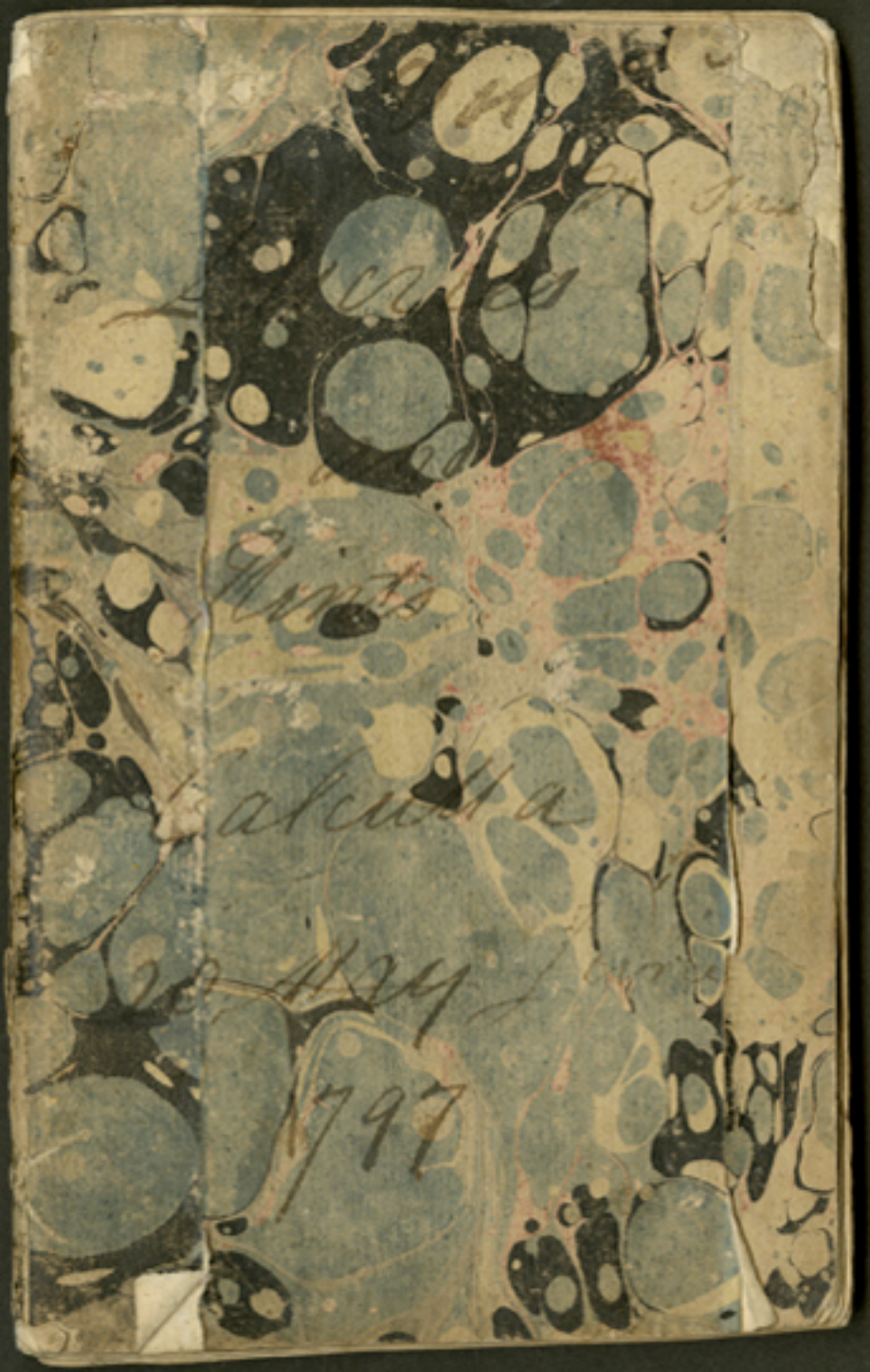


Queries
and
Hints
Vol: 2d
New Series
20th Old Series

Calcutta 28th May 1797

100. In discharging Tubes in the Nitrous air as soon as one gill of air is discharged the tubes always rise to the top — query what sort of air is discharged?

