

The Project Gutenberg eBook of Nova analysis aquarum Medeviensium, by friherre Jöns Jakob Berzelius

This ebook is for the use of anyone anywhere in the United States and most other parts of the world at no cost and with almost no restrictions whatsoever. You may copy it, give it away or re-use it under the terms of the Project Gutenberg License included with this ebook or online at www.gutenberg.org. If you are not located in the United States, you'll have to check the laws of the country where you are located before using this eBook.

Title: Nova analysis aquarum Medeviensium

Author: friherre Jöns Jakob Berzelius

Contributor: Anders Gustaf Ekeberg

Release date: November 1, 2003 [EBook #10054]

Most recently updated: December 19, 2020

Language: Latin

*** START OF THE PROJECT GUTENBERG EBOOK NOVA ANALYSIS AQUARUM MEDEVIENSIUM ***

Produced by Lars Aronsson and the Project Runeberg

"Nova analysis aquarum Medeviensium" is a scientific paper in Latin about the quality of the water of the health spa at Medevi in Sweden, published in 1800 by Swedish chemist Jöns Jakob Berzelius (1779-1848).

This e-text was produced for Project Gutenberg from Project Runeberg's digital facsimile edition, available at <http://runeberg.org/berzaqua/>

This is a plain text file using the ISO 8859-1 (Latin-1) character set (É,é = E,e-acute; Å,å = A,a-ring; Ä,ä = A,a-umlaut; Ö,ö = O,o-umlaut).

Project Runeberg publishes free digital editions of Nordic literature. We need more volunteers like you. Learn more at <http://runeberg.org/>

Regio Collegio Medico
Sacrum.

NOVA ANALYSIS AQUARUM MEDEVIENSIUM

Quam
Venia ampliss. ord. philos.
p. p.
Præses
Mag. A. G. EKEBERG
chem. Adjunctus
Reg. Acad. Scient. Stockh. Membr.
ET
AUCTOR
JACOBUS BERZELIUS
Ostrog. Stip. Strandb.
In audit Gust. Maj. D. VI Decemb. MDCCC.
Upsalię
Litteris Joh. Fr. Edman, Reg. Acad. Typogr.

Table of Contents

Nova analysis aquarum Medeviensium
Vetus sive infimus fons
Fons Medius
Fons supremus
Limes Medeviensis
Fons Lokaënsis
Limus Lokaënsis

NOVA ANALYSIS AQUARUM MEDEVIENSIIUM

Aquę Medevienses a Cel. BERGMAN primum justa & consummata analysi chemica exploratę sunt. In actis Reg. Acad. Scient. Holm. An. 1783. P. 4, p. 218, hanc suam disquisitionem exposuit. Sed Cel. Medicus S. R. M. Primarius etc. D. Doct. S. HEDIN, hujus institutionis p̄fenti tempore curator (Brunns Intendent,) cum variare interdum naturam fontium & elementorum rationem, assiduis nobilissimorum chemicorum investigationibus confirmatum esse, & in recentissimis p̄terea chemię profectibus majora ad disquisitiones hujus generis subtilius instituendas subsidia esse posita reputaverit, ęstate superiori novam analysin suscipiendam esse censuit; eamque mihi, ad Medevi vices Chirurghi, ejus auspicio, tunc gerenti, mandavit. Quam cura diligentiaque quanta maxima potuerim peractam, propter magnam ab experientia summi viri discrepantiam, eorum. qui his rebus student, iudicio esse submittendam existimavi. Et cum etjam celebratum Loka fontem limumque, antea rite consummateque non examinatum, eadem hac p̄tērita ęstate, ab ejus curatore D:o Doct. etc. ASCHAN sollicitatus, adcurate sim perscrutatus, brevem ejus descriptionem, reservata in aliam occasionem copiosiori experimentorum expositione, adjungere, ob materię similitudinem, institui.

Ex tribus fontibus, quibus jam uti licet, unus tantum, & is infimus, ante nostram ętatem scaturivit. Olim quidem tres etjam numero fuerunt fontes; duo autem reliqui, quos Cel. BERGMAN Rödbrunn & Dahlbrunn appellat, jam ita cessaverunt, ut ne locum quidem ubi siti fuerint, reperire potuerim. At curante Cel. HEDIN alii duo nuper aperti sunt & ędiculis belle superstructis hoc anno consummatis, tecti; ut pauperibus usui essent, quibus antea circa horam tertiam matutinam surgendi, necessitas erat, ne ex unica scaturigine petita aqua opulentioribus ad horam sextam fontem adeuntibus deesset.

Vetus sive infimus fons.

