

A Thesis

Submitted to the Graduate Faculty of the  
Louisiana State University and  
Agricultural and Mechanical College  
in partial fulfillment of the  
requirements for the degree of

Master of Science

in

The Department of Nuclear Engineerin

by

Ralf Wilhelm Karl Czepluch  
B.S., Louisiana State University, 1971

August, 1973

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DEDICATED TO  
Sheryl, my wife















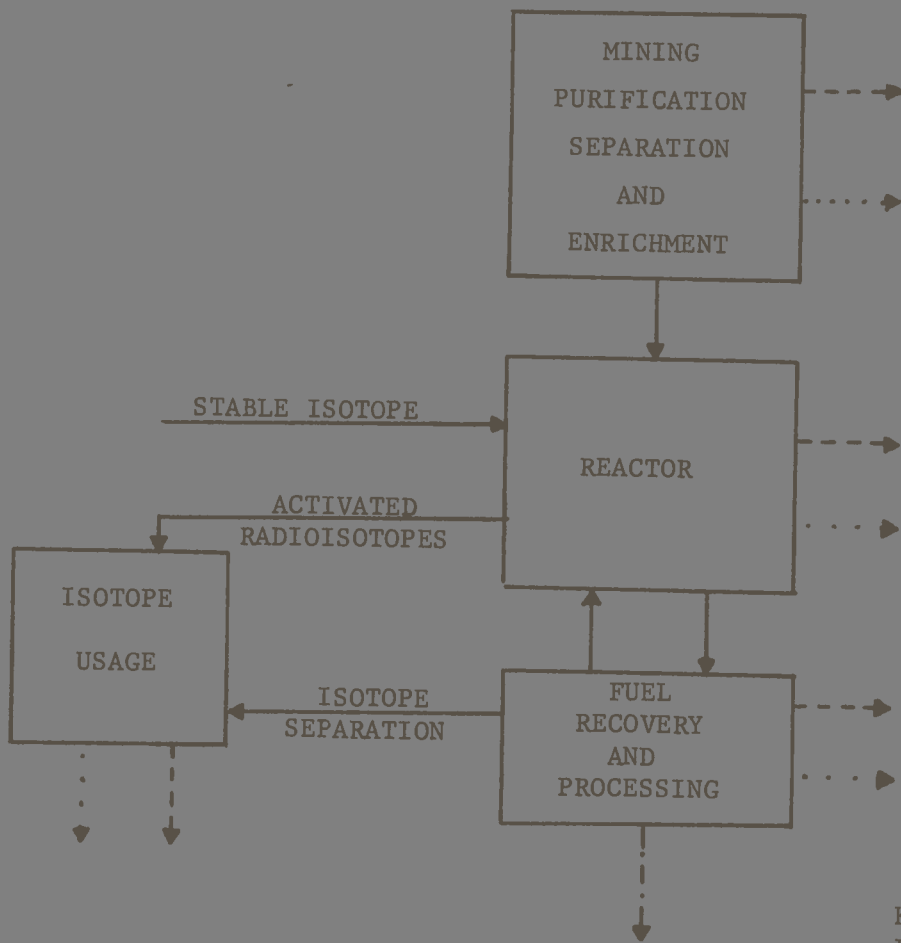


TABLE 1

## Estimated Wastes from Nuclear Power\*

	Calendar Year		
	1970	1980	2000
Installed electricity, 10 <sup>3</sup> MW(e)		150	940
Fuel Processed, 10 <sup>3</sup> metric tons/year	0.055		
	0.017	0.97	
Wastes	0.4		77 5.8
			14,000
			267,000
			730
			12,000
			20,000





