SODA.		LIME.	
Sulfuric acid	1000*	Sulfuric acid	903*	Sulfuric acid		Oxalic acid		Oxalic acid	960
Oxalic	950	Phosphoric	827*		894* 885*	Sulfuric		Sulfuric	868*
Succinic	930	Oxalic	825	Nitric	812* 804*	Tartaric		Tartaric	867
Fluoric		Tartaric	757	Muriatic	804* 797*	Succinic		Succinic	866
Phosphoric	906*	Fluoric		Phosphoric	801* 795*	Phosphoric		Phosphoric	865*
Mucic	900	Nitric	754*	Suberic?	745 740	Mucic		Mucic	860
Nitric	849*	Muriatic	748*	Fluoric	671* 666*	Nitric		Nitric	741*
Muriatic	840*	(Succinic)	740	Oxalic	650 645	Muriatic		Muriatic	736*
Suberic	800	(Fluoric)	703*	Tartaric	616 611	Suberic		Suberic	735
Citric		Succinic		Arsenic	614 609	Fluoric		Fluoric	734*
Tartaric	760	Citric?	618	Succinic	612 607	Arsenic		Arsenic	733½
Arsenic	733½	Lactic	603	Citric	610 605	Lactic		Lactic	732
(Citric)	730	Sulfurous	527*	Lactic	609 604	Citric		Citric	731
Lactic	729	Acetic		Benzoic	608 603	Malic		Malic	700
(Fluoric)	706*	Arsenic	(733½)	Sulfurous	488* 484*	Benzoic		Benzoic	590
Benzoic	597	Boracic	513*	Acetic	486 482	Acetic		Acetic	
Acetic	594	(Acetic)	480	Mucic	484 480	Boracic		Boracic	537*
Boracic	(515)*	Nitrous?	430	Boracic	482* 479*	Sulfurous		Sulfurous	516*
Sulfurous	592*	Carbonic	419*	Nitrous	440 437	(Acetic)		(Acetic)	470
Nitrous	450			Carbonic	306* 204*	Nitrous		Nitrous	425
Carbonic	420*			Prussic	300 298	Carbonic		Carbonic	423*
Prussic	400					Prussic		Prussic	290

MAGNESIA.		AMMONIA.		GLYCINA?		ALUMINA.		ZIRCONIA?	
Oxalic acid	920	Sulfuric acid	808*	Sulfuric acid	718*	709*		700*	
Phosphoric		Nitric	731*	Nitric	642*	634*		626*	
Sulfuric	810*	Muriatic	729*	Muriatic	639*	632*		625*	
(Phosphoric)	736*	Phosphoric	728*	Oxalic	600	594		588	
Fluoric		Suberic?	720	Arsenic	580	575		570	
Arsenic	733	Fluoric	613*	Suberic?	535	530		525	
Mucic	732½	Oxalic	611	Fluoric	534*	529*		524*	
Succinic	732½	Tartaric	609	Tartaric	520	515		510	
Nitric	728*	Arsenic	607	Succinic	510	505		500	
Muriatic	728*	Succinic	605	Mucic	425	420		415	
Suberic?	700	Citric	603	Citric	415	410		405	
(Fluoric)	620*	Lactic	601	Phosphoric	(648)*	(642)*		(636)*	
Tartaric	618	Benzoic	599	Lactic	410	405		400	
Citric	615	Sulfurous	433*	Benzoic	400	395		390	
Malic?	600?	Acetic	432	Acetic	395	391		387	
Lactic	575	Mucic	431	Boracic	388*	385*		382*	
Benzoic	560	Boracic	430*	Sulfurous	355*	351*		347*	
Acetic		Nitrous	400	Nitrous	340	336		332	
Boracic	459*	Carbonic	339*	Carbonic	325*	323*		321*	
Sulfurous	439*	Prussic	270	Prussic	260	258		256	
(Acetic)	430								
Nitrous	410								
Carbonic	366*								
Prussic	280								

## Acids.

SULFURIC.		NITRIC.		MURIATIC.		PHOSPHORIC.	
Barita	1000*	Barita	849*	Barita	840*	Barita	906*
Strontia	903*	Potass	812*	Potass	804*	Strontia	827*
Potass	894*	Soda	804*	Soda	797*	Lime	(865)*
Soda	885*	Strontia	754*	Strontia	748*	Potass	801*
Lime	868*	Lime	741*	Lime	736*	Soda	795*
Magnesia	810*	Magnesia	732*	Ammonia	729*	Ammonia	(728)*
Ammonia	808*	Ammonia	731*	Magnesia	728*	Magnesia	736*
Glycina	718*	Glycina	642*	Glycina	639*	Glycina	648*
Itria	712	Alumina	634*	Alumina	632*	Alumina	642*
Alumina	709*	Zirconia	626*	Zirconia	625*	Zirconia	636*
Zirconia	709*						

FLUORIC.