Situs ejus est aliquanto depressior, ita tamen ut defluxus sit facilis. Intra ędificium alto muro circumdatur, qui ad ęquabile frigus conservandum plurimum confert. Profundus est V pedes. Cantharos circiter LX per horam effundit, cli temporisque varietate parum affectus. Temperatura in superficie + 6,5; ad fundum 6,7 intra menses ęstivos non mutata. Sapor asper, multis nauseosus. Odor concussione exprimitur hepaticus. In aperto vase sensim oxidum ferri demittit, & odorem saporemque asperum perdit. Tincturam Heliotropii rubefacit, at non post coctionem ferrive demissionem. Calce soluta turbatur, sed non post coctionem. Acidum carbonicum in aqua ita prodi docent, si primo calcis solutionem turbaverit, uberius autem adfusa solverit quę p̄cipitata erant; quod vero hic non incidit, cum ferrum etjam p̄cipitetur, ex quo p̄cipitarum flavescit; in aqua autem nihil vel parum adsir liberi acidi carbonici. Cum acido sulphurico forti nulla effervescentia. Solutiones Fernambuci aut Curcumę non mutatę. Cum ac. gallaceo color violaceus; prussiate kali cęruleus purissimus; ex quo post quietem XXIV horarum prussias ferri depositus; utrumque in aqua cocta inefficax. Acidum oxalicum paullulum permutavit, sed non in cruda solum, verum etjam in cocta; quod sulphatem calcis prodit. Carbonas kali nihil. Natrum purum post horas XXIV luteolum p̄cipitatum effecit. Similiter ammoniacum. Aliquantulum ac. azotici in aquę portionem instillabatur, quę dein azotate barytę p̄cipitabatur: pauxillum illud, quod post h. XXIV demissum erat, inde separabatur, quo facto aqua azotate argenti p̄cipitabatur; hoc p̄cipitatum suisse muriatem argenti exinde colligimus, quod luci expositum nigrescebat; quod in carbonatibus argenti non accidit. Azotas hydrargyri frigide p̄paratus album dedit & subtile p̄cipitatum, ad labra vitri adherens, & vix sensibile antequam aqua effusa, vitrum aruisset. Azotas hydr. calide p̄paratus & azotas plumbi p̄cipitata fecerunt e luteo candicantia. Ad detegendum in aqua hydrogenium sulphuratum multa sunt a chemicis proposita, at pleraque non nisi in

aquis saturatoribus efficacia. Ejusmodi sunt: argentum metallicum; sed in fonte suspensus nummus argenteus bene politus post IIX dies eque splendebat; oxidum arsenici album; id vero in hac aqua equali tempore nihil passum est; acidum azoticum conc. quod, hydrogenium oxidando sulphur precipitare docent; illud autem heic nihil tale effecit. Nihilominus olfactus hydrogenii sulphurati in hac aqua index certissimus est. Azotas plumbi in forma sicca ad hydr. sulph. valde sensibilis est; at solurus, propter suam ad aquam attractionem, sulphure difficiliter decomponitur. Scribebam autem hac solutione in charta, quæ vasi, in quo aqua fontana evaporaretur, superimponeretur: vas sensim calefactum est, ut gas hydr. sulph. quantum fieri posset siccum eliceretur: qua re etiam factum est, ut litteræ scriptæ, pro varia gasis siccitate, quibusdam in locis metallice splenderent & nigrescerent; aliis magis minusve perspicuæ, aliis non observabiles essent.

Post hæc experimenta præcursoria, nostra in eo verfat, est opera, ut quæ in hac aqua soluta sint gasia fecernerentur. Quantum aquæ Cantharus unus capere potest [1] in vas retortum vitreum instillabatur ejus magnitudinis, ut tertia pars vacua maneret: orificium subere obturabatur, per quod aptatus erat tubus vitreus; cui vesica arcte adligabatur. Tubus ad apparatus pneumaticum ducebat. Aqua, qua hunc apparatus impleveram, quartam horæ partem cocta erat, & jam intra temperaturam + 85r & 100r, igne subto facto, servabatur. Supra enim in recipulo pneumatico olei stratum fluitabat, ne, experimento peracto, gas ab aqua refrigerata imbiberetur. Quamquam aqua, ut diximus, antea diu servisset, bullæ tamen aëris jam exinde per oleum ascendentes animadvertentur, ex cucurbita non venientes. Gas, quod in apparatu pneumatico, postquam aqua in cucurbita horæ tres quartas partes servisset, receptum erat, minoris aliquanto voluminis fuit eo, quod supra aquam in cucurbita fuerat, utroque in eadem temperatura meso; ex quo sequitur, vapores aquosos non omnem ex superiori cucurbitæ parte aërem expulisse; quapropter hac methodo nihil certi de quantitate naturæ gasium in aqua fontana solutorum eruere licet. Alia igitur utendum erat. Nec apparatus a Cel. BERGMAN (Om Bitter-, Selzer-, Spa- och Pyrmontervattens halt och tillredning, § 8. Fig. 1.) comparare poteram. Hanc igitur, scopo, ut videtur, optime inservientem experiendi rationem inveni. Orificium lagenæ vitræ, accurate ejus capacitatem emensus, subere optimo obturabam, per quod tubus vitreus, ut in experimentis pneumaticis solet, curvatus ingerebatur ita, ut altera ejus extremitas ultra suber in lagena non exstaret. Et lagena & huic ita adjunctus tubus aqua examinanda implebantur, ne minima quidem aëris atmospherici bulla observabili relicta. Lagena ad commissuram luto vesicaque rite munita, in balneo arenæ ponebatur. Apparatu pneumatico eodem ac supra utebar; sed jam aqua plus horam ante initium experimenti ferveret. (Vas, in quo ferveret, ejus capacitatis erat, ut quod exhalaret cruda aqua compensare opus non esset). In ipso recipulo apparatus aqua, ut ante, oleo operiebatur. Huic methodo aliquis objicere forsitan posset, aquam fontanam in lagena calore valde dilatari ante quam gasia exinde abeant; ita partem expelli & amitti. Sed ubi hæc pars aquæ venerit in aquam bullientem apparatus pneumatici sub recipulum, gasia, quibus prægnans est, mox hujus calore in formam nativam restituta, effugere nequeunt. Postquam horæ dimidium aqua in lagena ferveret, summovebatur sensim ignis ad cautam refrigerationem. In temperatura +17r volumen gasium dimensum fuit 6,5 pollicum cubicorum decimalium pro quoque cantharo. Cel. BERGMAN 14 p. cub. ex. Cantharo accepit. Hæc discrepantia experimentum pluries iterare jussit; idem autem semper fuit eventus, si aberrationem 1/2 vel 3/4 p. c. exceperis, tribuendam temperaturæ, quam omnino æqualem obtinere non poteram. Iuncturam autem nec rimis latentibus fefellisse, tum illius post singula experimenta sollicita exploratio demonstravit, cum regressus aquæ ex apparatu pneumatico in lagenam frigescentem.

