cork is fixed between the parallel legs of the syphon to sustain it, and to serve as a point by which the whole is steadily suspended. For temperatures above the boiling point, the part of the syphon under E is evidently superfluous, merely containing in its two legs a useless weight of equipoised mercury. Accordingly, for high heats, the apparatus, Figs. 16 or 17, is employed, and the same method of proce

dure is adopted ; the ap

erture at O, Fig. 17, ad

mits the bulb of the ther

mometer, which rests as

usual on *l'.* The recur

ved part of the tube is

filled with mercury, and

then a little liquid is

passed through it to the

sealed end. Heat is now

applied by an argand

flame to the bottom of

C, which is filled with oil

or water, and the tem

perature is kept steadily

at 212° for some mi

nutes. Then a few drops

of quicksilver may be re

quired to be added to D',

till L and *l'* be in the

same horizontal plane.

The further conduct of

the experiment differs in

no respect from what has

been already described—

the liquid in C is progressively heated, and at each stage mercury is progressively added over L to restore the initial level or volume at *l',* by equipoising the progressive elas ticity. The column above L being measured, represents the succession of elastic forces: when this column is wished to extend very high, the vertical tube requires to be placed for support in the groove of a long wooden prism.

“ The height of the column in some of my experiments being nearly twelve feet, it became necessary to employ a ladder to reach its top. I found it to be convenient, in this case, after observing that the column of vapour had attained its primitive magnitude, to note down the temperature with the altitude of the column, then immediately to pour in a measured quantity of mercury nearly equal to three vertical inches, and to wait till the slow progress of the heating again brought the vapour in equilibrio with this new pressure, which at first had pushed the mercury within the platina ring at *l.* When the lower surface of the mercury was again a tangent to this ring, the temperature and altitude were both instantly observed.

“ This mode of conducting the process will account for the experimental temperatures being very often odd and fractional numbers. I present them to the public, as they were recorded on the instant in that particular repetition of the experiment which I consider most entitled to confidence. To trim and fashion the results into an orderly looking series, would have been an easy task ; but, in my opinion, this is a species of deception very injurious to the cause of science, and a deviation from the rigid truth of observation, which ought never to be made for any hypo thesis : we shall afterwards have ample opportunities of exposing the fallacy of such premature geometrical refinements.

The thermometers were constructed by Creighton with his well-known nicety, and the divisions were read off with a lens, so that 1/10th of a degree could be distinguished. After bestowing the utmost pains in repeating the experi ments, during a period of nearly two months, I found that the only way of removing the little discrepancies which crept in between contiguous measures, was to adopt the astronomical plan of multiplying observations, and deduc­ing truth from the mean. It is essential to heat with extreme slowness and circumspection the vessels A, B, C. One repetition of the experiment occupies on an average seven hours.

“ The apparatus employed in obtaining these results, has

the peculiar advantage, over all others, that the mercurial column is never heated. It is the concurrent opinion of all chemical philosophers, that caloric travels downwards in liquids with extreme slowness and difficulty. Indeed, Count Rumford’s experiments led him to infer, that heat could not descend in fluids at all.

“ It is evident that, in my constructions, figures 15, 16, and 17, only that small portion of quicksilver within the

vessels A, B, and C, will be affected by the heat, but the measuring column is beyond the reach of its influence.”

The Elastic Force of the Vapour of Water in inches of Mercury, obtained from Experiments by Dr Ure.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Temp. | Force. | Temp. | Force. | Temp. | Force. | Temp. | Force. | Temp. | Force. | Temp. | Force. |
| 24 | 0∙170 | 115° | 2∙820 | 195° | 21∙100 | 242» | 53∙600 | 270» | 86∙300 | 295·6° | 130∙400 |
| 32 | 0∙200 | 120 | 3∙300 | 200 | 23∙600 | 245 | 56∙340 | 271∙2 | 88 000 | 295 | 129·000 |
| 40 | 0250 | 125 | 3∙830 | 205 | 25∙900 | 245∙8 | 57∙100 | 273∙7 | 91∙200 | 297∙1 | 133∙900 |
| 50 | 0∙360 | 130 | 4∙366 | 210 | 28∙880 | 248∙5 | 60∙400 | 275 | 93∙480 | 298∙8 | 137∙400 |
| 55 | 0∙416 | 135 | 5∙070 | 212 | 30000 | 250 | 61∙900 | 275∙7 | 94∙600 | 300 | 139700 |
| 60 | 0∙516 | 140 | 5∙770 | 216∙6 | 33∙400 | 251∙6 | 63∙500 | 277∙9 | 97∙800 | 300∙6 | 140·900 |
| 65 | 0∙630 | 145 | 6∙600 | 220 | 35∙540 | 254∙5 | 66∙700 | 279.5 | 101∙600 | 302 | 144∙300 |
| 70 | 0∙726 | 150 | 7∙530 | 221∙6 | 36∙700 | 255 | 67.250 | 280 | 101∙900 | 303∙8 | 147∙700 |
| 75 | 0∙860 | 155 | 8∙500 | 225 | 39∙110 | 257∙5 | 69∙800 | 281∙8 | 104∙400 | 305 | 150∙560 |
| 80 | 1∙010 | 160 | 9∙600 | 226∙3 | 40∙100 | 260 | 72∙300 | 283∙8 | 107·700 | 306∙8 | 154∙400 |
| 85 | 1∙170 | 165 | 10∙800 | 230 | 43∙100 | 260∙4 | 72∙800 | 285∙2 | 112∙200 | 308 | 157∙700 |
| 90 | 1360 | 170 | 12∙050 | 230∙5 | 43∙500 | 262∙8 | 75∙900 | 287∙2 | 114∙800 | 310 | 161∙300 |
| 95 | 1∙640 | 175 | 13∙550 | 234∙5 | 46∙800 | 264∙9 | 77∙900 | 289 | 118·200 | 311∙4 | 164800 |
| 100 | 1∙860 | 180 | 15∙160 | 235 | 47∙220 | 265 | 78∙040 | 290 | 120∙150 | 312 | 167·000 |
| 105 | 2∙100 | 185 | 16∙900 | 238∙5 | 50∙300 | 267 | 81∙900 | 292∙3 | 123∙100 |  |  |
| 110 | 2∙456 | 190 | 19·000 | 240 | 51∙700 | 269 | 84∙900 | 294 | 126∙700 | 312 | 1655 |

31. A senes of experiments on high-pressure steam was subsequently made by Mr Philip Taylor, but he has not described his apparatus. A similar series was also made by Professor Arsberger of Vienna. As their results may be useful for comparison, we have united them in the following table :—