KEY:  
 LOW LEVEL---  
 INTERMEDIATE LEVEL...  
 HIGH LEVEL----



TABLE 2  
SOME IMPORTANT FISSION PRODUCTS\*

Nuclide	Half-life	Yield,%**
Kr-85	10.4 years	0.3
Sr-89	50.4 days	5.3
Sr-90	28.9 years	5.8
Y-91	59 days	5.9
Zr-95	65 days	6.4
Tc-99	$2.12 \times 10^5$ years	6.2
Ru-103	39.8 days	3.7
Ru-106	1 year	0.5
I-131	8.05 days	2.9
Xe-133	5.27 days	6.1
Cs-137	30.2 years	6.3
Ba-140	12.8 days	6.2
Ce-141	32.5 days	6.0
Pr-143	13.76 days	6.0
Ce-144	285 days	5.6
Nd-147	11.06 days	2.6
Pm-147	2.64 years	2.6

duces fission of U-235

















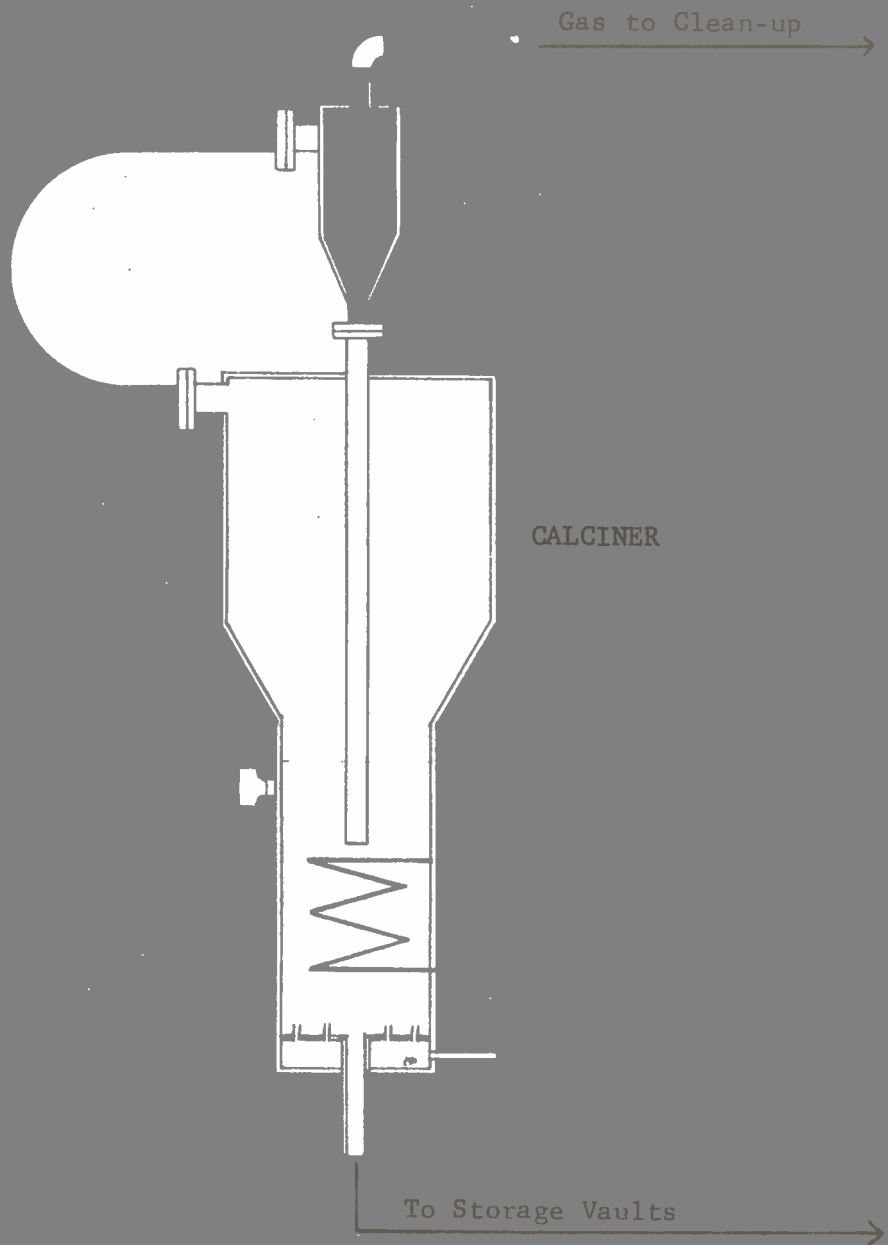


FIGURE 2. Fluidized-bed calcination







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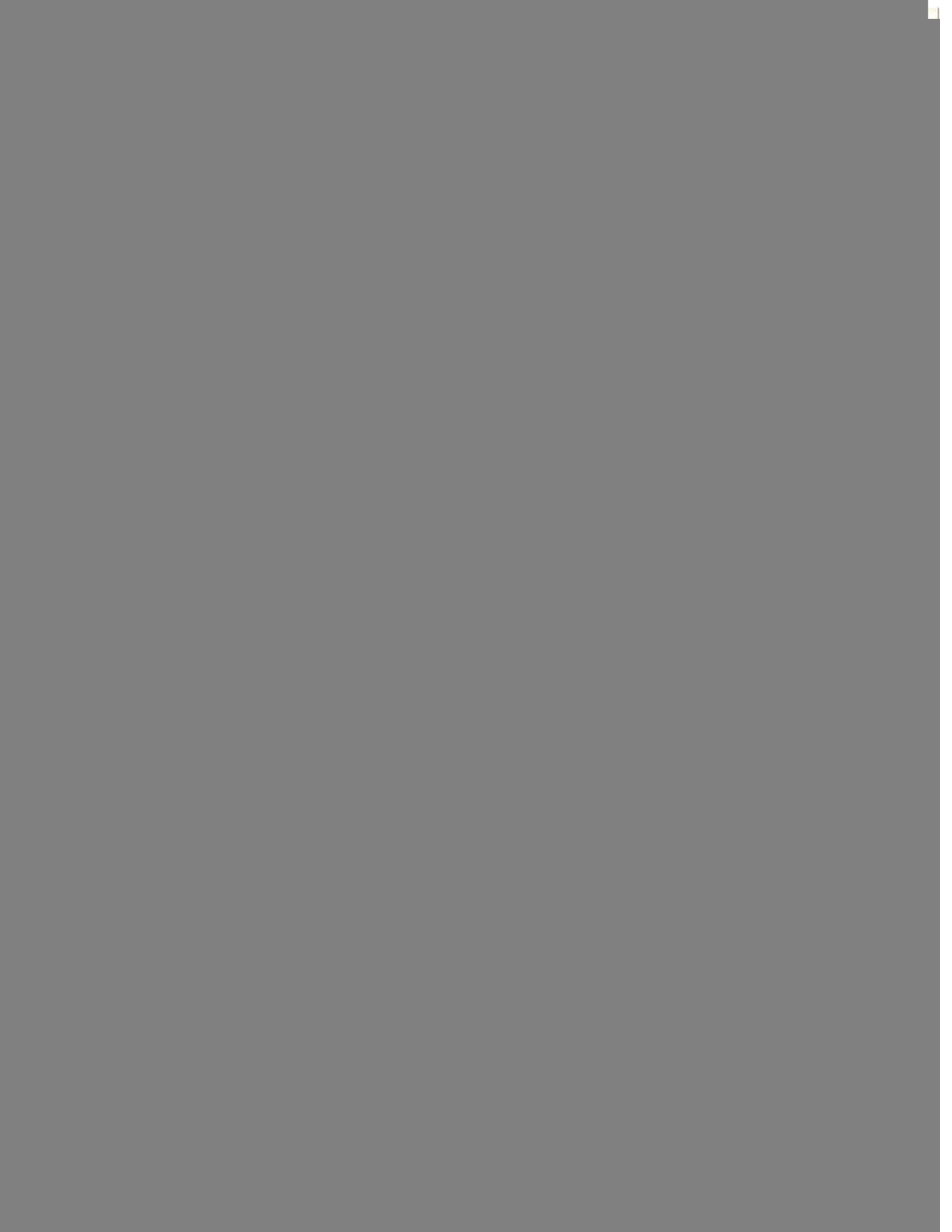
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FIGURE 3. Pot Calcination





