We ſee the ſame augmentation of the denſity of the ſalt in the diluted brines here as in the caſe of common ſalt. Thus a brine, of which the cubic foot weighs 1482 ounces, or which has the ſpecific gravity 1,482, contains 800 ounces of dry alkali and 682 of water. Therefore, if we ſuppoſe the denſity of the water un­changed, there remains the bulk of 318 ounces of water to receive 840 ounces of ſalt: its denſity is therefore 800/318, = 2,512 nearly. But in the brine whoſe weight *per* foot is only 1016 there are 20 ounces of ſalt, and there­fore 996 of water ; and there is only four ounce-meaſures of water, that is, the bulk of four ounces of water, to receive 20 ounces of ſalt. Its ſpecific gravity therefore is 20/4, ≡ 5, almoſt twice as great as in the ſtrong brine. Accordingly Mr Achard is diſpoſed to admit the abſorption (as it is careleſsly termed) in the caſe of ſal tart. But it is a general (we think an univerſal) fact in the ſolution of ſalts. It muſt be carefully diſtinguiſhed from the firſt contraction of bulk which ſalts undergo in passing from a ſolid to a fluid form. The contraction now under conſideration is analogous to the contraction of oil of virtriol when diluted with water ; for oil of vitriol muſt be conſidered as a very ſtrong brine which we cannot dephlegmate by diſtillation, and therefore cannot obtain the dry ſaline ingredient in a separate form, ſo as to obſerve its ſolid denſity, and ſay how much it contracts in firſt becoming fluid. The way of conceiving the first contraction in the act of ſolution as a lodging of the particles of the one ingredient on the interſtices of the other, “ *ou ils ſe nichent, en augmentant le poids ſans affecter le volume de la ſaumure,"* as Eller and Lambert expreſs themſelves, is impoſſible here, when both are fluids. Indeed it is but a ſlovenly way of thinking in either caſe, and ſhould be avoided, becauſe inadvertent perſons are apt to uſe as a phyſical principle what is merely a mode of ſpeech.

We learn from the table, that a hydrometer with equidiſtant diviſions on a cylindrical or priſmatical stem is still more erroneous than in the brines of common ſalt.

We learn from the experiments of Kirwan, Lavoisier, and others, that dry ſalt of tartar contains about 1/4th of its weight of fixed air. In many applications of this ſalt to the purpoſes of manufacture, this ingredient is of no uſe. In ſome it is hurtful, and muſt be abstract­ed by lime. Soap-maker’s ley conſiſts of the pure alka­line ſalt dissolved in water. It is therefore of impor­tance to aſcertain its quantity by means of the ſpecific gravity of the brine. For this purpoſe, we took a ley of ſal tart whoſe ſpecific gravity was 1,20417, con­taining 314 oz. of mild alkali in a cubic foot of ley, and we rendered it nearly cauſtic by lime. The ſpecific gra­vity was then 1,1897. This is a very unexpected reſult. Nothing is employed with more ſucceſs than quick-lime for dephlegmating any watery fluid. We ſhould rather have expected an increaſe of ſpecific gravity by the abſtraction of ſome of the water of the menſtruum, and perhaps the water of the cryſtallization, and the aerial part of the ſalt. But we muſt aſcribe this to the great denſity in which the fixed air exiſts in the mild alkali.

It is unneceſſary to give ſimilar tables for all the ſalts, unleſs we were writing a diſſertation on the theory of their ſolution. We ſhall only obſerve, that we examined with particular attention ſal ammoniac, becauſe Mr Achard, who denies what is called the abſorption of ſalts, finds himſelf obliged to allow ſomething like it in this ſalt. It does not, however, differ from thoſe of which we have given an account in detail in any other reſpect than this, that the changes of fluid denſity are much leſs than in others (inſtead of being greater, as Achard’s experiments seem to indicate) in all brines of moderate ſtrength. But in the very weak brines there is indeed a remarkable difference ; and if we have not committed an error in our examination, the addition of one part of ſal ammoniac to 64 of water occupies leſs room than the water alone. We think that we have met with this as an accidental remark by ſome author, whoſe work we do not recollect. But we do not choose to rest ſo much on our form of the experiment in ſuch weak brines. The following mixtures will abundantly ſerve for conſtructing the table of its ſtrength : Sal ammoniac = 960 grains was diſſolved in 3506 grains of water, making a brine of 4466 grains. A phial which held 1600 grains water held 1698 of this brine. It contained 1698x960/4460, or 365 grains of ſalt. The ſpecific gravity was 1690/1600,= 1061, and the cubic foot weighed 1061 ounces. It alſo contained1061x365/1698, or 228 ounces of ſalt. By repeated abſtraction of brine, and replacing with water, we had the following ſeries :

|  |  |  |  |
| --- | --- | --- | --- |
| Series. | Brine. | Sp. Gr. | Oz. Salt in  Cub. F. |
| Weight of brine, | 1st, 1698 | 1,061 | 228 |
| After taking out 1/4, | *2d,* 1676 | 1,048 | 171 |
| After taking out 1/3, | 3d, 1653 | 1,033 | 114 |
| After taking out 1/2, | *4th,* 1630 | 1,019 | 57 |
| After taking out 1/2, | 5th, 16l6 | 1,010 | 281/2 |
| **1/2** | *6th,* 1610 | 1,0063 | 141/4 |
| **1/2** | 7th, 1605 | 1,0038 | 71/3 |

This ſeries is extremely regular, and the progreſs of denſity may be confidently deduced from it.

From the whole of this diſquiſition on the relation be­tween the ſpecific gravities of brines and the quantities of ſalt contained, we ſee in general that it may be gueſſed at, with a uſeful degree of preciſion, from the denſity or ſpe­cific gravity of ſaturated ſolutions. We therefore conclude with a list of the ſpecific gravities of ſeveral ſatu­rated ſolutions, made with great care by the bishop of Landaff.—Thetemperaturewas 42⁰. The first numerical column is the denſity of ſaturated brine, and the next is the denſity of a brine conſiſting of 12 parts (by weight) of water and one of ſalt. From this may be inferred the quantity in the ſaturated ſolution, and from this again may be inferred the quantity correſponding to in­ferior denſities.

|  |  |  |
| --- | --- | --- |
| Borax, | **1,010** |  |
| Cor. Sublim. | 1,037 |  |
| Alum, | 1,033 |  |
| Glaub. Salt, | 1,054 | 1,029 |
| Common Salt, | 1,198 | 1,059 |
| Sal. cath. amar. | 1,232 | 1,039 |
| Sal ammon. | 1,072 | 1,026 |
| Vol. alk. mite, | 1,087 |  |
| Nitre, | 1,095 | 1,050 |
| Rochelle ſalt, | 1,114 |  |
| Blue vitriol, | 1,150 | 1,052 |
| Green vitriol, | 1,157 | 1,043 |
| White vitriol, | 1,386 | 1,045 |
| Pearl aſh, | 1,534 |  |