2.587711, and multiply the remainder by 771307; the product is the logarithm of the pressure in decimal parts of an atmosphere ; which, if multiplied by 15. will give pounds on the square inch, and by 30. inches of mercury.

To find the temperature at which steam will have a given elastic force less than that of the atmosphere—

*Rule.* Find the logarithm of the pressure in decimal parts of an atmosphere, multiply it by 0.12965, add to the product 2.5877110 ; the sum is the logarithm of the temperature which will be expressed in degrees of Fahrenheit’s scale, if 175. be subtracted from it.

*Example.* To find the pressure of steam at 175°.

To 170°

Add 175°

The sum is 345°, of which the log. 2.5378191 subtract 2.5877110

the remainder 1.9501081 multiplied by 7∙7l307

6.6507567

6650756

95010

28503

6650

—(771307)

The next No. is 0.412837, its log. 1.6157786 30

12.384 inches of mercury is the pressure ; being 17.616 inches of mer. below the atmos.

30.000

By these rules the following table is calculated.

*Table of the Elastic Force of Vapour in inches of Mer­cury, at different temperatures, according to our For­mulæ* S2 *below* 212° *and* T2 *above it.*

|  |  |  |  |
| --- | --- | --- | --- |
| 0° 0.07 | 62° 0.68 | 1 96° 1.89 | 130° 4.78 |
| 10 0.10 | 63 0.70 | 97 196 | 131 4.91 |
| 20 0.15 | 64 0.72 | 98 2.01 | 132 5 03 |
| 30 0.22 | 65 0.74 | 99 2.08 | 133 5.15 |
| ‘32 0.24 | 66 0.77 | 100 2.15 | 134 5.28 |
| 33 0.25 | 67 0.80 | 101 2.21 | 135 5.41 |
| 34 0.26 | 68 0.82 | 102 2.28 | 136 5.55 |
| 35 0 27 | 69 0.85 | 103 2.34 | 137 5.70 |
| 36 0.28 | 70 0.88 | 104 2.41 | 138 5.84 |
| 37 0.29 | 71 0.91 | 105 2.48 | 139 5.98 |
| 38 0.30 | 72 0.94 | 106 2.55 | 140 6.13 |
| 39 0.31 | 73 0.97 | 107 2.62 | 141 6.29 |
| 40 0.32 | 74 1.00 | 108 2.69 | 142 6.45 |
| 41 0.33 | 75 1.03 | 109 2.76 | 143 6.61 |
| 42 0.34 | 76 1.06 | 110 2.83 | 144 6.76 |
| 43 0.35 | 77 1.09 | 111 2.91 | 145 6.92 |
| 44 0.37 | 78 1.12 | 112 2.98 | 146 7.08 |
| 4.5 0.38 | 79 1.16 | 113 3.08 | 147 725 |
| 46 0.39 | 80 1.20 | 114 3.16 | 148 7.41 |
| 47 0.40 | 81 1.24 | 115 3.25 | 149 7.61 |
| 48 0.42 | 82 1.28 | 116 3.33 | 150 7.80 |
| 49 0.43 | 83 1.31 | 117 3.42 | 151 8.00 |
| 50 0.45 | 84 1.36 | 118 3.51 | 152 8.20 |
| 51 0.47 | 85 1.39 | 119 3.60 | 153 8.40 |
| 52 0 19 | 86 1.44 | 120 3.69 | 154 8.59 |
| 53 0.51 | 87 147 | 121 3.79 | 155 8.79 |
| 54 0.53 | 88 1.51 | 122 3.88 | 156 8.99 |
| 55 0.55 | 89 1.56 | 123 398 | 157 9∙20 |
| 56 0.57 | 90 1.61 | 124 4.08 | 158 9.41 |
| 57 0∙59 | 91 1.65 | 123 4.19 | 159 9.62 |
| 58 0.61 | 92 1.69 | 126 4.30 | 160 9.84 |
| 59 0.62 | 93 1.74 | 127 4.42 | 161 10.06 |
| 60 0.64 | 94 1.79 | 128 4.53 | 162 10.28 |
| 61 0.66 | 95 1.84 | 129 4.66 | 163 10.51 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 164° | 10.75 | 192° | 19.86 | 220° | 35.35 | 248° | 58.48 |
| 165 | 11.01 | 193 | 20.30 | 221 | 36.08 | 249 | 59∙37 |
| 166 | 11.28 | 194 | 20.74 | 222 | 36.80 | 294.7 | 60.00 |
| 167 | 11.56 | 195 | 21.19 | 223 | 37.54 | 250. | 60.27 |
| 168 | 11.85 | 196 | 21.64 | 224 | 38.31 | 274.1 | 90.00 |
| 169 | 12.05 | 197 | 22.11 | 225 | 39.11 | 291.9 | 120.00 |
| 170 | 12.36 | 198 | 22.57 | 226 | 39.94 | 306.8 | 150.00 |
| 171 | 12.66 | 199 | 23.04 | 227 | 40.70 | 319.2 | 180.00 |
| 172 | 12.96 | 200 | 23.52 | 228 | 41.66 | 329.9 | 210.00 |
| 173 | 13.26 | 201 | 24.00 | 229 | 42.55 | 339∙3 | 240.00 |
| 174 | 13.56 | 202 | 24.50 | 230 | 43.46 | 348.8 | 270.00 |
| 175 | 13.86 | 203 | 25.00 | 231 | 44.29 | 355.6 | 300.00 |
| 176 | 14.16 | 204 | 25.52 | 232 | 45.14 | 363.0 | 330.00 |
| 177 | 14.47 | 205 | 26.05 | 233 | 45.95 | 369.4 | 360.00 |
| 178 | 14.78 | 206 | 26.59 | 234 | 46.78 | 375.5 | 390.00 |
| 179 | 15.09 | 207 | 27.14 | 235 | 47.58 | 381.3 | 420.00 |
| 180 | 15.41 | 208 | 27.69 | 236 | 48.39 | 387.0 | 450.00 |
| 181 | 15.73 | 209 | 28.25 | 337 | 49.21 | 391.9 | 480.00 |
| 182 | 16.06 | 210 | 28.83 | 238 | 50.04 | 396.7 | 510.00 |
| 183 | 16.40 | 211 | 29.40 | 239 | 50.86 | 401.3 | 540.00 |
| 184 | 16.75 | •212 | 30.00 | 240 | 51.70 | 405.8 | 570.00 |
| 185 | 17.10 | 213 | 30.61 | 241 | 52.53 | 410.0 | 600.00 |
| 186 | 17.46 | 214 | 31.24 | 242 | 53.37 | 444.6 | 900.00 |
| 187 | 17.83 | 215 | 31.89 | 243 | 54.22 | 470.5 | 1200.00 |
| 188 | 18.21 | 216 | 32.56 | 244 | 55.07 | 491.4 | 1500.00 |
| 189 | 18.60 | 217 | 33.24 | 245 | 55.93 |  |  |
| 190 | 19.00 | 218 | 33.93 | 246 | 56.73 |  |  |
| 191 | 19.42 | 219 | 34.63 | 247 | 57.60 |  |  |

