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THE METRIC SYSTEM IN EVERY-DAY LIFE.*

BY H. V. ARNY, PH.D.

There seems but little that I can add to the admirable addresses delivered by the distinguished men who have just presented their views. In fact, all I can do is to present a simple story of my own experiences with that beautiful, logical and simple system of weights and measures now used by 437,000,000 of the people of this globe.

In school, as a twelve-year-old youngster, along with other monstrosities, such as cube root, proportions involving the wildly exciting facts that if 10 men in 7 days could excavate a ditch 1,000 feet long; then 3 men in 12 days could excavate X feet of trenches, I learned that there was a foreign thing called the metric system; that it dealt with "decis" and "centis" and "kilos" and "millis" and "dekas;" that the thing they called the kilogramme represented 2.2046 pounds; that the kilometer was 0.6213 mile. These data passed through the mind of the lad and along with cube root were shortly consigned by him to the limbo of uninteresting and unnecessary things.

Later, as a pharmaceutical apprentice, I learned that this self-same metric system was used by the French physicians of the neighborhood in writing their prescriptions and there then came the first intimation that metric weights were of some practical use. Later, in college, all pharmaceutical preparations were prepared by metric units and a month of use of such weights and measures brought a realization that their decimal sub-divisions make them as superior to the ordinary units of weights and measures as dollars and cents are easier to calculate than are pounds, shillings and pence.

Later, four years' residence in Germany, completed my metric conversion. In truth it might be stated that the first week did the work, since any one accustomed to our decimal system of currency finds that *thinking* in the metric system is merely a matter of *using* the units. In using the meter, one learns that it approximates the yard; in using the kilogramme, the novice instinctively thinks of two pounds; in discussing distance in kilometers, one quickly comes to the realization that the unit measures about $^5/_8$ of a mile. And after a few weeks of such mental translating, one drops all thought of old units and thinks of quantities exclusively in kilos and meters.

Despite assertions to the contrary, I found in Germany barely twenty-five years after the official adoption by that country of the metric system that all purchases I made were on the basis of the metric system. It is true that in the market places the peasants talk of "pfunds" (pounds) but it is equally true that their "pfund" is the official half-kilo weight. Nor do we have to cross the ocean to find such anachronisms. In certain sections of this land, we hear the silver quarter called the shilling; in other parts of the land it is called "two-bits," while it is an undeniable fact that in one city the five cent piece is still called to a cer-

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tain extent "the picayune," after a Spanish coin of $6^1/_4$ cents value, that was used in that section a century ago. Nor do I believe that these colloquialisms prove the failure of our decimal system of currency.

The only justifications for the adoption of the metric units as the official standard of this country are (*a*) The development of our foreign trade demands the change. (*b*) The saving of time brought about by the use of the metric system would repay the annoyance incidental upon the change.

The first proviso has been emphatically answered in the affirmative by the speakers who have preceded me; but I can add some testimony as to the time-saving properties of the system. As to this there has been a number of extravagant statements made by metric enthusiasts, but figures founded on experimental work have been rare. Accordingly, a comparative test of the same problems expressed in U. S. and metric units was made on third-year University students by having them solve the following commercial problems:

PROBLEMS BASED ON METRIC UNITS.

1—Cost of 22 tubes of tooth paste at $1.45 a "dizaine" (package of 10).

2—Cost of 2.26 kilos of quinine sulphate at 4.7 cents a gramme.

3—Cost of 27 kilos of coal at $7.70 a metric ton (1000 kilos).

4—Cost of 1.7 meters of cloth at 26 cents a meter.

5—Cost of 7.27 liters of glycerin (Sp. Gr. 1.25) at 44 cents a kilo.

6—Cost of 5 liters of sulphuric acid (Sp. Gr. 1.84) at 22 cents a kilo.

7—A gold dollar contains 1.67 Gm. gold. How many cubic meters of gold (Sp. Gr. 19) would represent eight billion dollars?

PROBLEMS BASED ON ORDINARY (U. S.) UNITS.

1—Cost of 22 tubes of tooth paste at $1.75 a dozen.

2—Cost of 5 lbs. (Avoirdupois) of quinine at $1.45 an avoirdupois ounce.

3—Cost of 59 lbs. of coal at $7.00 a ton.

4—Cost of 70 inches of cloth at 24 cents a yard.

5—Cost of two gallons of glycerin (Sp. Gr. 1.25) at 20 cents an avoirdupois pound.

6—Cost of $1^3/_8$ gallons sulphuric acid (Sp. Gr. 1.84) at 10 cents an avoirdupois pound.

7—A gold dollar weighs 25.8 grains. How many cubic feet of gold (Sp. Gr. 19) would represent eight billion dollars?

In order to eliminate the problem of fatigue half of the students were given the metric; the other half were given the U. S. problems first.

As to the problems themselves, the first four are ordinary transactions of retail trade. All eight of these (U. S. and metric) could be calculated within three minutes and while metric units showed an advantage, it was so slight that the difference could be expressed only in seconds. The next two of each set involve practical problems of the chemical industry where liquids bought by the pound are frequently dispensed in gallons. The last problem is taken from the *Outlook* of November 16, 1916, where the author of an article published in a previous issue apologized for an error made in calculating the cubical capacity of eight billion dollars claimed to represent the gold coin of the world. He acknowledged that while his article stated that eight billion dollars represented a cube of gold 70 feet on each side, the real figures were a cube of 29 feet, or 25,641 cubic feet.