101. The following optical deception frequently takes place on first presenting the Telescope to the moon namely that all the elevated spots on the surface appear to be cavities; and all cavities assume the shape of mountains — This fallacious app: soon vanishes

102. The Spots on the Sun are supposed by Dr. Herschel to be parts of the Solid body of the Sun seen through a transparent portions of this ~~Sun~~ Atmosphere. —

103. It is supposed by the workers in Edge tools, to be impossible to weld cast steel on iron, for if they are brought to the same welding heat the steel will run; It has however been discovered lately that cast

steel at a white heat and iron at a welding heat unite completely —.

104. In the art of Soldering care must be taken to prevent the metals from being calcined; this is effected by Sal: am: borax rosin &c some other Substances — N.B. These also serve as a flux — Query what effect has a flux in the calcining of a metal?

105 The weight of the Great main of D. Thin Ankle 40 foot Resofspin from the cast was 2118. It must have lost a small quantity in Po: lishing – Its present thickness which is equal in every part is 3½ Inches

106

107 Freezing Mixture

Sal:am 5, Nitre 5	water 16	=	+10
Sal am: 5, Nitre 5			
Glauber salt 8	— 16	=	+ 4
Nitrous Am: 1	— 1	=	+ 4
Nit: am: 1 Sal. soda 1	— 1	=	−7
Glaubers S. 3 Dil. nit: a. 2		=	−3
Gl: S. 6 Sal: am. 4, Nitre 2	— 4	=	−10
Gl: Salt 6 Nit: am 5	— 4	=	−14
Phosp. Soda 9	— 4	=	−12
[illegible] 9, [illegible] am: 6	— 4	=	−21
Gl: S. 8 Mur: acid	5	=	−0
Gl: S. 5 Dil. Nitric: 4		=	+3

In the table the temp: is
50 a temp: which may in
Britain be had at all times
by means of well water —
The numbers denote the proport:
by Troy weight — one ounce of
water by wine measure correspond
with one ounce by Troy weight —
— dil: nit: acid is red fuming
acid 2 Parts and rain or distilled
water one part — N. B. The salts
must be mixed in the order of
the table, stirring one well before
the addition of the next ——
— A mixture consisting of Diluted
Nitrous Acid Phosph: Soda and

Nitrous Amm: is the most power
of all those compounded of salts
with acids, this however is not
quite equal to a mixture of snow
and Nitrous acid each at +30°
— Strength of the fuming acid used
was 1.510 — October 1808
— This Nit: acid with ~~...~~
half its weight of water to six
parts of snow sunk the Ther
from +30 to −24 that is about
eight degrees less than Nitrous acid
would have produced
— Snow in pounded ice 2 parts
com^n Salt = −5
— Snow and pounded 12, comm Salt

5 and a powder consisting of equal pts. of Sal. amm: and Nitre mixed 5 $\frac{1}{2}$ = −18

— Snow so pounded viz 12 parts Common Salt 5 parts and Nitrous Amm: in powder 5 = −25

— In all the mixtures with Salts and Acids, the Ingredients must be cooled lower, than when Snow or ice is used

+ The freezing point of Mercury = −39 as accurately ascertained as that of Water

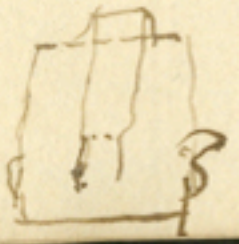
— Equal parts of dilated Vit: and and Nitrous Acid with snow or powdered ice, ingredients previously cooled to −10 = −56

— Dilated Vit: and with snow or powdered ice — cooled to −20 will produced a still greater degree of cold

— The Salts must retain all the water of Crystalli: and fresh Crystallized

— Glass Vessels best — Tin Vessels coated with melted white wax — to resist the acid

— Tin Vessel may hold about 2 pints, and the Tube 5 ounces —



108. The Base Line measured by General Roy on Romney Marsh with Glass rods, differed from measurement of the same by the steel chain only 3 Inches, tho' the base exceeds 5 miles — The latter measurement was made under the Direction of the Duke of Richmond

109. It is said that Lime mixed with Gunpowder increases its strength — It can be of use only in a third place of Lime ——

If the Powder be moist the newly burned Lime will attract the moisture from the Powder, this advantage will soon be over balanced by the moisture which it will afterwards attract from the air — Lime is incombustible —