[1] Hoc loco & in sequentibus mensura coronata & accurate explorata utebar.

Ad vulgare præscriptum solutio calcis in gase his experimentis collecto collocabatur. Post XXXVI horas ex 6,5 p. c. dimidius tantum restabat, quam aëra esse atmosphericum gas azoticum oxigenatum indicavit. Quorsum igitur gas hydrogenium sulphuratum, quod aquæ inesse certo sciebam? Id quo intelligenrem, lagenam, hoc gase, præparato ex sulphureto ferri ac acido sulphurico diluto, impletam supra calcem aqua solutam collocavi. Post XIV horas X p. c. absorpti erant; supererat unus cum dimidio p. c., post XXIV horas nihil diminutus; quem esse atmosphericum, gase azotico oxigenato exploravi. Gas hydr. sulph. & gas acidi carbonici ad equalia volumina commixta & eidem experimento subjecta, ab aqua calcarea, uno p. c. relicto, absorbebantur. Solutionis calcareæ in his experimentis, & præcipue in superiori, color erat luteoalbidus, odor saporque sulphureti calcarei; solutio sensim sulphatem calcis deponendo turbabatur, quod tamen in posteriori propter carbonatem calcis simul precipitatum discerni non poterat. Ex quibus intelligitur, diminutionem supra descriptam gasis aquæ examinandæ non acido tantum carbonico sed gasi etiam hydr. sulph. esse tribuendam. Horum igitur gasium quantitates alia via dignoscendæ sunt. Eum in finem unum aquæ fontanæ Cantharum in vase aperto calce precipitabam; precipitatum, cujus pondus erat = 0,085 [2] ex oxido ferri = 0,020, carbonate calcis magnesieque aquæ proprio, aliis experimentis noto = 0,035, & carbonate calcis jam generato, cujus igitur pondus = 0,030, constabat. Si pondera carbonatis calcis & acidi carb. quod continet, sunt inter se = 100:43, oritur exinde pondus acidi carbonici ex aqua fontana recepti = 0,014; ex quo tamen volumen gasis ejus haud facile inveniri potest.

[2] Unitas ponderis per totam banc disfertationem = 1/4 lod viktualie-vigt = 1 drachma 7 1/2 gr.
= 1 centner prober-vigt.

Unde autem oritur hujus aque gas hydrogenium sulphuratum? In quibusdam aquis non dubium est quin originem debeat sulphureto calcis, quod, dum ex aqua oxidatur, ideoque gas hydrogenium generat, illi sulphuris aliquid tradit; ipsum autem in sulphatem calcis transit, qui circum tales fontes, forma pulveris albi, se manifestat. In aqua Medeviensi sulphas quidem calcis adest, quem primo sulphuretum fuisse posse, deinde vero oxidatum, hoc gas, ut diximus, produxisse, haud quidem districte negaverim, vero tamen similis esse existimaverim, a stratis corporum organicorum putrefactorum vel putrescentium, per que vena transit, idem illud gas originem duxisse, quippe quod destructione animalium vegetabiliumque generari, ideoque ex stagnosis limosisque locis, preesertim commotione quadam facta, exhalari noverimus. Per hanc hypothesin explicatur etiam ortus gasis hydrogenii carbonati, quod in hoc & pluribus aliis Svecie fontibus adesse, cum alia fere desint ipsius indicia, sapor peculiaris certe arguit; quamquam ejus quantitas, propter minorem in aqua solubilitatem longe minor sit, nec determinari potest nisi combustionem; quam experiri, defectus instrumentorum prohibuit.

Ex quovis fonte V Cantharos, in vase vitreo, unum cum dimidio cancharum capiente, singulos vaporare curavi. Massa sicca caute colligebatur, & quod vitro arctius adhaerebat, acido muriatico diluto abluatur & solutioni N. 5 addebatur. Masse in temp. + 108 siccate pondus = 0,575.

1. Massa diligenter aqua eluebatur & liquidum siphone secernebatur, quo colatio evitaretur. Hec aqua deinceps ad siccum vaporabat, supra infundebatur alcohol, qui non solutum reliquit album terrestre = 0,025, quod experimentis infra enarrandis sulphatem calcis esse reperi.