If a distinguished financial publicist could make such an error, I was anxious to see what a class of students could do with it in both systems. The figures below show that the honors were even, although it is only fair to say that in the metric problem two were ruled out because of the improper placing of the decimal point.

The results of the experiments are tabulated below:

RESULTS OF THE TEST ON GROUP I.

Student.	Metric. Time	Metric. Correct out of 6.	U. S. measures. Time.	U. S. measures. Correct out of 6.
A.....	15 minutes	5	21 minutes	4
B.....	13 minutes	3	18 minutes	4
C.....	11 minutes	6	18 minutes	5
D.....	15 minutes	1	14 minutes	3
E.....	18 minutes	2	13 minutes	3
F.....	10 minutes	4	23 minutes	5
G.....	8 minutes	8	16 minutes	5
H.....	8 minutes	4	10 minutes	3
I.....	12 minutes	6	22 minutes	4
J.....	7 minutes	3	16 minutes	3
K.....	8 minutes	6	13 minutes	6
L.....	9 minutes	4	18 minutes	3
M.....	24 minutes	4	12 minutes	1
N.....	13 minutes	3	13 minutes	3
	171	68 percent	227	62 percent

RESULTS OF THE TEST ON GROUP II.

Student.	Metric. Time.	Metric. Correct out of 7.	U. S. measures. Time.	U. S. measures. Correct out of 7.
A.....	19 minutes	5	42 minutes	6
B.....	30 minutes	4	36 minutes	5
C.....	25 minutes	4	39 minutes	5
D.....	19 minutes	5	26 minutes	4
E.....	23 minutes	5	28 minutes	5
F.....	21 minutes	6	47 minutes	4
G.....	26 minutes	6	33 minutes	2
H.....	24 minutes	2	42 minutes	1
I.....	30 minutes	5	37 minutes	5
J.....	22 minutes	7	27 minutes	6
K.....	20 minutes	4	54 minutes	3
L.....	14 minutes	7	27 minutes	5
M.....	28 minutes	3	30 minutes	5
N.....	15 minutes	6	35 minutes	7
O.....	22 minutes	6	37 minutes	4
P.....	22 minutes	6	39 minutes	6
	360	72 percent	579	65 percent

The figures just given show that one class of third-year University students did the first six problems in U. S. units in 227 minutes, the similar metric problems took only 171 minutes; that while a second group did all seven problems in U. S. units in 579 minutes, they took only 360 minutes to do the same problems in metric units. It will also be noticed that the percentage of correct problems in the metric system is somewhat higher than those done with U. S. units; hence the metric system is not only a tremendous time-saver, but it gives in the hands of the average student more accurate results.

Enough, I think, has been said about the advantages of the metric system.

Our presence here to-day attests to our belief that we should in due course of time become a metric country. And now that we have come together, what are we going to do? It would be the worst of blunders if we, representing such diversified occupations, should not, before we separate, form a permanent organization aimed to disseminate the metric gospel among the commercial bodies until they too agree with us that it is high time for this country of ours to throw off the shackles of an Elizabethan set of standards and add our 110,000,000 people to the 437,000,000 already using the metric system.

COMPARISON OF MEDICINAL MINERAL OILS—RUSSIAN AND AMERICAN.

BY W. F. ODOM AND W. W. DAVIES.

It has been heralded widely in the magazine articles, newspaper advertisements, and other literature of the day that Liquid Paraffin, whether it be a Russian or an American Oil, finds its value as a medicinal agent in its chemical inertness —because it acts merely as a lubricant of the intestinal tract. This point seems to be conceded by all those European scientists who have devoted their time and energy toward research work on this subject, and it is now the only idea fostered by those interested in Liquid Paraffin in this country.

With this in mind, then, we will endeavor to show that the Russian Oil, for clinical, chemical, and physical reasons, is better than the American Oil now found on the market.

CLINICAL OBSERVATIONS.

It is a well-known fact that the European physicians and scientists were the first to prescribe and recommend Liquid Paraffin. After experimenting with the Russian Oil, Sir W. Arbuthnot Lane, the English scientist whose articles are being quoted by many of the promoters of American Oil in their pamphlets and advertising matter, wrote: "The treatment, other than operative, of chronic intestinal stasis of the defective drainage scheme consists in the use of paraffin before each meal. This precedes the food in its passage along the canal and facilitates the effluent."[1] We might quote from a long list of others, among them Phillips, Ross, and Cropper, all Europeans, whose research work into the subject is being applied by many to the American Oil, whereas the data on which they based their articles were obtained from the Russian Oil. The facts of the case then tend to show that the clinical observations on which the use of Liquid Paraffin is based were made with the Russian Oil—and that it is yet to be proven that the same claims are applicable to the American Oil.

CHEMICAL COMPOSITION.

In considering the chemical composition of the two oils, we learn that the Russian Oil is composed almost wholly of naphthene hydrocarbons, which are most probably, saturated cyclic compounds of the hexamethylene type. The American Oil, on the other hand, is mainly methane hydrocarbons with some olefines. They have then totally different structural formulas and, of course, for this reason one will find them acting differently in chemical reactions. The

[1] Page 409, *Hygienic Laboratory Bulletin 98, U. S. Public Health Service.*