

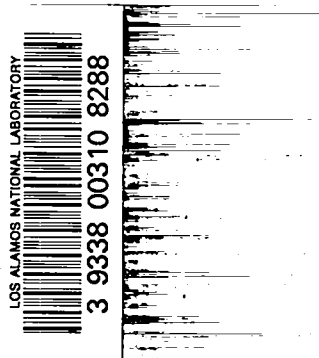
LAMS-1640 Revised

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THERMONUCLEAR REACTION RATES



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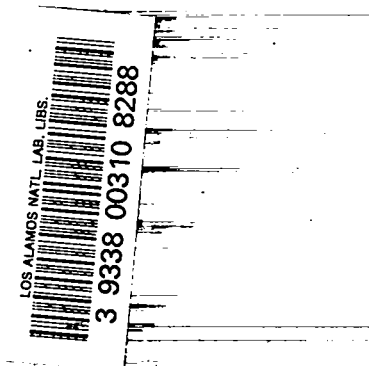
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THERMONUCLEAR REACTION RATES

by

James L. Tuck



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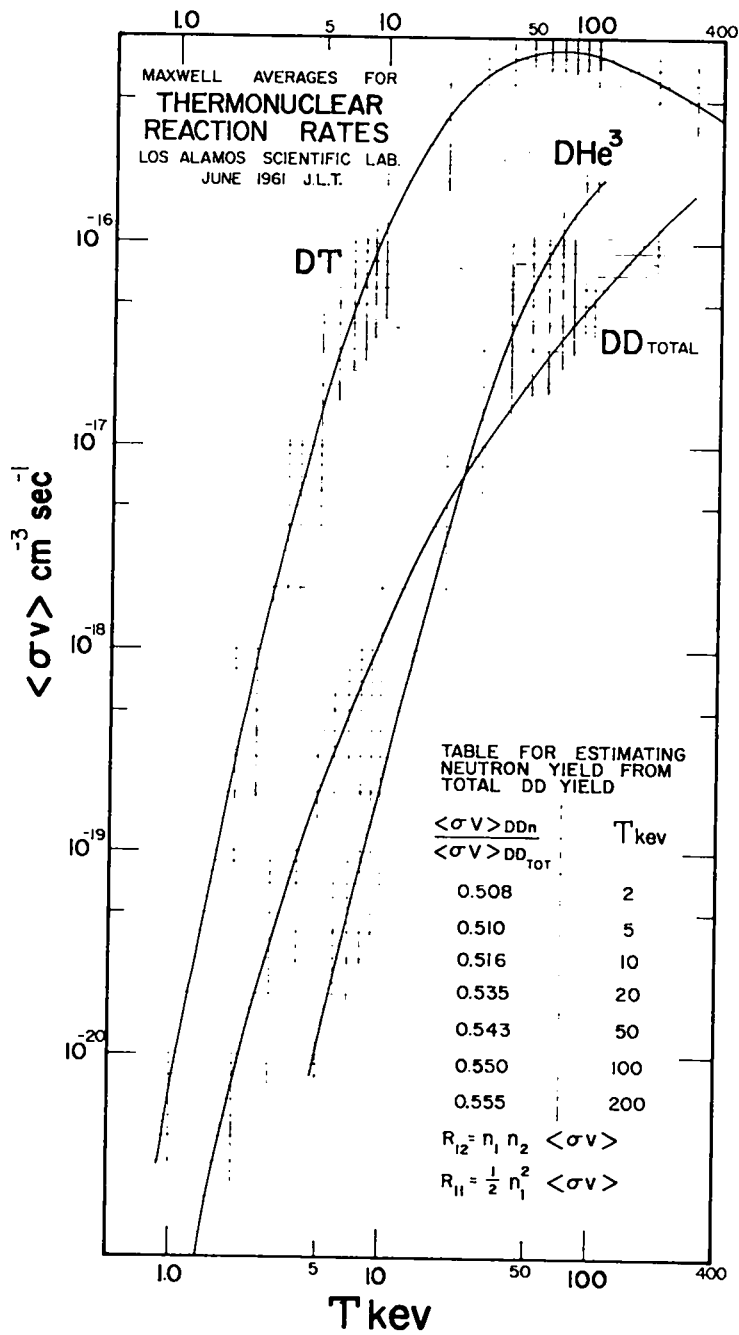
Physicists working on controlled thermonuclear reactions in the laboratory have had little occasion to consult tables of $\langle\sigma v\rangle$ so far. Happily the indications are that this situation will soon be changed. To provide some measure of consistency, the following newly revised curves of $\langle\sigma v\rangle$ for DD, DT and DHe³ are offered. The results given here supersede the writer's earlier compilation, Los Alamos Manuscript No. 1640 (1954), itself a revision of a still earlier one.

The $\langle\sigma v\rangle$ s are based on σ s which comprise in part the following values:

Deuterium Energy in Lab. system kev	Millibarns			DHe ³
	DD _n	DD _p	DT	
15	6.5×10^{-2}	6.5×10^{-2}	15	
30	1.15	1.10	278	
60	6.8	6.5	2180	2.3
120	23	20	4700	31
250	46	38	1720	290
500	74	59	660	630
1000	96	78	280	230

σ s below 120 kev are those of W. R. Arnold, J. A. Phillips, G. A. Sawyer, E. J. Stovall, Jr., and J. L. Tuck, Phys. Rev. 93, 483 (1954), except that the neutron branch DD_n has been modified to take into account the angular distribution of G. Preston, P. F. D. Shaw, S. A. Young, Proc. Roy. Soc. A226, 206 (1954) in accordance with the method of K. G. McNeill, Phil. Mag. 46, 800 (1955).

The latter moves $\sigma_{DD_n} / \sigma_{DD_p}$ upward at low energies so that the branching ratio now declines to unity at the lowest energies, instead of to 0.92. The σ s at energies above 120 kev come from many sources tabulated in Los Alamos Report No. 2014. The Maxwell averages given here are in close agreement with values given at 5, 10, 25, 50, 100 and 150 kev temperatures by T. Hesselberg Jensen, O. Kofoed-Hansen, A. H. Sillesen and C. F. Wandel, Risø Report No. 2 (1958).



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