2. Solutio alcoholina lente evaporabatur; fusca erat, & crystallos muriatis natri facile agnoscibiles in reliqua massa fusca deliquesibili dabat [3]. Pondus totius masse = 0,150. In aqua solvebatur, cui solutioni admistum ammoniacum purum nihil mutavit; sed azotate baryte precipitatum efficiebatur, quod lotum siccatumque erat = 0,01. & azotate argenti precipitatum cinereum, in lamella vitrea supra ignem odorem empyreumaticum spargens, quo manifestatur extractum vegetabile: id igitur coctione cum acido azotico conc. destruebatur; quod hujus acidi supererat, ammoniaco dein saturabatur, quod primo precipitatum faciebat, mox solvebat; quapropter acidum muriaticum ad saporem acidulum addebatur. Murias argenti bene elotus & siccatus niveo fuit colore & pondere = 0,240.

[3] Sales cum extracto conjunctos difficulter crystallisari, notisi mum est.

3. Ex reliqua solutionis parte argentum superfluum muriate ammoniaci precipitabatur: dein inspissabatur, nihilque acido oxalico tartaricove afficiebatur; quapropter nec kali nec calcem habebat.

4. Residuum ex lotionem cum aqua N. 1 cum alcohole eluebatur, quod evaporando dedit refinam odorem fuscam = 0,005.

5. Residuum ex massa alcohole elota N. 4 acido muriatico diluto solvebatur; solutio secernebatur, & quod solutum non erat, aqua eluebatur, que dein solutioni admiscebatur. Hec ad dimidiam partem evaporata ammoniaco precipitabatur; precipitatum elotum fuit = 0,15. Reliqua solutio, cum aqua lotionis, carbonate ammoniaci precipitabatur, quod carbonatem calcis = 0,125 dedit. Calcem fuisse inde colligitur, quod cum acido sulphurico sal difficulter solubile efficiebat, nec carbonare ammoniaci solvebatur; ideoque magnesia non erat.

6. Quod ammoniaco precipitatum erat, in acido sulphurico solvebatur; residua erat magnesia, que acid. sulph. dilato difficulter solvitur, si pura est; pondus erat = 0,03. Acido muriatico soluta carbonate ammoniaci precipitabatur [4] & mox ab eo solvebatur; que magnesie nota est.

[4] BERGMAN & secundum eum plures alii, magnesie ad acida attractionem majorem statuunt quam ammoniaci. Alii negant; cum ex acid. sulphurico ammoniaco precipitetur. BERGMAN (In Opusculis T. 3 p. 317 & 337) hoc precipitatum inde oriri contendit quod in solutione sal tripliciter compositum generaretur. Qua de re hec sequentia ipse sum expertus. Si Murias magnesie cum carbonate kali precipitatur, usque dum reagat alcali, & precipitatum inde separatur, precipitari dein potest cum ammoniaco puro nova magnesie portio. Idem evenit, si ordine inverso primo adhibetur ammoniacum purum & deinde Carbonas kali. Sulphas magnesie carbonate kali totus decomponitur; at si plus carbonatis kali additur, solvitur iterum precipitatum, & post horas quasdam crystalli formantur. Idem evenit, si precipitatio ope carbonatis ammoniaci perficitur. Etiam ex muriate magnesie precipitando formantur hi sales; si solutio valde diluta est, nihil carbonate ammoniaci precipitatur; si aliquantum puri ammoniaci additur, precipitatum oritur quod carbonate ammoniaci, si sufficiens ejus quantitas adsit, solvitur & crystallisatur eam in formam, quam BERGMAN, Opusc. T. 1 Tab. 1. depinxit & carbonatis magnesie esse dixit; sed. ut ex allatis sequitur, ammoniacum etiam continet, quod in auctiore calore effugit, & magnesie

carbonatem pulverulentum relinquit. Solutio muriatis magnesie valde diluta non precipitatur carbonate ammoniaci, sed tantum si concentrata sit; tum autem precipitatum est triplex ille sal, cujus supra mentionem fecimus, sere difficulter solubilis. Carbonates alcalium solvunt carbonatem magnesie, & efficiunt sales crystallisabiles difficulter solubiles. Murias ammoniaci carbonatem magnesie solvit, sed pars decomponitur & sal triplex nascitur. Alcalia pura solvunt carbonatem magnesie ita, ut se acido carbonico saturent, & quod superest carbonatis magnesie solvant; quod de ammoniaco non valet; cum carbonas ammoniaci puram magnesiam ita solvat, ut hec primum ab ammoniaco rapiat ad se acidum carbonicum. Fourcroy & Vauquelin, in analysi urine, Bulletin des Sciences An. 1798 N. IX, propensitatem magnesie ad triplicem conjunctionem cum ammoniaco & acido phosphorico memoraverunt. Hec magnesie proprietates accuratius disquisitione digna esse videntur.

Solutio in acido sulphurico facta, ad siccum evaporabatur; quod dum fiebat, crystalli sulphatis calcis formabantur: massa sicca ustulabatur donec effugisset ac. sulphuricum; residui pondus = 0,125; que ponderis auctio majori ferri oxidationem tribuenda esse videretur, quam etiam color & vapores acidi sulphurosi indicabant.