110. The Rajah Jay Sinha succeeded to the Instantaneous of the Ancient Rajahs of Amboise in 1693

— was shown by Mahomed Shah to reform the Calendar. The new Tables he published for this purpose were called Zeej Mahomed Shahy in honour of the reigning prince By these Almanacs are constructed at Delhi and all Astronomical computations made at the present time

" from the preface to these

" Tables —

— " from an ability to comprehend the all encompassing

" benificence of his power, His

" Wisdom is an ignorance known

" who wrings the hands of

" Vexation; and in the contemplation of his exalted Majesty

" Astronomy is a Bat who can

" never arrive at the sun of

" truth: The demonstrations

" of Euclid are an imperfect

" sketch of the forms of his

" countenance; and Theorems

" of Jemshid Cashy, or Noozar

" Loose in this attempt would

" labour in vain

" — Jay Sinha found that

" all the Tables both of Mosul
" men, Hindus and Europeans
" gave results which did not
" agree with standards
— He represented it to his
" Majesty of dignity and Power
" the Sun of the Firmament
" of felicity and dominion, the
" splendour of the forehead of mu-
" jesty magnificence, the en-
" riched pearl of the sea of Sove-
" reignty, the incomparably
" brightest star of the heaven
" of Empire, whose standard is
" the sun, whose retinue the
" moon, whose name is Mars
" and his pen like Mercury
" with attendants like Venus;
" whose hand is the sky
" whose Regret is Jupiter,
" whose Sentence Saturn
" the Emperor descended from
" a long race of Kings: the
" Alexander in dignity, the
" Shadow of God, the Defender
" King Mahommed Shah
" may he ever be victorious
" in battle
— Nothing of this kind had
" been done either by the Sovereigns
" of Mahratta nor among the
" Princes of Islam since the
" time of the Martyr Prince whose

" since no farther Mirza Ulugh
" Beg to the present, a space of
" 300 years
" — Jayasinha bound the girdle
" of resolution about ~~his loins~~ the
" loins of his soul, and constructed
" here at Delhi several of the
" instruments of an Observatory
" such as had been erected at
" Samarcand agreeably to the
Musulman books
" But finding these instruments
" of brass did not come up to
" his expectation of accuracy
" on acct. of ~~their~~ the smallness
of their size, the want of division

" into minutes, the shaking
" and wearing of the axes, the
" displacement of the centres of
" the circles and the shifting
" ~~and~~ of the planes of the instru-
" ments; he concluded that
" the reason why the determi-
" nations of the Ancients such
" as Hipparchus and Ptolemy
" proved inaccurate must have
" been of this kind; he therefore
" constructed in Dar-ul-Khala-
" fet Shah-Jehanabad (Delhi)
" which is the seat of Empire
" and prosperity, instruments
" of his own invention of
stone and lime —

—"Also instruments of the
"same kind at Sewaii Jey-
"poor, Matra, Benares and
"Oujein —
— after seven years had
been spent in this Employment
he heard that about this
time Observatories had
also been constructed in
Europe — He sent to that
country several skilfull
persons along with Padre
Manuel and having
procured the new tables
which had been constructed
there thirty years before and

published under the name
of Luyyer (La Hire) as
well as all the European
tables anterior to these, and
comparing them with observations
he found in the Hires an
error in the moon's place
of half a degree, that of the
planets was not so great
— Eclipses ~~half~~ one fourth of a Gurree
(6 minutes of time) — attributed
them to the inaccuracy of
the instruments —

N.B. an error of 3' in the
moon's place would produce
6' minutes of time, there must
be a mistake respecting half

a Degree in De La Hire
to guess on was not probably
in his tables

— Instruments

Large Equatorial Dial
at Delhi of the form of A
in the Benares Ob.
Length of the gnomon or
is ——— 118.7
Elev.: = Lat - 28° 37
Base - 104, 1 Inch
Perp: Height 56.9

(Samrat Yuntur or Royal
Dial Prince of Dials)

— Don Pedro de Salvo
son of one of Jaysinha's
Astronomers is still alive
and his father had not
been dead more than
six years —

Euclids Elements, Plane
Trigonometry, with tables
of Logs. — Tracts & Conic
Sections; were all translated
in Sanscrit by order of
Jayasinha ———

