

As can be understood from the above examples, coherence is something that is rather difficult to accomplish. There are also times when the coherence of units should be sacrificed in order to reduce the number of formulas. Another way we can put this is that multiple units can be recognized for the same type of quantity in order to reduce the number of concepts.

Let's consider the decay of elementary particles.

An elementary particle's lifetime is the mean time until decay, and can also be said to be the time until the number of particles becomes  $1/e$  due to decay. The half-life, on the other hand, is the time until the number of particles becomes  $1/2$  due to decay. We consider these two to be quantities of different concepts that both have the dimension time. However, by recognizing the two units  $\log e (= \text{neper})$  and  $\log 2 (= B_1)$  for the logarithmic quantity, these can be interpreted as a single quantity (dimension: time/logarithmic quantity) that represents the slowness of decay with two units (for example, a half-life of 7 seconds represents roughly the same thing as a lifetime of 10 seconds. Therefore, this can be expressed as "the decay slowness is 7 seconds/  $B_1$ " or "the decay slowness is 10 seconds/neper").

The same can be said for frequency and angular frequency as well. The relationship of the quantum of action,  $\hbar$ , and the Planck constant,  $h$ , should be considered to be as follows.

$$h = \hbar/\text{rad} = 2\pi\hbar/\Omega_1 \tag{30}$$

Of course, this kind of lack of coherence should be limited to cases in which the ratios of multiple units can be strictly determined, such as they can be for 'mathematical' units. <sup>13</sup>

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<sup>13</sup> This is also why it is desirable that the fine structure constant is a mathematical constant that can be strictly calculated.