7. Massa usta lavabatur aqua, ex qua nec ammoniacum nec carbonates alcalium aliquid precipitabant. Dein ac. muriatico solvebatur, ex qua solutione murias baryte precipitatum effecit, quod sulphatem calcis = 0,02 adhuc remansisse indicabat. Etiam oxalas kali calcis presentiam docebat. Puro ammoniaco oxidum ferri purum precipitabatur = 0,10.

8. Solutio N. 5, ex qua calx carbonate ammoniaci precipitate erat, in siccum evaporabatur; cum acido sulphurico miscebatur & urebatur donec acid, muriaticum effugisset; iterum solvebatur, & ammoniaco precipitabatur; quo secernebatur magnesie = 0,02.

9. Quod post solutionem in acido muriatico supererat, aqua difficulter solvebatur; at aqua postquam diutius superinfusa mansisset, & solutione baryte & acid. oxalico precipitabatur; coctum in carbonate natri generavit sulphatem natri, & quod non solvebatur, effervescebat aliquantulum, adfuso acido quodam; fuit igitur sulphas calcis = 0,140.

Hec omnes rationes si conferuntur; animadvertitur auctio = 0,040, que tribuenda est iis particulis, que ex vase, in quo facta erat evaporatio, acido muriatico eluebantur.

Salis N. 2 pondus erat = 0,150; murias argenti = 0,240 continet ac. muriaticum = 0,043, quod ad plenam saturarionem requirit natrum = 0,065 & aquam ad crystallisandum = 0,022, quo quantitas muratis natri invenitur = 0,130. Sulphas baryte, ibidem, = 0,010 continet ac. sulphuricum = 0,003; quod saturatur natro = 0,005, ex quo quantitas sulphatis natri = 0,08. Residuum fuit extractum & aqua & alcohole solubile = 0,012.

Sequens tabula exhibet, quantum ex meis quidem experimentis concludere licuit, quantitates corporum in quovis hujus aque cantharo solutorum; cui adjungitur tabula Cel. Prof. BERGMAN, loco supra citato allata.

Secundum experimenta Secundum mea

BERGMANNI

Gas acidi carbonici - 6 p. c. Gas ac. carb.

Gas hydr. sulph. - 8 cum gase hydr.

sulph. - 6 p. c.

Aer atmosph. - 0,5

14 6 1/2

Murias natri - 0,005 Murias natri - 0,026

Oxidum ferri - 0,056 Oxid. ferri - 0,020

Extractum mucil. - 0,019 Extract. muc. - 0,003

---- Sulphas natri - 0,001

---- Sulphas calcis - 0,037

---- Carbonas calc. - 0,025

---- Carb. magnes. - 0,010

---- Resine - 0,001

Murias calcis - 0,009 ---

0,089 0,123

In ipso fere plano soli circumjacentis scattet; reliqui duo depressiores. Aqua per duo foramina crateris emittitur, ideoque fere semper turbida est. Temperatura variat. D 1 Junii erat in fundo +7°; in superficie 7,°5; in atmosphæra 8° vel 9° D. 30 Julii in fundo 9,5 in superficie 10,° in atmosphæra 19° vel 20°. Quantitas gasium per cantharum aquę hujus fontis est 1 1/2 p. cub. major, quam reliquorum; odore hydrogenii sulph. fortiori & quadam virtute laxante prædita est. Ejus partes constitutive eędem sunt, ac fontis supra descripti, excepto, quod minus ferri (= 0,015) & carbonatis calcis (= 0,080) habet, quod etjam quantitatem acidi carbonici minorem indicare videtur.

Fons supremus.

Situs hujus fontis editior est, quam ceterorum. Sapor veteris fontis saporis similis est. Reactio eadem. Temperatura variat. D. 1 Jun. erat in fundo + 6,°5; in superficie 7.° D. 30 Jul. in fundo + 8° in superficie 9.° Ferri quantitas eadem est ac in vetere fonte, sulphatis calcis major (= 0,045); carbonatis calcis & magnesię minor. Sales reliqui sunt iidem in omnibus his fontibus.

Limus Medeviensis.

Non admodum profunde sub ipsa soli superficie reperitur. Scripturam azotate plumbi factam afficit. Schidiis & aliis reliquiis vegetabilibus immixtus est. Ustione duas partes tertias ponderis perdit; residuum constat ex ferro, silice & sulphate calcis. Sulphatem ferri, ut limus Lokaęnsis, non continet. Una ejus tertia pars est extractiva, & alkohole & aqua solubilis.

Fons Lokaęnsis.

Ejus partes constitutivas eadem fere ratione, qua fontium Medeviensium, exploratas has sequentes reperi.