— All the Observations
recorded by Tieffenthaler in
his work are of modern

date and more probably
of Europe than Hindoo
construction ———

— Jay a Sinha finished his
table in 1728 — De La Hire
published the first Edition
of his 1687 and the 2d in 1702
— It was probably the 2d Edit
which Jayasinha procured
or published 30 years after

N.B. Jayasinha
was Rajah of
Ambhere, or Jayana
gar ——

111. The Banana is the same with the plantain only smaller. The distinct obtains in the West, but not that I have heard in the East Indies —

112. Roots are the inhabitants of ~~food~~ a greater variety of sorts than grain or fruits — quere. why —

113. Dr. Percival alledges that the ancient Romans were acquainted with the mode of conveying water in Leaden pipes; but that they preferred aqueducts, because they supposed the water to receive a noxious quality from Lead and want of air — The greater Palladius, Vitruvius book 8 ch. 7 Pliny — — 31. — 6 —

114. Is it possible for the scent communicated by the musk rat, to penetrate a corked and sealed bottle of wine? Has not the smell either been given previously to the corks or empty bottle?

115 Jurisconsults in a quotation from an English Lawyer says that tho' the forging of the bill is felony, yet the forging the indorsement is not —

116. Stone henge and other remains of Antiquity would be more striking in models than in Drawings

117. A celebrated Mathematician asserts that if a vessel formed by the rotation of a Hyperbola round one of its Asymptotes, be filled with water, it and a hole be made in the bottom of it, let the hole be ever so large and the depth of the vessel ever so small, it will take an infinite time to be exhausted

— Solution — —

Since the velocity of the fluid thro' the aperture is always as the subduplicate ratio of the superincumbent height of its surface above the hole it is evident that when that height is infinitely small, the velocity must be so too, that is in effect nothing, consequently the water can never be exhausted

— Quere can any approximation to this be made in practice? —

118. The Geographical Paradoxes given in Gordon's Geog. Grammar, Cosmography &c. were first published in the Ladies Diary which was commenced in 1705 by Mr Tipper —

119. Sessa Daurond for inventing the Game of Chess —

$$\frac{2^{64}-1}{2-1}\times 1 = 18446744073709551615$$

Grains of Wheat, this divided by 640000 the No. of grains in a Bushel gives

28823037615171.1743984375

the No. of Bushels which at 3 M: [illegible] = 720575940379.279 &c the double of which is the Wt. in Cwt. then the Value divided by 1000 and the weight by 2000 give each 720575940.379 &c. for the number of horse or ship loads required

120. Query ~~does~~ is the variation of the rate of a Chronometer owing to alteration of the pend. Spring, or bal. or both, if this last be true, in what proportions —

121. — In clocks used for Astronomical purposes it will be necessary to observe the arc of vibn. which is different from that described by the pendulum when the clock keeps time, it must be corrected as follows.

If N. corr.n be expressed in seconds and the arcs in degrees then the Correction will be equal to one half of the time the ~~[illegible]~~ diff. of the squares of the given arcs and the true time are —

Ex: If a clock keeps time when the pendulum vibrates in an arc of 3°, how many seconds will it lose daily by vibrating 4°

$$4^2 - 3^2 \times \frac{3}{2} = 7 \times \frac{3}{2} = 10\frac{1}{2}$$

122. A brass rod equal in length to a second pendulum is found by experiment to expand & contract the $\frac{1}{1000}$ part of an inch for one degree of Fahrenheit and since the time are in a subduplicate ratio of the lengths of the pendulums hence $\frac{1}{1000}$ part of an inch will correspond nearly to one second = 1.° of Fahr. If 55° = Standard in England

from 30° to 90° =
60.th Slow daily —
— Gave according to that
proportion to the balance
of a watch affected by heat
and cold —

123. The fundamental principles
can never be ascertained —
The expansion of metals varies
so much even in the same
bar ~~rod~~, by different hammering
cooling &c that it can seldom
be accurately ascertained —

124. The expansion and con-
traction of straight grained
fir by heat and cold is 20
Inch. that it may be used
in pendulum rods. It should
not be baked, varnished &c
but simply rubbed over
with wax. Mr Woodman found
the iron is much lengthened
but not annihilated —