FIGURE 4. Spray Solidification





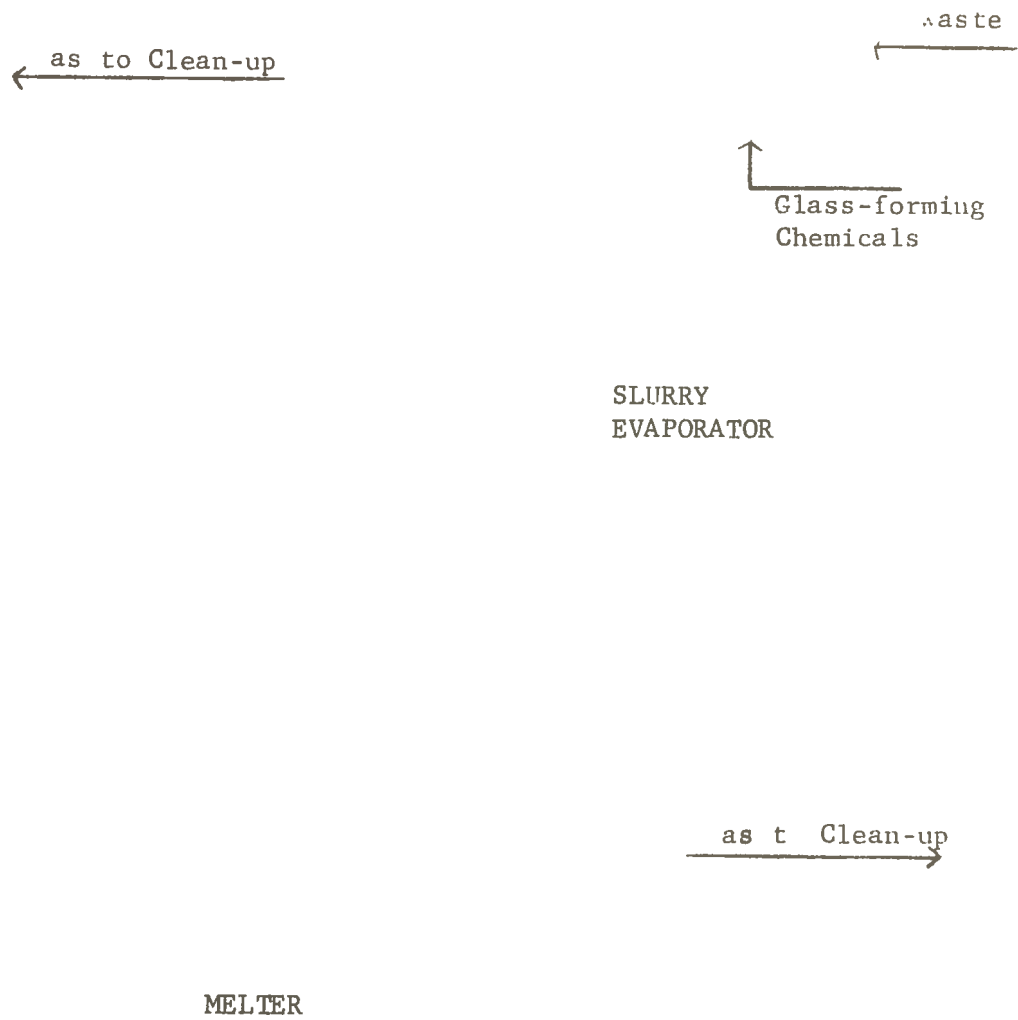