Gas Hydrog. sulph. & perpauullulum	
Gasis acidi carbonici - - 2 p. c.	
Aēr atmospericus - - 3,5	
ex quo gas oxigenium - 0,5	
& gas azotum - 3,0	

	5,5 p. c.
Carbonas calcis - - 0,0042	
Carbonas magnesię - - 0,0035	
Silex - - 0,0107	
Sulphas calcis - - 0,0023	
Murias natri - - 0,0055	
Extractivum - - 0,0014	
Aliquantulum resinę - -	

per Cantharum 0,0276	

Limus Lokaęnsis,

In quaque libra continentur	
Gas ac. carb. & hydrog. sulph. - 2,6	
Aēr atmospericus - 0,3	
Gas hydrogenium carbonatum - 0,8	

	3,7 p. cub.
Aquosum - 9,5 lod.	
Limus siccatus = 4, continet	
Extractum - 0,045	

Sulphas calcis - 0,010
 Sulphas ferri - 0,005
 Combustibilia - 1,402
 Oxidum ferri - 0,172
 Argilla - 0,075
 Carbonas magnesie - 0,020
 Silex - 2,232
 Aliquantulum carb. calcis -

 3,961
 Addito quod deficit 0,039

 4,000

End of text.

*** END OF THE PROJECT GUTENBERG EBOOK NOVA ANALYSIS AQUARUM MEDEVIENSIUM ***

Updated editions will replace the previous one—the old editions will be renamed.

Creating the works from print editions not protected by U.S. copyright law means that no one owns a United States copyright in these works, so the Foundation (and you!) can copy and distribute it in the United States without permission and without paying copyright royalties. Special rules, set forth in the General Terms of Use part of this license, apply to copying and distributing Project Gutenberg™ electronic works to protect the PROJECT GUTENBERG™ concept and trademark. Project Gutenberg is a registered trademark, and may not be used if you charge for an eBook, except by following the terms of the trademark license, including paying royalties for use of the Project Gutenberg trademark. If you do not charge anything for copies of this eBook, complying with the trademark license is very easy. You may use this eBook for nearly any purpose such as creation of derivative works, reports, performances and research. Project Gutenberg eBooks may be modified and printed and given away—you may do practically ANYTHING in the United States with eBooks not protected by U.S. copyright law. Redistribution is subject to the trademark license, especially commercial redistribution.

START: FULL LICENSE
 THE FULL PROJECT GUTENBERG LICENSE
 PLEASE READ THIS BEFORE YOU DISTRIBUTE OR USE THIS WORK

To protect the Project Gutenberg™ mission of promoting the free distribution of electronic works, by using or distributing this work (or any other work associated in any way with the phrase “Project Gutenberg”), you agree to comply with all the terms of the Full Project Gutenberg™ License available with this file or online at www.gutenberg.org/license.

Section 1. General Terms of Use and Redistributing Project Gutenberg™ electronic works

1.A. By reading or using any part of this Project Gutenberg™ electronic work, you indicate that you have read, understand, agree to and accept all the terms of this license and intellectual property (trademark/copyright) agreement. If you do not agree to abide by all the terms of this agreement, you must cease using and return or destroy all copies of Project Gutenberg™ electronic works in your possession. If you paid a fee for obtaining a copy of or access to a Project Gutenberg™ electronic work and you do not agree to be bound by the terms of this agreement, you may obtain a refund from the person or entity to whom you paid the fee as set forth in paragraph 1.E.8.

1.B. “Project Gutenberg” is a registered trademark. It may only be used on or associated in any way with an electronic work by people who agree to be bound by the terms of this agreement. There are a few things that you can do with most Project Gutenberg™ electronic works even without complying with the full terms of this agreement. See paragraph 1.C below. There are a lot of things you can do with Project Gutenberg™ electronic works if you follow the terms of this agreement and help preserve free future access to Project Gutenberg™ electronic works. See paragraph 1.E below.

1.C. The Project Gutenberg Literary Archive Foundation (“the Foundation” or PGLAF), owns a compilation copyright in the collection of Project Gutenberg™ electronic works. Nearly all the individual works in the collection are in the public domain in the United States. If an individual work is unprotected by copyright law in the United States and you are located in the United States, we do not claim a right to prevent you from copying, distributing, performing, displaying or creating derivative works based on the work as long as all references to Project Gutenberg are removed. Of course, we hope that you will support the Project Gutenberg™ mission of promoting free access to electronic works by freely sharing Project Gutenberg™ works in compliance with the

terms of this agreement for keeping the Project Gutenberg™ name associated with the work. You can easily comply with the terms of this agreement by keeping this work in the same format with its attached full Project Gutenberg™ License when you share it without charge with others.

1.D. The copyright laws of the place where you are located also govern what you can do with this work. Copyright laws in most countries are in a constant state of change. If you are outside the United States, check the laws of your country in addition to the terms of this agreement before downloading, copying, displaying, performing, distributing or creating derivative works based on this work or any other Project Gutenberg™ work. The Foundation makes no representations concerning the copyright status of any work in any country other than the United States.

1.E. Unless you have removed all references to Project Gutenberg:

1.E.1. The following sentence, with active links to, or other immediate access to, the full Project Gutenberg™ License must appear prominently whenever any copy of a Project Gutenberg™ work (any work on which the phrase “Project Gutenberg” appears, or with which the phrase “Project Gutenberg” is associated) is accessed, displayed, performed, viewed, copied or distributed:

This eBook is for the use of anyone anywhere in the United States and most other parts of the world at no cost and with almost no restrictions whatsoever. You may copy it, give it away or re-use it under the terms of the Project Gutenberg License included with this eBook or online at www.gutenberg.org. If you are not located in the United States, you will have to check the laws of the country where you are located before using this eBook.