55. The formulæ thus given are in such perfect accor dance with our best experimental knowledge, that we can not withhold our assent from the correctness of the principles from which they have been deduced. At the same time, we desiderate very much a better series of experiments than we yet possess, as the range of doubtful temperature above 212° is far wider than the present perfect state of experimental science, and our improved means of observing, can at all warrant. The discrepancies between the experiments above and below 212° show, that the two series should if possible be performed with identical apparatus.

The formulæ we have obtained have been founded on the *hypothesis, that bodies expand nearly equal proportions of bulk in equal intervals Of true temperature ; and we have found that the elastic force of steam increases in equal proportions, from equal increments of temperature, reckoned in true intervals from the bottom of the scale.*

Our formula should, however, be capable of being reduced into a form closely resembling those which have preceded it, in so far as these have represented approximately the experiments they were made to represent ; thus the formula of Laplace and his followers is of the form F ***— Q m t*** f ***m t8 +^ m*** ∕3 ½ 4,c. ***ad infinit»***

So, in like manner, we should obtain from Equation T the following ;

*( ∕ t c t6 . )*

Log. 2 × ■ 21og.c—Iog.(cf0)λ (+1 f&c.]) >

***I*** ' c\* 2c4 3cβ ' )

— log. **C —** log. (1.11401) log. F = 0 which is easily presented in a form absolutely the same.

In like manner, it may be presented at once in the form adopted by Dr Thomas Young and all his followers, viz.

for, if we take our formula S9

Log. F=7.71307 (log. *t—*2.587711) we get, resuming the natural number,

Fs√i±Wn, Ss.

∖ 387 *J s*

Or, if we take formula T2, we get

F = /£±W\*’ Ts.

V 333 *J 3*

We thus find, that the old formulæ have all approximated in a greater or less degree to the representation of