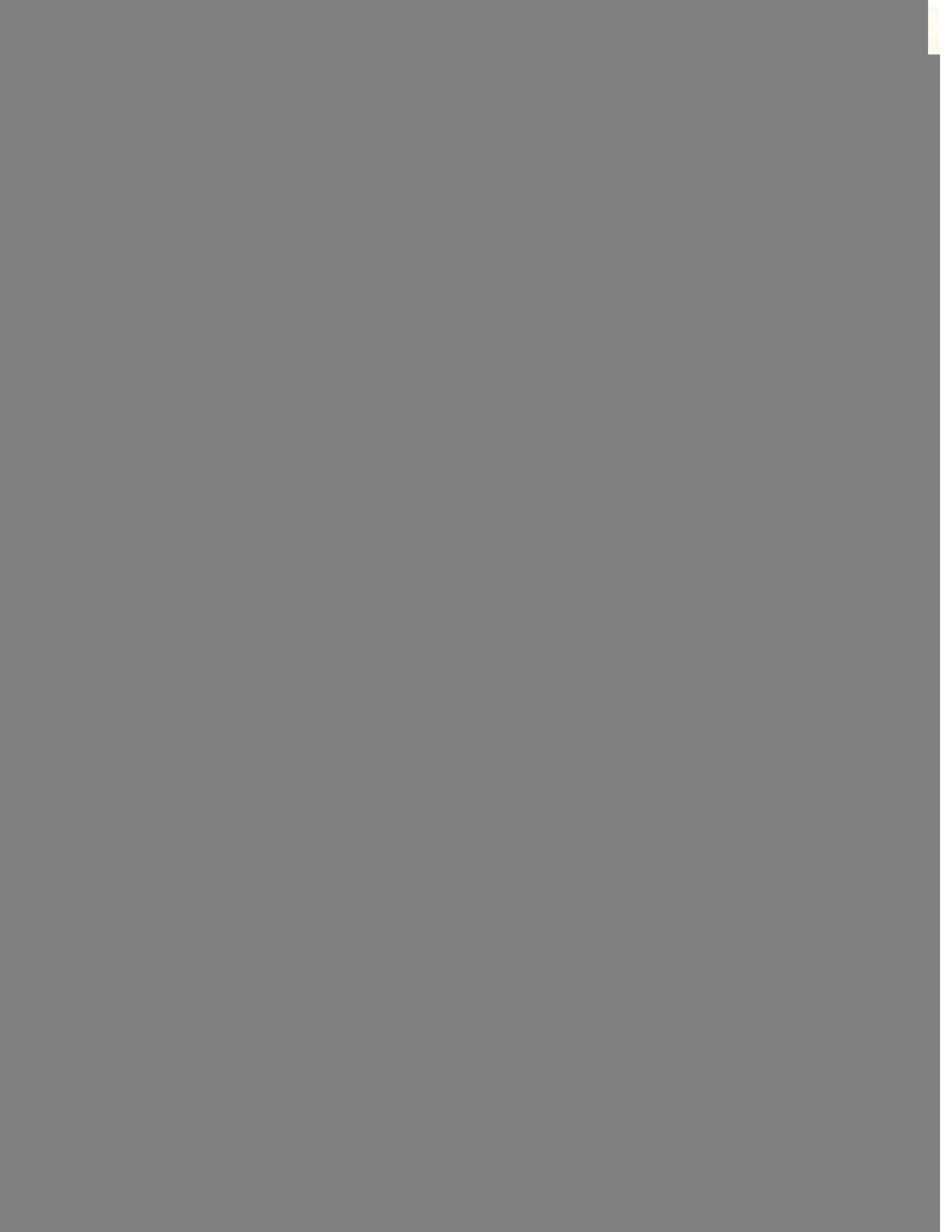
FIGURE 5. Phosphate-glass Solidification