125. Paste is rendered more
tenacious by mixing a
fourth, fifth or sixth part of
the weight of the flower of pow-
dered resin, such as that used
by bookbinders, paper hangers &c
It may be rendered still stronger
by adding gum Arabic or
any kind of size —

126 In the Grotto called the Cave of St Paul in Malta a magnificent church is erected. The alta[r] piece is ornamented with the story of the Viper, over the painting is the following inscription

Vipera ignis acta calore frustrans Pauli
Manum invadit; is insulae benedicens
Anguibus et herbis ademit omne virus

MDCV

— The Church built over St Paul's grave near rome is said to be in existence at this day — Calmet's Dict.

127. A ready Orator it is said pronounces English at the rate of about two words [per] Second

128. The action of the Eolipel in blowing a fire depends solely on the atmosphere air which it drives before it into the fuel; for when steam alone is employed, the instrument produces no effect in animating the fire — Dr Dowbiggin

129. The Greeks were equally unacquainted with the use and abuse of Chemistry —

— Pliny and Seneca are both silent on the subject of transmutation of the base metals into gold. Had Alchemy been known at that time, the former writer would undoubtedly have mentioned it —

— The persecution of Diocletian in the 4th century, his ordering the books of the Alchemists to be burned is the first authentic event in the history of Alchemy ——

130. It is a leading principle in Buffon's system to reduce as much as possible the number of species, by supposing perpetual varieties generated by climate, domestication, and other incidental causes — His reasoning in this way is almost always delusory, his principles gratuitous ——

131. In all countries except Britain, verse is always read with a fractional chant between singing and speaking — It is certain that the Greeks and Romans recited their verse in the same manner — The Hindus read both prose and verse in this way —

132 Mr. Garrick first intro-
duced on the English Stage
the method of reading blank
verse like prose without
modulation or cadence —
— When the subject is
pathetic, and the sentences
short, this mode is perhaps
the best

133. We may describe the
Characters, but we can never
paint the manners of foreigners

134. The universality of belief
is a presumption, but not
a sufficient proof of the truth
of an opinion — E. G.

the Earth's rest — Heaven above
and Hell below — Thunder the
voice of Gods &c. &c. —

135. A moral sense has been
frequently annexed to expressions
in ancient authors which the
writer perhaps never thought
of — Story of Circe the Enchantress
in the Odyssey — Words
medio tutissimus ibis &c —

136. To purify ether —
Fill about a quarter of
a strong bottle with com-
mon ether, pour on it about
double the quantity of water;
then stop the bottle and
shake it in order to mix

the ether and water. Invert the bottle and keep it motionless in that position for three or four minutes, when the Ether will be found ascending in the water, from the water nearly all out, very gently, and repeat this process three or four times. The Ether will now be found exceeding pure and will dissolve elastic gum which it would not do at first. The quantity of Ether is reduced by this process to a third a fourth part of the quantity —

Caoutchouc

137. When one metal is precipitated from its solution in an acid by another metal. The precipitate is always in a metallic state

138. It appears at first view, that an article of so low price as salt should yet furnish one of the most lucrative employments under most States — China — India Turkey afford proof of this the managers of the salt business have

139. To discover in a solution of salt, whether it is Glauber or Epsom salt — Fixed Alkali occasions a copious precipitate with the latter, but produces no change on the former —

140. Metaphor should be confined solely to Eloquence and Poetry, & should never be made use of in Philosophy

141. Opium dissolved in an aqueous infusion of Turmeric root is the best test for Alkalies —

142. Different kinds of air which have no affinity to each other when one kind will not separate, notwithstanding any difference of specific gravity such is the case with inflam.ble and oxygene air and even of inflam.ble and fixed air — Without this property our Atmosphere would soon be decomposed

143. Inflam.ble air will not mix with and alkaline air —

144. The Gases receive different degrees of Expansion from the

same degree of heat; oxygene gas the least, and alkaline air the most —

145 The organic acid air produced in making the acid is heavier than atmospheric air extinguishes a candle with a blue flame, and water absorbs 360 times it bulk of this air, and thereby forms the strongest spirit of salt. It absorbs one sixth more than its bulk of alkaline air, and with it forms common sal: ammoniac —

