

September 1, 1927.

THE ULTRAVIOLET SPECTRAL TRANSMISSION OF VARIOUS NEW GLASSES
AND WINDOW GLASS SUBSTITUTES, USED IN THERAPY*

1. This letter circular is issued in response to numerous inquiries for information on the transmissive properties of new glasses and organic substitutes for window glass for use in solariums, sun parlors, animal houses, etc.

2. The data presented in this communication refer to the extreme ultraviolet region of the solar spectrum, which rays are almost completely absorbed by common window glass and which are found to have a therapeutic value in preventing rickets, etc. It is not the function of this Bureau to pass judgment on this claim and reference is made to recent biological tests of substitutes for window glass described in the Journal of the American Medical Association, Vol. 88, p. 1562; May 14, 1927.

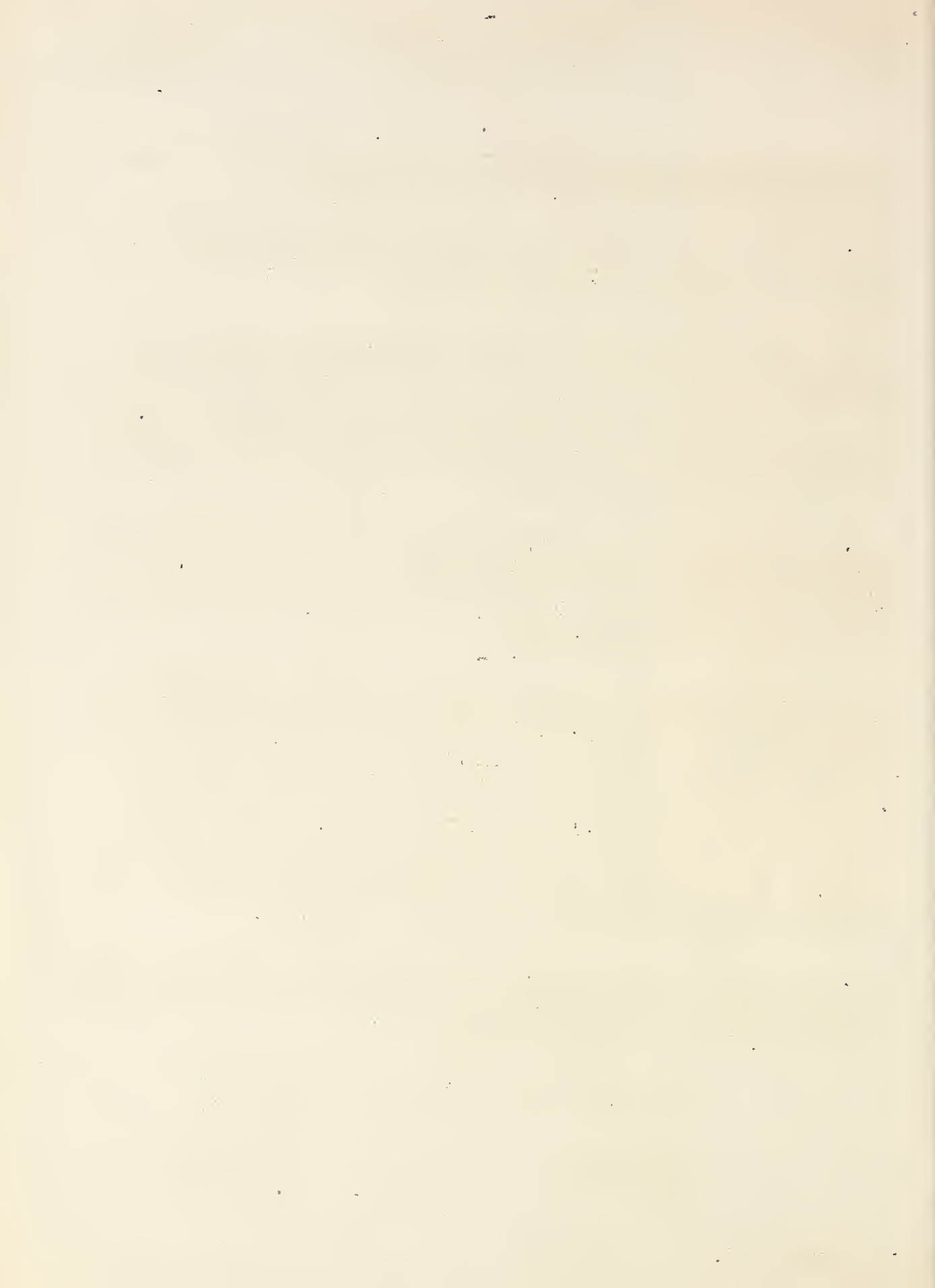
3. Biologically it is found that ordinary window glass completely absorbs short wavelength (less than about 3100 A.U.) ultraviolet rays of the sun which have a therapeutic value in preventing rickets, etc. Recently new glasses, and organic substitutes for window glass, have been developed which transmit some of these therapeutic rays.

Using a common window glass as a filter, radiometric measurements were made at sea level, during the noon hours in April, May, and June, 1927, to determine the magnitude of this short wavelength ultraviolet radiation in terms of the total incoming solar radiation. This gives at the noon hour about 3.5 to 4 per cent of the total (which varies from 1.25 to 1.3 gr. cal. per cm^2 per min.) or 0.04 to 0.05 gr. cal. per cm^2 per min. The value is fairly constant for 3 to 4 hours, during midday, but decreases to an imperceptible value at sunrise and sunset. It fluctuates greatly with weather conditions and the season, falling relatively low in the winter and rising to its maximum value when the solar altitude is highest.