1.E.2. If an individual Project Gutenberg™ electronic work is derived from texts not protected by U.S. copyright law (does not contain a notice indicating that it is posted with permission of the copyright holder), the work can be copied and distributed to anyone in the United States without paying any fees or charges. If you are redistributing or providing access to a work with the phrase “Project Gutenberg” associated with or appearing on the work, you must comply either with the requirements of paragraphs 1.E.1 through 1.E.7 or obtain permission for the use of the work and the Project Gutenberg™ trademark as set forth in paragraphs 1.E.8 or 1.E.9.

1.E.3. If an individual Project Gutenberg™ electronic work is posted with the permission of the copyright holder, your use and distribution must comply with both paragraphs 1.E.1 through 1.E.7 and any additional terms imposed by the copyright holder. Additional terms will be linked to the Project Gutenberg™ License for all works posted with the permission of the copyright holder found at the beginning of this work.

1.E.4. Do not unlink or detach or remove the full Project Gutenberg™ License terms from this work, or any files containing a part of this work or any other work associated with Project Gutenberg™.

1.E.5. Do not copy, display, perform, distribute or redistribute this electronic work, or any part of this electronic work, without prominently displaying the sentence set forth in paragraph 1.E.1 with active links or immediate access to the full terms of the Project Gutenberg™ License.

1.E.6. You may convert to and distribute this work in any binary, compressed, marked up, nonproprietary or proprietary form, including any word processing or hypertext form. However, if you provide access to or distribute copies of a Project Gutenberg™ work in a format other than “Plain Vanilla ASCII” or other format used in the official version posted on the official Project Gutenberg™ website (www.gutenberg.org), you must, at no additional cost, fee or expense to the user, provide a copy, a means of exporting a copy, or a means of obtaining a copy upon request, of the work in its original “Plain Vanilla ASCII” or other form. Any alternate format must include the full Project Gutenberg™ License as specified in paragraph 1.E.1.

1.E.7. Do not charge a fee for access to, viewing, displaying, performing, copying or distributing any Project Gutenberg™ works unless you comply with paragraph 1.E.8 or 1.E.9.

1.E.8. You may charge a reasonable fee for copies of or providing access to or distributing Project Gutenberg™ electronic works provided that:

- You pay a royalty fee of 20% of the gross profits you derive from the use of Project Gutenberg™ works calculated using the method you already use to calculate your applicable taxes. The fee is owed to the owner of the Project Gutenberg™ trademark, but he has agreed to donate royalties under this paragraph to the Project Gutenberg Literary Archive Foundation. Royalty payments must be paid within 60 days following each date on which you prepare (or are legally required to prepare) your periodic tax returns. Royalty payments should be clearly marked as such and sent to the Project Gutenberg Literary Archive Foundation at the address specified in Section 4, “Information about donations to the Project Gutenberg Literary Archive Foundation.”
- You provide a full refund of any money paid by a user who notifies you in writing (or by e-mail) within 30 days of receipt that s/he does not agree to the terms of the full Project Gutenberg™ License. You must require such a user to return or destroy all copies of the works possessed in a physical medium and discontinue all use of and all access to other copies of Project Gutenberg™ works.
- You provide, in accordance with paragraph 1.F.3, a full refund of any money paid for a work or a replacement copy, if a defect in the electronic work is discovered and reported to you within 90

days of receipt of the work.

- You comply with all other terms of this agreement for free distribution of Project Gutenberg™ works.

1.E.9. If you wish to charge a fee or distribute a Project Gutenberg™ electronic work or group of works on different terms than are set forth in this agreement, you must obtain permission in writing from the Project Gutenberg Literary Archive Foundation, the manager of the Project Gutenberg™ trademark. Contact the Foundation as set forth in Section 3 below.

1.F.

1.F.1. Project Gutenberg volunteers and employees expend considerable effort to identify, do copyright research on, transcribe and proofread works not protected by U.S. copyright law in creating the Project Gutenberg™ collection. Despite these efforts, Project Gutenberg™ electronic works, and the medium on which they may be stored, may contain “Defects,” such as, but not limited to, incomplete, inaccurate or corrupt data, transcription errors, a copyright or other intellectual property infringement, a defective or damaged disk or other medium, a computer virus, or computer codes that damage or cannot be read by your equipment.

1.F.2. LIMITED WARRANTY, DISCLAIMER OF DAMAGES - Except for the “Right of Replacement or Refund” described in paragraph 1.F.3, the Project Gutenberg Literary Archive Foundation, the owner of the Project Gutenberg™ trademark, and any other party distributing a Project Gutenberg™ electronic work under this agreement, disclaim all liability to you for damages, costs and expenses, including legal fees. YOU AGREE THAT YOU HAVE NO REMEDIES FOR NEGLIGENCE, STRICT LIABILITY, BREACH OF WARRANTY OR BREACH OF CONTRACT EXCEPT THOSE PROVIDED IN PARAGRAPH 1.F.3. YOU AGREE THAT THE FOUNDATION, THE TRADEMARK OWNER, AND ANY DISTRIBUTOR UNDER THIS AGREEMENT WILL NOT BE LIABLE TO YOU FOR ACTUAL, DIRECT, INDIRECT, CONSEQUENTIAL, PUNITIVE OR INCIDENTAL DAMAGES EVEN IF YOU GIVE NOTICE OF THE POSSIBILITY OF SUCH DAMAGE.

