

Table 1

Symbol	Contenders for confusion
a, A	atto, atomic unit, Ampere, Astronomical unit.
b	barn.
c, C	centi, velocity of light, candela, Coulomb, °C.
d	deci, deka, degree, differential.
e	electrons, exponential, eV.
f, F	femto, Farad.
g, G	gramme, Giga, Gauss.
h, H	hour, hecto, quantum unit, Henry.
i	imaginary, unity, roman numeral, i, j.
J, J	Joule.
k, K	kilo, general constants, °K.
l	litre, lumen, lux, unity, i.
m, M	milli, metre, minute, electron mass, Mega.
n, N	nano, Newton.
o	zero.
p, P	pico, parsec, Poise.
q	quantum.
r	radius, radian.
s	second.
t, T	tonne, time, Tera, Tesla.
u	units in general.
v, V	velocity, Volt.
w, W	weber, Watt.
x, X	variable, coordinate, X-ray units.
y	year, variable, coordinate.
z	variable, coordinate.

b, however, allows the use of the Greek baros for weight. This at once leads to the name baram or barram, implying a heavy gram. The symbol b would clash with barn, but confusion could be avoided by changing the barn abbreviation to bn. I think the new name should be pronounced with short vowels. The word connotes kilogram reasonably well and may be acceptable.

Any name would need careful investigation before adoption.

Yours faithfully,

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<sup>1</sup> *Metrication in Scientific Journals*, Royal Society (Jan., 1968)—see *Nature*, 218, 1272 (1967).

### Alcohol in Body Fluids

SIR,—It has been reported by Payne, Hill and Wood<sup>1</sup> in a recent publication that ethyl alcohol does not distribute itself uniformly between the plasma and red cells of the blood. Furthermore, the implication of this significant observation has been commented on in the *New Scientist*<sup>2</sup>. Here it is pointed out that the method of taking samples of capillary blood by a pin prick may lead to gross errors and that for the accurate determination of alcohol concentration in blood only direct analysis of venous blood could suffice.

In Northern Ireland, blood and urine have been analysed for alcohol content in cases of drinking drivers since 1959. A paper published by this department in 1965 dealt with concentrations of alcohol in samples of blood and urine taken at the same time<sup>3</sup>. The practice in Northern Ireland is for the Department of Industrial and Forensic Science to provide each police station with the equipment for the examining doctor to take both blood and urine. The blood pack consists of an envelope containing a sterile disposable plastic syringe (10 ml.) and two bijou bottles (5 ml.) prepared as recommended by the British Medical Association. Each bottle is sealed with a viscap and peeler and the date of preparation is stamped on the label. After the blood is placed in the bottles they are sealed with adhesive tape and sealing wax bearing a distinctive embossed impression. This procedure of taking and sealing blood samples has been in use since 1959 and has operated very satisfactorily. There has been no adverse criticism over this period.

In my paper<sup>3</sup> the analytical results of 224 "drunk in charge" cases in which simultaneous samples of blood and urine were taken were examined. The object of this study was to investigate the relationship of a blood alcohol concentration derived by calculation from a random

sample of urine with the actual concentration of alcohol in the blood. The result of this investigation indicated that it was an unsatisfactory procedure to calculate the blood alcohol concentration from a random specimen of urine.

The urine : blood ratio and the urine : breath ratio have been discussed by Drew, Colquhoun and Long<sup>4</sup>. It was shown that there was some disagreement about these ratios and that they vary even for one individual under different conditions. This was taken into consideration in the Road Traffic Act (Northern Ireland) 1964 and it was not made a requirement that the concentration of alcohol in body fluids which are not blood should be converted by calculation into a blood alcohol figure. The certificates of analysis state only the concentrations of alcohol in the specimens submitted for analysis.

Urine, however, can provide most useful information in the case of the drinking driver. Urine has the great advantage that samples are easy to collect and do not require the attendance of a medically qualified person. The concentration of alcohol in the urine gives a fairly good indication of a person's previous drinking and fitness to have control of a motor vehicle. This will be apparent from the table of results in my paper<sup>3</sup>. It should be appreciated that these urines examined were random samples and the bladder had not previously been voided. Carpenter<sup>5</sup> reviewed the literature on the effects of alcohol with special reference to skills in driving motor vehicles and concluded that all the authorities are in agreement that ability to control a motor vehicle is impaired at relatively low alcohol levels.

When statutory limits are introduced dealing with concentrations of alcohol in the body, it is most important to specify the body fluids to be used and also the concentration of alcohol in each fluid, for this procedure will eliminate calculations involving the use of conversion factors which of necessity involve making assumptions. The innocence or guilt of a person will be dependent primarily on the alcohol content of the specified fluid. The actual concentrations of alcohol in the body fluids which are chosen for the statutory levels will be influenced by clinical findings and statistical analysis of accidents, but the final decision is to some extent empirical. Once this is decided, however, and the levels are clearly defined, when it becomes law there can be no injustice if a person is found with a concentration of alcohol above the specified limit.

While we are satisfied that it is a very unsatisfactory procedure to convert a urine alcohol concentration into a blood alcohol figure by calculation, nevertheless it would appear from our results that if the blood alcohol level is defined as 80 mg/100 ml., then the level of 107 mg/100 ml. is not an unreasonable one to accept for the urine. It should be remembered that the choice of this value is empirical and the important factor is that there is a clearly defined urine alcohol level.

The essential consideration to be borne in mind when a statutory limit is introduced is that the analytical results must be accurate and reproducible.

Professor Payne's article is most informative on the distribution of alcohol in the blood and his suggestion of using plasma : breath and urine : plasma ratios merits further attention and consideration.

Yours faithfully,

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<sup>1</sup> Payne, J. P., Hill, D. W., and Wood, D. G. L., *Nature*, 217, 963 (1968).

<sup>2</sup> Chedd, Graham, *New Scientist*, 37, 577 (1968).

<sup>3</sup> Morgan, W. H. D., *J. Forensic Sci. Soc.*, 5 (1), 15 (1965).

<sup>4</sup> Drew, G. C., Colquhoun, W. P., and Long, Hazel A., *M.R.C. (London) Memorandum*, 38, 67 (1959).

<sup>5</sup> Carpenter, John A., *Quart. J. Stud. A. Alcohol*, 26, 274 (1962).