

DEPARTMENT OF COMMERCE

Bureau of Standards

WASHINGTON

PGA
PFD

January 11, 1917.

Mr. F. P. Cox,
General Electric Company
West Lynn, Mass.

Dear Sir:

The question of a standard temperature of reference which your Subcommittee is considering, (your letter of December 15), touches a field in which many interests are concerned. The practice of the Bureau is not uniform in this matter throughout the various lines of work. It has been necessary to comply with certain international agreements, and also to meet certain semi-standardized commercial practices. The following represents the principal practices of the Bureau at the present time:

20° C.

Reference point for standard cells by international agreement. The cell bath is usually kept at 25°, for practical reasons, correcting to 20° by known temperature coefficient.

Calorimetric determinations. The 20° caloric is very largely used internationally.

Testing of all glass volumetric apparatus, (Association of Official Agriculture Chemists.)

Testing Metric Tapes.

Index of refraction tests by Zeiss refractometer.

Polariscopic work on sugar solutions, etc., to meet specifications of International Sugar Commission.

The basis for the copper wire tables, by international agreement.

25° C.

Certification of resistance standards.

Refractive indices (in part)

The control baths for the following testing work are maintained at 25° C.

Standard Condensers

Resistance Standards

Permeability

Various chemical baths

Standard cells (part of year).

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Miscellaneous

Wave length measurements are referred to a fundamental standard at 15° C. by international agreement.

60° F is used in gas volumetric reductions.

English tapes are tested at 62° F.

The standard meter bar and the mercury oim are referred to the ice point, but these are special and have no real bearing on the question.

60° F is used in oil testing, conforming to the general custom of the industry.

The U. S. Pharmacopoeia has used 25° C since 1900. This has, of course, a very important bearing on the question as the pharmacopoeia touches so many different phases of laboratory work.

The average laboratory temperatures in Europe are decidedly lower than in nearly the whole of the United States, and it is doubtful whether international agreement is possible on so high a temperature as 25° . There has been much difficulty in getting Europeans to agree even to 20° . Various temperatures have been suggested and used abroad, 15° , 16° , 17.5° , 18° , etc., for different standardizing purposes. 15° was formerly the one in greatest use.

I find considerable difference of opinion among the men at the Bureau. Most of the chemists feel strongly that 25° is the temperature that should be used as a standard. Most of the electrical men, but not all, prefer 25° rather than 20° , while those in length and volumetric measurements prefer 20° .

In maintaining a temperature for experimental work 25° is frequently much more convenient than 20° , since it is so much easier to heat than to refrigerate. In electrical work another consideration enters. Even if one does go to the trouble to refrigerate in summer, it will frequently happen that the humidity then becomes very high, even to saturation, and insulation problems become acute.

It seems to be doubtful whether a single standard temperature of reference is possible for all the interests involved. Yet a very great simplification in scientific and technical work will result if the matter can be compromised on one fundamental temperature of reference, (say 20°), for international bases of reference, etc., and one or two other subsidiary reference temperatures for use in special lines of work to which the fundamental temperature is not so well adapted.

In the present case, I do not see that either of the two temperatures (20° and 25°) has a decided advantage over the other, but am submitting the above detailed information in the belief that it will be of interest to your committee. If you have not already done so, it might be worth while to secure data from the Weather Bureau showing that the average temperatures are for various sections of the country during the

working hours of the day, and for the months in which artificial heating is not used.

Respectfully,

(Signed) P. G. Agnew

Associate Physicist.