4. By direct radiometric measurements made during the noon hours in April to June, 1927, it was found that the total amount of these short wavelength ultraviolet solar rays transmitted by these materials is, approximately:

Quartz-glass and Corex -----	92 per cent
Vitaglass -----	50 per cent
Celoglass -----	20 per cent
Quartz-Lite -----	5 per cent
Flexoglass -----	1 per cent
Window glass -----	0 per cent

*Prepared by W. W. Coblentz.



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5. The spectral transmissions given in the attached blueprint were determined by using monochromatic light from a quartz mercury arc lamp. The same transmission curves would have been obtained by using monochromatic light from any other source.

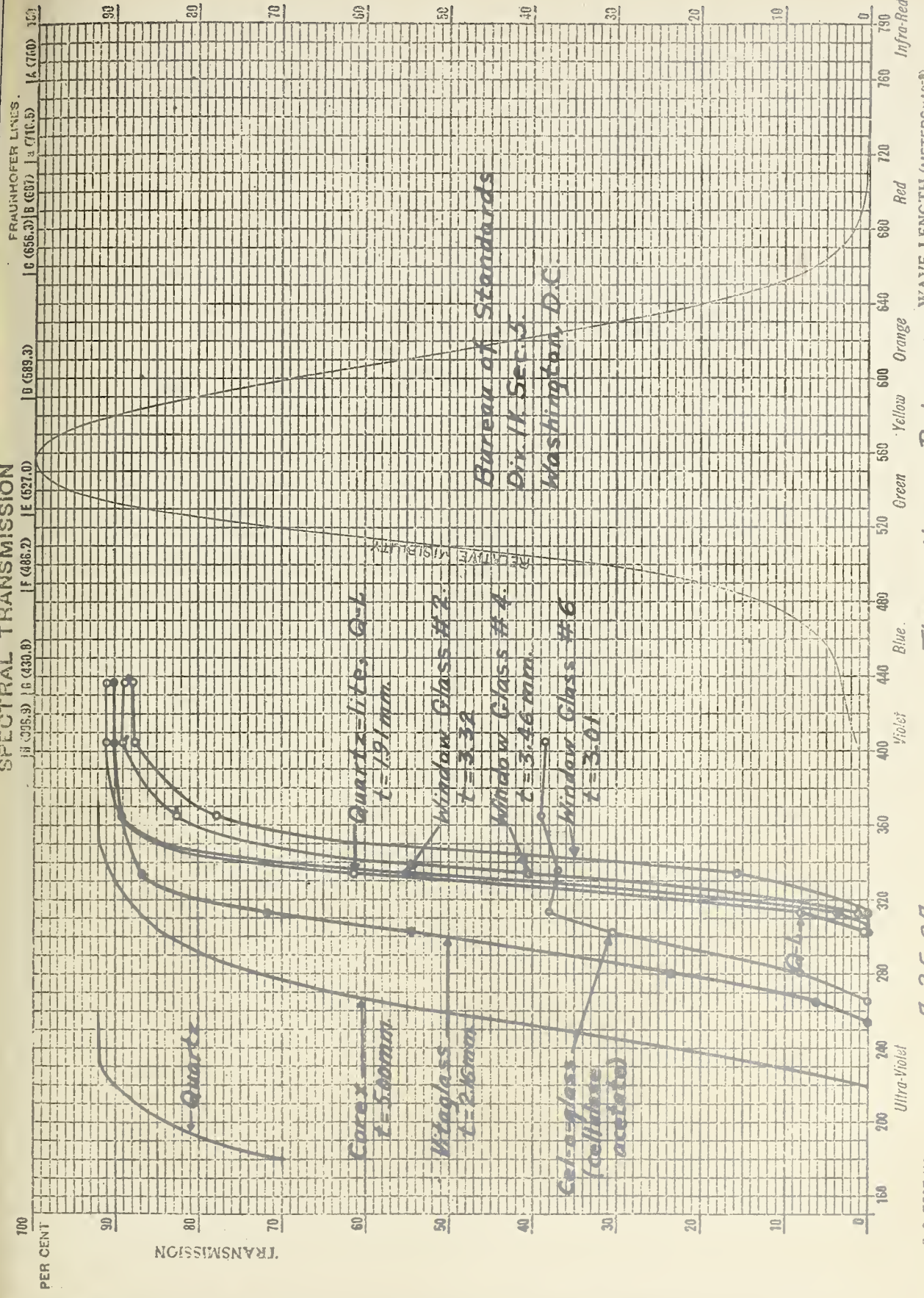
The samples of window glass used in these tests came from the supply in this Bureau's carpenter shop. They had closely the same thickness and were selected to show that the most greenish tinted samples absorb the greatest amount of ultraviolet radiation.

From a comparison of the spectral transmission curves, an estimate can be formed regarding the therapeutic value of the various glasses.

6. The infrared spectral transmissions of the various glasses are closely the same as that of window glass to 3μ , beyond which wavelength the question of transparency is unimportant, since the atmosphere absorbs the solar rays of greater wavelength.

7. Attention is to be directed to the fact that in some of these glasses the high transparency to the extreme ultraviolet rays is obtained partly by reducing the thickness. Hence, in installing such glass, attention should be given to the use of the proper size of sash to meet the safety requirements.

SPECTRAL TRANSMISSION



B. S. TEST NO. DATE 7-25-27. DET. MIN. NO. INSTRUMENT Thermopile METHOD Radiometric

WAVE LENGTH (METERS $\times 10^{-8}$)

PLOTTED BY

CHECKED BY