1.F.3. LIMITED RIGHT OF REPLACEMENT OR REFUND - If you discover a defect in this electronic work within 90 days of receiving it, you can receive a refund of the money (if any) you paid for it by sending a written explanation to the person you received the work from. If you received the work on a physical medium, you must return the medium with your written explanation. The person or entity that provided you with the defective work may elect to provide a replacement copy in lieu of a refund. If you received the work electronically, the person or entity providing it to you may choose to give you a second opportunity to receive the work electronically in lieu of a refund. If the second copy is also defective, you may demand a refund in writing without further opportunities to fix the problem.

1.F.4. Except for the limited right of replacement or refund set forth in paragraph 1.F.3, this work is provided to you ‘AS-IS’, WITH NO OTHER WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PURPOSE.

1.F.5. Some states do not allow disclaimers of certain implied warranties or the exclusion or limitation of certain types of damages. If any disclaimer or limitation set forth in this agreement violates the law of the state applicable to this agreement, the agreement shall be interpreted to make the maximum disclaimer or limitation permitted by the applicable state law. The invalidity or unenforceability of any provision of this agreement shall not void the remaining provisions.

1.F.6. INDEMNITY - You agree to indemnify and hold the Foundation, the trademark owner, any agent or employee of the Foundation, anyone providing copies of Project Gutenberg™ electronic works in accordance with this agreement, and any volunteers associated with the production, promotion and distribution of Project Gutenberg™ electronic works, harmless from all liability, costs and expenses, including legal fees, that arise directly or indirectly from any of the following which you do or cause to occur: (a) distribution of this or any Project Gutenberg™ work, (b) alteration, modification, or additions or deletions to any Project Gutenberg™ work, and (c) any Defect you cause.

Section 2. Information about the Mission of Project Gutenberg™

Project Gutenberg™ is synonymous with the free distribution of electronic works in formats readable by the widest variety of computers including obsolete, old, middle-aged and new computers. It exists because of the efforts of hundreds of volunteers and donations from people in all walks of life.

Volunteers and financial support to provide volunteers with the assistance they need are critical to reaching Project Gutenberg™’s goals and ensuring that the Project Gutenberg™ collection will remain freely available for generations to come. In 2001, the Project Gutenberg Literary Archive Foundation was created to provide a secure and permanent future for Project Gutenberg™ and future generations. To learn more about the Project Gutenberg Literary Archive Foundation and how your efforts and donations can help, see Sections 3 and 4 and the Foundation information page at www.gutenberg.org.

Section 3. Information about the Project Gutenberg Literary Archive Foundation

The Project Gutenberg Literary Archive Foundation is a non-profit 501(c)(3) educational corporation organized under the laws of the state of Mississippi and granted tax exempt status by the Internal Revenue Service. The Foundation's EIN or federal tax identification number is 64-6221541. Contributions to the Project Gutenberg Literary Archive Foundation are tax deductible to the full extent permitted by U.S. federal laws and your state's laws.

The Foundation's business office is located at 809 North 1500 West, Salt Lake City, UT 84116, (801) 596-1887. Email contact links and up to date contact information can be found at the Foundation's website and official page at www.gutenberg.org/contact

Section 4. Information about Donations to the Project Gutenberg Literary Archive Foundation

Project Gutenberg™ depends upon and cannot survive without widespread public support and donations to carry out its mission of increasing the number of public domain and licensed works that can be freely distributed in machine-readable form accessible by the widest array of equipment including outdated equipment. Many small donations (\$1 to \$5,000) are particularly important to maintaining tax exempt status with the IRS.

The Foundation is committed to complying with the laws regulating charities and charitable donations in all 50 states of the United States. Compliance requirements are not uniform and it takes a considerable effort, much paperwork and many fees to meet and keep up with these requirements. We do not solicit donations in locations where we have not received written confirmation of compliance. To SEND DONATIONS or determine the status of compliance for any particular state visit www.gutenberg.org/donate.

While we cannot and do not solicit contributions from states where we have not met the solicitation requirements, we know of no prohibition against accepting unsolicited donations from donors in such states who approach us with offers to donate.

International donations are gratefully accepted, but we cannot make any statements concerning tax treatment of donations received from outside the United States. U.S. laws alone swamp our small staff.

Please check the Project Gutenberg web pages for current donation methods and addresses. Donations are accepted in a number of other ways including checks, online payments and credit card donations. To donate, please visit: www.gutenberg.org/donate

Section 5. General Information About Project Gutenberg™ electronic works

Professor Michael S. Hart was the originator of the Project Gutenberg™ concept of a library of electronic works that could be freely shared with anyone. For forty years, he produced and distributed Project Gutenberg™ eBooks with only a loose network of volunteer support.

Project Gutenberg™ eBooks are often created from several printed editions, all of which are confirmed as not protected by copyright in the U.S. unless a copyright notice is included. Thus, we do not necessarily keep eBooks in compliance with any particular paper edition.

Most people start at our website which has the main PG search facility: www.gutenberg.org.

This website includes information about Project Gutenberg™, including how to make donations to the Project Gutenberg Literary Archive Foundation, how to help produce our new eBooks, and how to subscribe to our email newsletter to hear about new eBooks.