Chapter 5 — Supplementary Experiments: Measurement of the Burn Velocity of Burst Charges and Stars in the Normal Atmosphere

To obtain these data, the 16-mm movie camera was used. A Black Powder pasted paper strip was arranged on a piece of metal mesh. Grains of burst charge, or stars, were arranged on the strip at intervals of about 5 cm, and the paper strip was ignited at one end. The grains or stars ignited one by one. They were photographed from a distance of about 1.5 meters.

Type of		Weight	Initial Diameter		Number of Frames		
Star	No.	(g)	D ₁ (mm)	$D_2(mm)$	D₃ (mm)	Colored part	Core part
B ₈	1	0.50	8.39	8.33	8.24	95	25
B ₈	2	0.45	7.94	7.94	8.38	97	27
B ₈	3	0.55	8.88	8.57	8.79	79	27
B ₈	4	0.50	8.42	8.50	8.32	106	16
B ₈	5	0.55	8.82	9.16	9.97	79	33
					Ave.	91.2	25.6
						(0.76 s)	(0.21 s)
B ₁₂	1	1.45	11.73	12.12	11.89	184	20
B ₁₂	2	1.50	11.80	12.01	12.34	179	22
B ₁₂	3	1.50	12.25	12.33	12.12	187	21
B ₁₂	4	1.45	12.37	11.70	11.89	191	21
B ₁₂	5	1.55	11.37	12.24	13.30	182	33
					Ave.	184.6	23.4
						(1.54 s)	(0.19 s)
G ₁₂	1	1.35	11.58	11.60	11.67	259	50
G ₁₂	2	1.45	12.11	12.09	12.13	249	42
G ₁₂	3	1.45	12.01	12.10	11.96	263	29
G ₁₂	4	1.70	12.81	12.75	12.63	265	29
G ₁₂	5	1.40	12.07	12.11	12.03	255	16
					Ave.	257.6	33.2
						(2.15 s)	(0.28 s)

Table 12. Burn Velocity of Stars (Measured by 16-mm Movie Camera).

Note: The figures in () show the average burn time when the speed of the camera was 120 frames per second.

Table 13. Burn Velocity of Burst Charges.

	Н		Р	S	
No.	No. Frames	No.	No. Frames	No.	No. Frames
1	7	1	44	1	30
2	26	2	60	2	30
3	26	3	73	3	25
4	26	4	65	4	30
5	15	5	69	5	
Ave.	20.2	Ave.	62.2	Ave.	28.8
	(0.167 s)		(0.518 s)		(0.240 s)

Note. The figures in () show the average burn time when the film speed was 120 frames per second. The photograph did not show clear images of the starting points and ending points. The accuracy of the data is therefore not very good.