|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Ol. Vit. | Water. | Specific Gravity.  \_ A. | | Cond. |
| Obſerved. | Calculated. |
| 10 | X O | 1,877 | 1.877 | .00 |
|  | 4 | 1,644 | 1,501 | ,143 |
|  | 8 | 1,474 | 1,350 | ,124 |
|  | 12 | 1,381 | 1,269 | ,112 |
|  | 16 | 1,320 | 1,219 | ,101 |
|  | 20 | 1,274 | 1,184 | ,090 |
|  | 24 | 1,243 | 1,159 | ,084 |
|  | 28 | 1,2 I I | 1,140 | ,071 |
|  | 32 | 1,195 | 1,125 | ,070 |
|  | 36 | 1,183 | 1,113 | ,070 |
|  | 40 | 1,172 | 1,103 | ,070 |
|  | 50 | 1,148 | 1,084 | ,064 |
|  | 60 | 1,128 | 1,069 | ,059 |

Here is obſerved a much greater condenſation than in the mixture of alcohol and water. But we cannot aſſign the proportion of ingredients which produces the greateſt condenſation ; becauſe we cannot, in any caſe, say what is the proportion of the ſaline and watery in­gredients. The ſtrongeſt oil of vitriol is already a wa­tery ſolution; and it is by a conſiderable and uncertain detour that Mr Kirwan has aſſigned the proportion of 612 and 388 nearly. If this be the true ratio, it is un­like every other ſolution that we are acquainted with ; for in all ſolutions of ſalts, the ſalt occupies leſs room in its liquid form than it did when ſolid ; and here it would be greatly the reverſe.

This ſolution is remarkable alſo for the copious emer­gence of heat in its dilutions with more water. This has been aſcribed to the great ſuperiority of water in its capacity for heat ; but there are facts which render this very doubtful. A veſſel of water, and another of oil of vitriol, being brought ſrom a cold room into a warm one, they both imbibe heat, and riſe in their tem­perature ; and the water employs nearly the ſame time to attain the temperature of the room.

Aquafortis or nitrous acid is another fluid very much employed in commerce ; ſo that it is of importance to aſcertain the relation between its ſaline ſtrength and its ſpecific gravity. We owe alſo to Mr Kirwan a table for this purpoſe.

The moſt concentrated ſtate into which it can easily be brought is ſuch, that 1000 grains of it conſiſts of 563 grains of water and 437 of dry acid. In this ſtate its ſpecific gravity is 1,557. Let this be called *nitrous add.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Nitr. Ac. | Water. | | | |
| 10 | X O | 1,557 | 1,557 |  |
|  | I | 1,474 | 1,474 |  |
|  | 6 | 1,350 | 1,273 | 0,077 |
|  | 11 | 1,269 | 1,191 | o,078 |
|  | 16 | 1,214. | 1,147 | 0,067 |
|  | 21 | 1,175 | 1,120 | 0,055 |
|  | 26 | 1,151 | 1,101 | 0,050 |
|  | 31 | 1,127 | 1,087 | 0,040 |
|  | 36 | 1,106 | 1,077 | c,029 |
|  | 41 | 1,086 | 1,068 | 0,018 |

There is not the ſame uniformity in the denſities of this acid in its different ſtates of dilution. This ſeems owing to the variable proportion of the deleterious and vital air which compose this acid. It is more denſe in

proportion as it contains more of the latter ingre­dient.

The proportions of the aeriform ingredients of the muriatic acid are ſo very variable, and ſo little under our command, that we cannot frame tables of its ſpecific gravity which would enable us to judge of its ſtrength.

It is a general property of theſe acids, that they are more expanſible by heat as they are more concentrated.

There is another claſs of fluids which it would be of great conſequence to reduce to ſome rules with reſpect to ſpecific gravity, namely, the ſolutions oſ ſalts, gums, and reſins. It is intereſting to the philoſopher to know in what manner ſalts are contained in theſe watery ſo­lutions, and to diſcover the relation between their ſtrength and denſity ; and to the man of buſineſs it would be a moſt deſirable thing to have a criterion of the quantity of ſalt in any brine, or of extractible mat­ter in a decoction. It would be equally deſirable to thoſe who are to purchaſe them as to thoſe who manu­facture or employ them. Perhaps we might aſcertain in this way the value of ſugar, depending on the quantity of ſweetening matter which it contains ; a thing which at preſent reſts on the vague determina­tion of the eye or palate. It would therefore be doing a great ſervice to the public, if ſome intelligent perſon would undertake a train of experiments with this view. Accuracy alone is required ; and it may be left to the philoſophers to compare the facts, and draw the conſe­quences reſpecting the internal arrangement of the par­ticles.

One circumſtance in the ſolution of ſalts is very ge­neral ; and we are inclined, for ſerious reaſons, to think it univerſal: this is a diminution of bulk. This indeed in ſome ſalts is inconſiderable. Sedative ſalt, for in­ſtance, hardly ſhows any diminution, and might be con­ſidered as an exception, were it not the ſingle inſtance. This circumſtance, and ſome conſiderations connected with our notions of this kind of ſolution, diſpoſe us to think that this ſalt differs in contraction from others only in degree, and that there is ſome, though it was not ſenſible, in the experiments hitherto made.

Theſe experiments, indeed, have not been numerous. Thoſe of Mr Achard of Berlin, and of Dr Richard Watſon of Cambridge, are perhaps the only ones of which we have a deſcriptive narration, by which we can judge of the validity of the inferences drawn from them. The ſubject is not ſuſceptible of much accuracy ; for salts in their ſolid form are ſeldom free from cavities and ſhivery interſtices, which do not admit the water on their firſt immerſion, and thereby appear of greater bulk when we attempt to meaſure their ſpecific gravity by weighing them in fluids which do not diſſolve them, ſuch as ſpirits of turpentine. They alſo attach to them­ſelves, with conſiderable tenacity, a quantity of atmoſpheric air, which merely adheres, but makes no part of their compoſition. This eſcapes in the act of ſolution, being ſet at liberty by the ſtronger affinity of the wa­ter. Sal gem, however, and a few others, may be very accurately meaſured; and in theſe inſtances the de­gree of contraction is very conſtant.

The following experiments of Dr Watſon appear to us the moſt inſtructive as to this circumſtance. A glaſs veſſel was uſed, having a ſlender cylindrical neck, and holding 67 ounces of pure water when filled to a cer­-