TABLE—VISUAL SENSITOMETRIC DATA.

Field Brightness	Different Fraction	Discrimination Factor	Threshold Limit	Glare Limit ml.
0.000001	(1.00)	1.0	0.00000093	20.1
0.00001	(0.66)	1.5	0.0000042	40.7
0.0001	0.395	2.5	0.000019	89.0
0.001	0.204	4.5	0.000087	186.0
0.01	0.078	12.8	0.00039	400.0
0.1	0.0370	27.0	0.00174	810.0
				I.
1.0	0.0208	48.2	0.0081	1.66
10.0	0.0174	57.5	0.036	3.47
100.0	0.0172	58.1	0.28	7.25
1,000.0	0.0240	41.7	2.15	14.45
10,000.0	(0.048)	(20.9)	(232.0)	30.90

ROCHESTER, N. Y.,
Sept. 21, 1916.

PROPORTIONAL REDUCERS.*

By Kenneth Huse and Adolph H. Nietz.

[*Abstract*]

Photographic reducing solutions may be divided into three classes: (1) those which attack the highest densities most, (2) those which attack the lowest densities most, and (3) those which reduce all densities in the same proportion.

Norman Deck has recently suggested that by the use of a mixture of potassium permanganate and ammonium persulphate a satisfactory proportional reducer could be obtained, belonging to the third class. This has suggested the present investigation on reducers generally and especially on the best formula for a mixture of potassium permanganate and ammonium persulphate to give proportional reduction.

Sensitometric strips of various plates were exposed, developed and reduced in a thermostat under an accurately controlled condition, the plates being first developed, fixed, washed and dried and then, after measurement, reduced, dried and read again. The percentage of the original density removed by reduction from each step of exposure was plotted against the logarithm of the exposure. The results show that persulphate is the only reducer which removes a greater percentage of the higher densities; and that all others tried, including some which have been supposed to work proportionally, really reduce the lower densities most,

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so that they tend to remove the shadow detail, the reducer having the greatest influence in this direction being a solution of ferricyanide and thiosulphate, which reduces the shorter exposures to such an extent that its effect on the curve through the greater part of its action is exactly as though less exposure had been given to the plate, this reducer being very useful for correcting overexposure.

After a trial of various proportions of the permanganate and persulphate mixture suggested by N. Deck, the following formula was adopted as giving the most evenly proportional reduction:

Sol. A. Potass. Permanganate	0.25	gms.
10 per cent. sulphuric acid	15	cc.
Water	1000	cc.
Sol. B. Ammonium Persulphate	25	gms.
Water	1000	cc.

Use 1 part of A to 3 of B. The solutions will keep well and should not be mixed until ready for use. The time of reduction required will be from one to three minutes, depending on the amount desired. Reduction should be followed by immersion for five minutes in a one per cent. solution of potassium metabisulphite. The plate should then be washed for a short time.

In the course of this work it was observed that the result obtained depended to a considerable extent upon the nature of the emulsion used, even this proportional reducer showing greater action on the low densities in the case of a slow, fine-grained plate.

ROCHESTER, N. Y.,
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Sources of Nitrogen Compounds in the United States. C. G. GILBERT. (*Proceedings of the Smithsonian Institution,* June 30, 1916.)—Nitrogenous compounds are essential not only to self-defense but to the country's capacity for self-support, and to be effective the source must be such that the product may be adaptable to meet their requirement. The arc method of producing nitrogen compounds has not thus far demonstrated capacity to meet the agricultural requirement at all or even the defense requirement efficiently. Definite knowledge concerning the Haber process is lacking, but its record of achievement is against it, and it would seem, moreover, unsuited to American conditions, at least in the present