146 Nitrous and nitrous all metallic substances except Gold and Platina,

and in the Solution Nitrous air is produced

147. All the Nitrates are deliquescent

148 All the Sulphates Crystallize and do not deliquesce —

149. The nitrous acid, tho usually denominated a weaker acid than the Nitrous, yet it will take Silver, Lead or Mercury from their union with the nitrous — Pure a Solution of these metals in the Nitrous and become a part of the crystals of the nitrates in water and other fluids —

150. Every kind of wood when distilled or burned yields a peculiar acid; and it is the Potash of this and that is so offensive to the eyes in the smoke of wood —

151 If a substance emitting heat without light be placed in the focus of a concave mirror it will raise a Thermometer placed in the focus of another concave mirror parallel to the first; if ice be used the Thermometer will fall —

152. Sir Isaac Newton predicted not only the inconbustability of the Diamond, but also the existence of a combustible principle in water.

153. Besides oxygen and azotic gas, Atmospheric air contains several other substances foreign to it, but these altogether do not amount to the one hundredth part of the whole —

154. Phosphorus is used for the purpose of Endiometry; by burning it in a Cylindric Vessel till it is extinguished the diminution of the air points out the quantity of Vital air absorbed —

155 The colder the air the more does it promote combustion, because a greater quantity rushes to the fire —

156. Cast iron becomes malleable by being exposed to a blast of air when nearly melting. The consequence is a discharge of inflamable air, and the separation of a ligneous substance, which when consumed is called forging cinder. The iron generally loses one fourth of its weight in this process — Crude iron contains much plumbago — Pig

157. Iron acquires some additional weight when by being converted into Steel, and when

dissolved in acid yields
more plumbago —
— Steel has somewhat
less specific gravity than
iron — When heated in
contact with earthy matter
is reduced to iron again —

158. The Ancients had a
method of giving copper
a ~~cer~~ considerable degree
of hardness, so that horses
were shod with it and
swords with a tolerable
edge made before the dis-
covery of iron — that is
before the dis^y of making mal:
iron from cast 2^d vol: 277 —
+ see vol: 21

Nitric

159. If Nitrous acid be
made to pass thro' a
red hot earthen tube, it
will be decomposed and
the greatest part of it
be converted into oxygen
gas

160. The acid of Borax or
Sedative Salt. is obtain'd
by putting Sul: acid to
a solution of borax in
water — in form of white
flakes which require
fifty times their w^t.
of water to dissolve them —

161. The acid of Tartar may be obtained by boiling cream of Tartar in four or six times its weight of water and then putting Sulph: acid to it. This unites with the pot ash and forms Sulphat of Potash and the pure acid of Tartar may be procured in Crystals by evapn. and filtration; equal to half the cream of Tartar used

162 The rays of light are differently inflected towards or from the contiguous body. Hence

coloured
streaks of light appear both within the shadow and on the outside of it, the red rays being inflected at the greatest distance from the body

163. Part of the light which enters bodies is retained within them and produces no sensation; but so loosely in some kinds of bodies, that a small degree of heat is sufficient to expel it again, so as to render the body visible in the dark. This is a strong argument for the materiality of light
—Bolognian Stone—Canton Comp[osition]

164. Light imparts colour to the human skin by means of the sun under Tanning—copper colour of the North American—black colour of the negroes

165. Ice at 32° absorbs 112° of heat in melting or such a quantity of caloric as would raise a body of water of equal bulk with itself to 144.
or 144—

166. The Phosphoric acid may be obtained either by dissolving phosphorus in the Nit: or Nitric acid the last is best; or by simple slow combustion in atmospheric air or better in pure air—

167. Green copperas ~~coloured~~ becomes red by calcination, it is then called Colcothar and used in polishing glass—

168. Mercury triturated with Sulphur forms Ethiops mineral— A more intimate combination by means of heat produces Cinnabar; this reduced to powder is vermillion— Sulphur constitutes about one third of the Cinnabar

169. The purest Potash is got by the deflagation of Nitre by Charcoal—

170. The new process for making Salt Ammoniac—To the Liquor from distilling bones Vol: acid is added Com: Salt: A Double affinity takes place Vol: a: and Mineral alk: of the Salt form Glauber's Marine acid with Vol: alk: forms Sal Ammoniac—

Ch. Dec. 1797