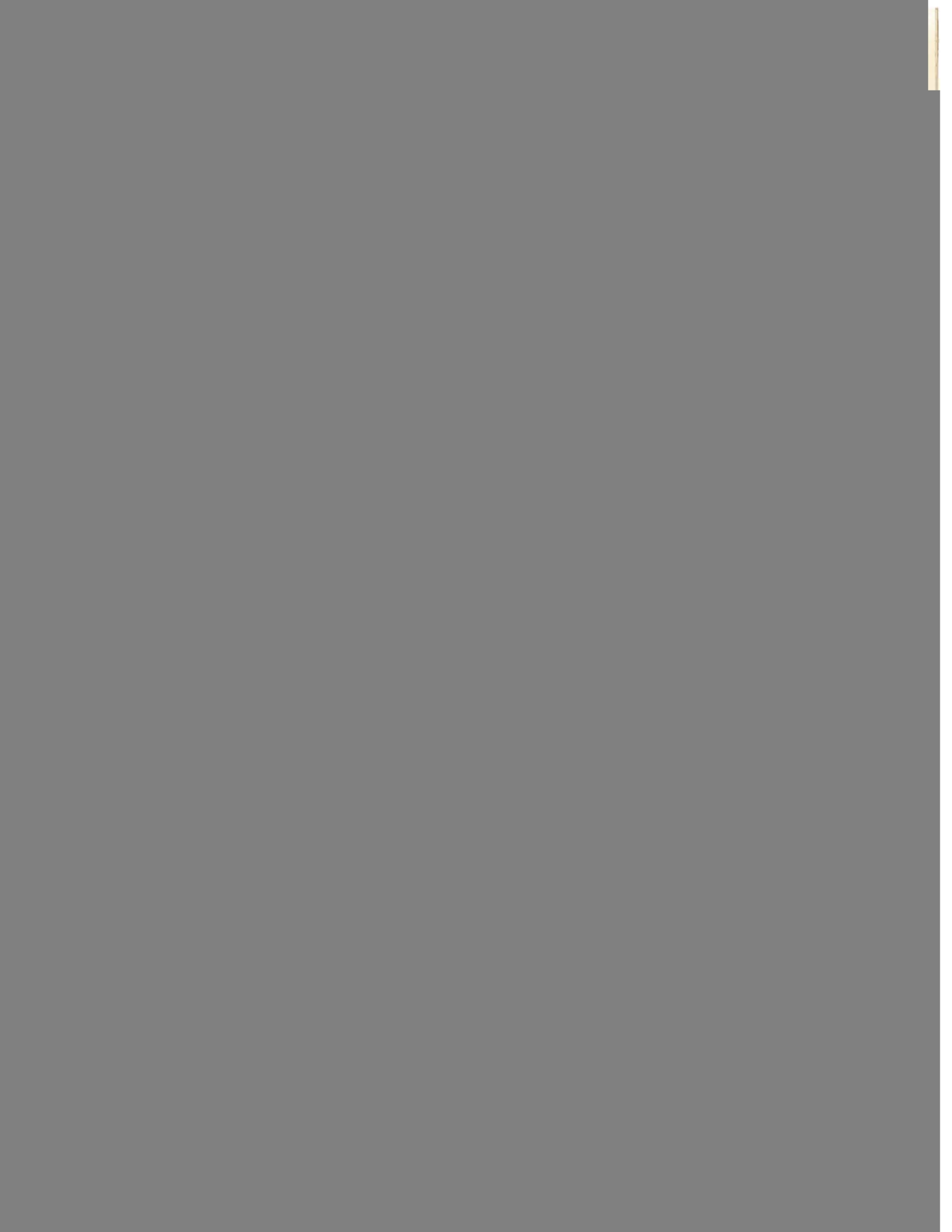












CHAPTER III







FIGURE 6. Vacuum Trap System Arrangement























TABLE 5

