tain mark. The neck above this mark had a ſcale of equal parts pasted on it. It was filled to the mark with water. Twenty-four penny weights of ſalt were thrown into it as ſpeedily as poſſible, and the bulk of the ſalt was meaſured by the elevation of the water. Every thing was attended to which could retard the immediate ſolution, that the error ariſing from the ſolution of the firſt particles, before the reſt could be put in, might be as ſmall as poſſible ; and in order that both the ab­ſolute bulk and its variations might be obtained by ſome known ſcale, 24 pennyweights of water were put in. This raiſed the ſurface 58 parts of the ſcale. Now we know exactly the bulk of 24 pennyweights of pure wa­ter. lt is 2,275 cubic inches ; and thus we obtain every thing in abſolute meaſures : And by comparing the bulk of each ſalt, both at its firſt immerſion and af­ter its complete ſolution, we obtain its ſpecific gravity, and the change made on it in paſſing from a ſolid to a fluid form. The following table is an abſtract of theſe experiments. The firſt column of numbers is the eleva­tion of the ſurface immediately after immerſion ; the ſecond gives the elevation when the ſalt is completely diſſolved ; and the third and fourth columns are the ſpe­cific gravities of the ſalts in theſe two ſtates.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Twenty-four Pennyweights. | I. | II. | III. | IV. |
| Water  Glauber’s ſalt | 58  42 | 36 | 1,380 | 1,611 |
| Mild volatile alkali | 40 | 33 | 1,450 | 1,787 |
| Sal ammoniac | 40 | 39 | **1,**450 | 1,487 |
| Refined white ſugar | 39 | 36 | 1,487 | 1,611 |
| Courſe brown ſugar | 39 | 36 | 1,487 | 1,611 |
| White ſugarcandy | 37 | 36 | 1,567 | 1,611 |
| Lymington Glauber’s ſalt | 35 | 29 | 1,657 | 2,000 |
| Terra foliata tartari | 37 | 3° | 1,567 | 1,933 |
| Rochelle ſalt | 33’ | 28 | 1,757 | 2,071 |
| Alum not quite diſſolved | 33 | 28 | 1,757 | 2,061 |
| Borax not one-half diſſolved in two days | 33 | 31 | 1,757 |  |
| Green vitriol | 32 | 26 | 1,812 | 2,230 |
| White vitriol | 30 | 24 | 1,933 | 2,416 |
| Nitre | 30 | 21 | 1,933 | 2,766 |
| Sal gem from Northwich | 2? | 17 | 2,143 | 3,411 |
| Blue vitriol | 26 | 20 | 2,230 | 2,900 |
| Pearl aſhes | 25 | 10 | 2,320 | 5,800 |
| Tart. vitriolatus | 22 | **II** | 2,636 | 5,272 |
| Green vitriol calcined **to** white | 22 | **I I** | 2,636 | 5,272 |
| Dry ſalt of tartar | 2 I | 13 | 2,761 | 4,461 |
| Basket ſea-ſalt | 19 | 15 | 3,052 | 3,866 |
| Corroſive ſublimate | 14 | 10 | 4,142 | 5,800 |
| Turbith mineral | 9 | 0 | 6,444 |

The inspection of this liſt naturally ſuggeſts two ſtates of the caſe as particularly intereſting to the philoſopher studying the theory of ſolution. The firſt ſtate is when the lixivium approaches to ſaturation. In the very point of saturation any addition of ſalt retains its bulk un­changed. In diluted brines, we ſhall ſee that the denſity of the fluid ſalt is greater, and gradually diminiſhes as we add more ſalt. It is an important queſtion, Whether this diminution goes on continually, till the fluid denſity of the ſalt is the ſame with its ſolid denſity ? or, Whether there **is** an abrupt paſſage from ſome

degree of the **one to the** fixed degree of **the other, as** we obſerve in the freezing of iron, the ſetting of ſtucco, and ſome other inſtances ?

The other intereſting ſtate is that of extreme dilu­tion, when the differences between the ſucceſſive densities bear a great proportion to the denſities themſelves, and thus enable the mathematician to aſcertain with ſome preciſion the variations of corpuſcular force, in conſequence of a variation of diſtance between the par­ticles. The ſketch of an inveſtigation of this important queſtion given by Boſcovich, in his Theory of Natural Philoſophy, is very promiſing, and ſhould incite the philoſophical chemiſt to the ſtudy. The firſt thing to be done is to compare the law of ſpecific gravity ; that is, the relation between the ſpecific gravity and quan­tity of ſalt held in ſolution.

Wiſhing to make this work as uſeful as poſſible, we have ſearched for experiments, and trains of experi­ments, on the denſity of the many brines which make important articles of commerce ; but we were morti­fied by the ſcantineſs of the information, and diſappoint­ed in our hopes of being able to combine the detached obſervations, ſuited to the immediate views of their au­thors, in ſuch a manner as to deduce from them ſcales (as they may be called) of their ſtrength. We rarely found theſe detached obſervations attended with cir­cumſtances which would connect them with others ; and there was frequently ſuch a diſcrepancy, nay op­poſition, in ſerieſes of experiments made for aſcertaining the relation between the denſity and the ſtrength, that we could not obtain general principles which enable us to conſtruct tables of ſtrength *à priori.*

Mr Lambert, one of the firſt mathematicians and philoſophers of Europe, in **a** diſſertation in the Berlin Memoirs (1762), gives a narration of experiments on the brines of common ſalt, from which he deduces a very great condensation, which he attributes to an abſorption in the weak brines of the salt, or a lodgement of its par­ticles in the interſtſees of the particles oſ water. Mr Achard of the ſame academy, in 1785, gives a very great liſt of experiments on the bulks of various brines, made in a different way, which ſhow no ſuch introſusception ; and Dr Watson, formerly regius profeſſor of chemiſtry at Cambridge, and now biſhop of Landaff, thinks this confirmed by experiments which he narrates in his Chemical Eſſays. We ſee great reaſon for heſitating our aſſent to either side, and do not think the experiments deciſive. We incline to Mr Lambert’s opinion ; for this reaſon, that in the ſuc­ceſſive dilutions of oil of vitriol and aquafortis there is **a** moſt evident and remarkable condenſation. Now what are these but brines, of which we have not been able to get the ſaline ingredient in a ſeparate form ? The experiments of Mr Achard and Dr Watſon were made in ſuch a way that a ſingle grain in the meaſurement bore too great a proportion to the whole change of specific gravity. At the ſame time, ſome of Dr Watſon’s are ſo ſimple in their nature that it is very difficult to with hold the aſſent.

In this ſtate of uncertainty, in **a** ſubject which ſeems to us to be of public importance, we thought it our duty to undertake a train of experiments to which recourſe may always be had. Works like this are ſeldom conſidered as ſources of original information ; and it is thought sufficient when the know