

$$X = Ne \left( \frac{1}{r^2} - \frac{r}{R^3} \right) \quad [\text{and}]^1$$

$$V = Ne \left( \frac{1}{r} - \frac{3}{2R} + \frac{r^2}{2R^3} \right).$$

$$X = Ne \left( \frac{1}{r^2} - \frac{r}{R^3} \right)$$

[and]<sup>2</sup>

$$V = Ne \left( \frac{1}{r} - \frac{3}{2R} + \frac{r^2}{2R^3} \right).$$

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<sup>1</sup>[To determine the electric potential we *integrate* the field strength  $X$  *over distance* (see Appendix II B, 269-71 below for a discussion of this), from  $s = r$  to  $s = R$  (it is not necessary to consider radii greater than  $R$  because, the atom as a whole being electrically neutral, there is no field beyond  $R$ ). Thus Rutherford's expression for  $V$  is the result of having evaluated the integral  $\int_r^R Ne(1/s^2 - s/R^3) ds$ .]

<sup>2</sup>[To determine the electric potential we *integrate* the field strength  $X$  *over distance* (see Appendix II B, 269-71 below for a discussion of this), from  $s = r$  to  $s = R$  (it is not necessary to consider radii greater than  $R$  because, the atom as a whole being electrically neutral, there is no field beyond  $R$ ). Thus Rutherford's expression for  $V$  is the result of having evaluated the integral  $\int_r^R Ne(1/s^2 - s/R^3) ds$ .]

TABLE VI<sup>a</sup>

$t_g$ Sec.	$t_F$ Sec.	$\frac{1}{t_F}$	$\frac{1}{t'_F} - \frac{1}{t_F}$	$n'$	$\frac{1}{n'}(\frac{1}{t'_F} - \frac{1}{t_F})$	$\frac{1}{t_g} + \frac{1}{t_F}$	n	$\frac{1}{n}(\frac{1}{t_g} + \frac{1}{t_F})$
11.848	80.708	.01236	.03234	6	.005390	.09655	18	.005366
11.890	22.366	.04470				.09138	17	.005375
11.908	22.390		.03751	7	.005358			
11.904	22.368	.007192				.005348	1	.005348
11.882	140.565		.01254	.01616	3			
11.906	79.600	.02870				.11833	22	.005379
11.838	34.748		.026872	5	.005375			
11.816	34.762	.007268				.021572	4	.005393
11.776	34.846		.01623	3	.005410			
11.840	29.286	.04507				.04307	8	.005384
11.904	29.236		.002000	.04879	9			
11.870	137.308	.05079				.03[79]4	7	.0054[20]
11.952	34.638		.01285	.01079	2			
11.860	22.104	.02364				Means		.005386
11.846								
11.912	22.268	.01285	.01079	2	.005395	.10783	20	.005392
11.910	500.1							
11.918	19.704	.05079	.03[79]4	7	.0054[20]	.09704	18	.005390
11.870	19.668							
11.888	77.630	.01285	.01079	2	.005395	.10783	20	.005392
11.894	77.806							
11.878	42.302	.02364	Means		.005386			.005384
11.880								

Duration of exp.	= 45 min.	Pressure	= 75.62 cm.
Plate distance	= 16 mm.	Oil density	= .9199
Fall distance	= 10.21 mm.	Air viscosity	= $1,824 \times 10^{-7}$ [poise]
Initial volts	= 5,088.8	Radius ( $a$ )	= .[0]000276 cm.
Final volts	= 5,081.2	$\frac{l}{a}$ [mean free path $\div a$ ]	= .034
Temperature	= 22.82°C.	Speed of fall	= .08584 cm./sec.

$$e_i = 4.991 \times 10^{-10} \text{ [statcoulomb]}^b$$

<sup>a</sup>[The bracketed numbers are our corrections of errors in the original paper.]

<sup>b</sup>[The value presently accepted is  $4.802 \times 10^{-10}$  statcoulombs.]