FLUORIC.		OXALIC.		TARTARIC.		ARSENIC.		TUNGSTIC.	
Lime	734 *	Lime	960	867	Lime	733 $\frac{1}{2}$	Lime		
Barita	706 *	Barita	950	760	Barita	733 $\frac{1}{2}$	Barita		
Strontia	703 *	Strontia	825	757	Strontia	733 $\frac{1}{2}$	Strontia		
Magnesia	(620) *	Magnesia	820	618	Magnesia	733	Magnesia		
Potass	671 *	Potass	650	616	Potass	614	Potass		
Soda	666 *	Soda	645	611	Soda	609	Soda		
Ammonia	613 *	Ammonia	611	609	Ammonia	607	Ammonia		
Glycina	534 *	Glycina ?	600	520	Glycina	580	Glycina		
Alumina	529 *	Alumina	594	515	Alumina	575	Alumina		
Zirconia	524 *	Zirconia ?	588	510	Zirconia	570	Zirconia		
SUCCINIC.		SUBERIC.		CAMPHORIC.		CITRIC.			
Barita	930	Barita	800	Lime		Lime	731		
Lime	866	Potass	745	Potass		Barita	730		
Strontia ?	740	Soda	740	Soda		Strontia	618		
(Magnesia)	732 $\frac{1}{2}$	Lime	735	Barita		Magnesia	615		
Potass	612	Ammonia	720	Ammonia		Potass	610		
Soda	607	Magnesia	700	Glycina ?		Soda	605		
Ammonia	605	Glycina ?	535 ?	Alumina		Ammonia	603		
Magnesia		Alumina	530	Zirconia ?		Glycina ?	415 ?		
Glycina ?	510	Zirconia ?	525 ?	Magnesia		Alumina	410		
Alumina	505					Zirconia	405		
Zirconia ?	500								
LACTIC.		BENZOIC.		SULFUROUS.		ACETIC.			
Barita	729	White oxide of		Barita	592 *	Barita	594		
Potass	609	arsenic		Lime	516 *	Potass	496		
Soda	604	Potass	608	Potass	488 *	Soda	482		
Strontia	603	Soda	603	Soda	484 *	Strontia	480		
Lime	(732)	Ammonia	599	Strontia	(527) *	Lime	470		
Ammonia	601	Barita	597	Magnesia	439 *	Ammonia	432		
Magnesia	575	Lime	590	Ammonia	433 *	Magnesia	430		
Metallic oxids		Magnesia	560	Glycina	355 *	Metallic oxids			
Glycina	410	Glycina ?	400 ?	Alumina	351 *	Glycina	395		
Alumina	405	Alumina	395	Zirconia	347 *	Alumina	391		
Zirconia	400	Zirconia ?	390 ?			Zirconia	387		
MUCIC ?		BORACIC.		NITROUS ?		PHOSPHOROUS.			
Barita	900	Lime	537 *	Barita	450	Lime			
Lime	860	Barita	515 *	Potass	440	Barita			
Potass	484	Strontia	513 *	Soda	437	Strontia			
Soda	480	Magnesia	(459) *	Strontia	430	Potass			
Ammonia	431	Potass	482 *	Lime	425	Soda			
Glycina	425	Soda	479 *	Magnesia	410	Magnesia ?			
Alumina	420	Ammonia	430 *	Ammonia	400	Ammonia			
Zirconia	415	Glycina	388 *	Glycina	340	Glycina			
		Alumina	385 *	Alumina	336	Alumina			
		Zirconia	382 *	Zirconia	332	Zirconia			
		CARBONIC.		PRUSSIC.					
		Barita	420 *	Barita	400				
		Strontia	419 *	Strontia					
		Lime	(423) *	Potass	300				
		Potass ?	306 *	Soda	298				
		Soda	304 *	Lime	290				
		Magnesia	(366) *	Magnesia	280				
		Ammonia	339 *	Ammonia	270				
		Glycina	335 *	Glycina ?	260				
		Alumina	323 *	Alumina ?	258				
		Zirconia	321 *	Zirconia ?	256				