GELATION WITH INTERMEDIATE SOLVENT ETHYL ALCOHOL

.1		
.1		
1		
2		
2		
2		
.3	.681	2
3	.34	2
3	.17	2
6	.7377	2
6	.368	2
6	.184	2

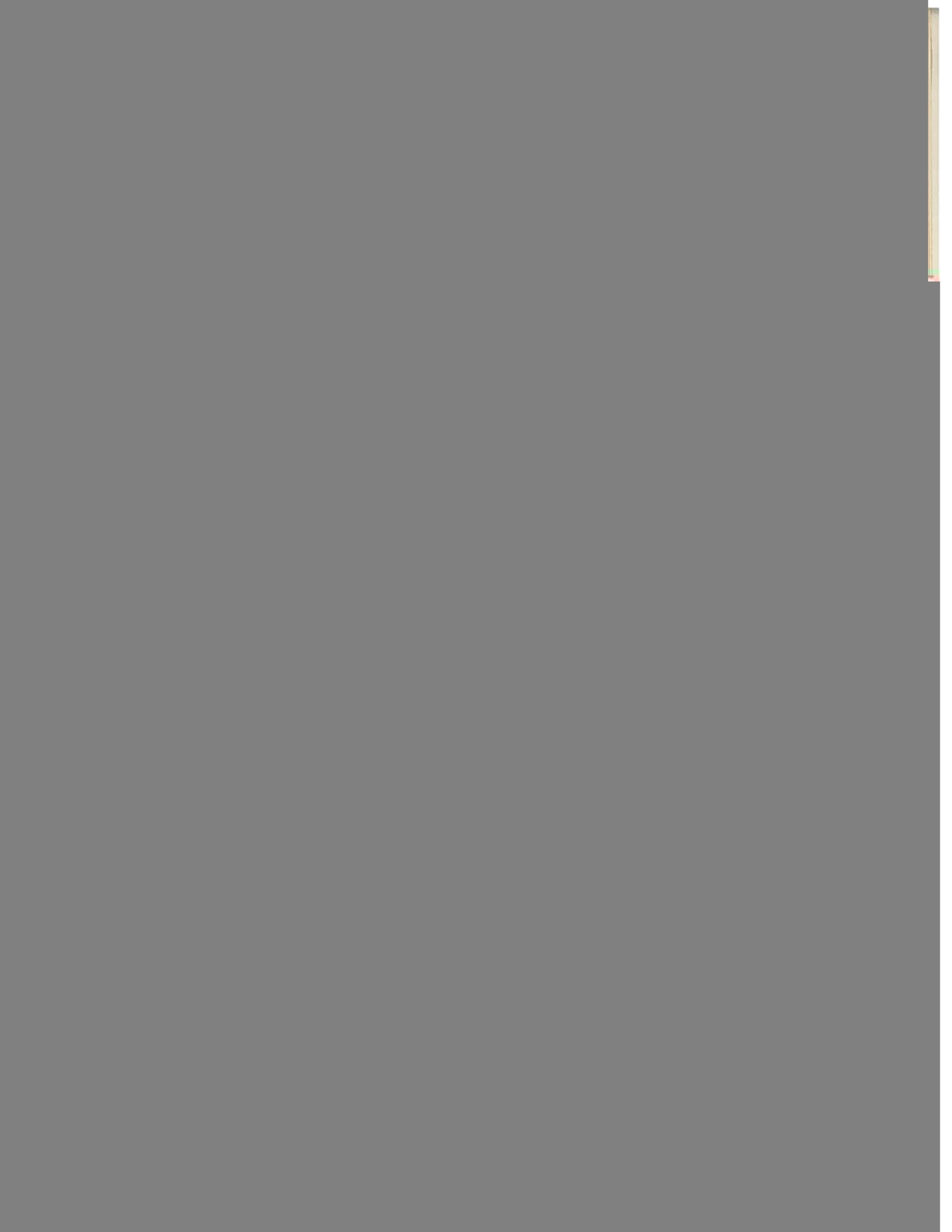
TABLE 5 -- Continued

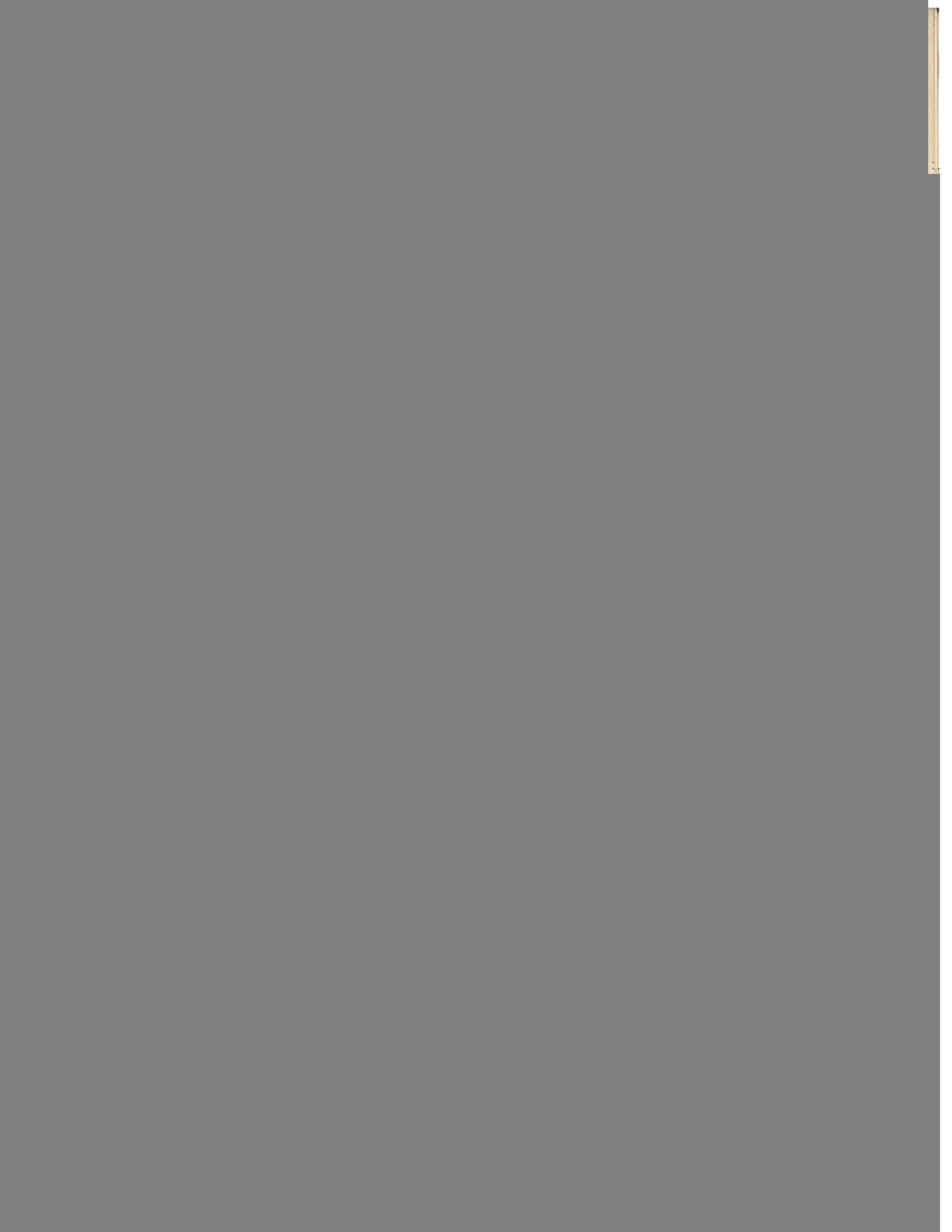
16	2	.8	.7944	4:1	28
17	2	1	.8512	4:1	33
18	2	1.2	.9079	4:1	37.5
19	2	1.4	.9647	4:1	41
20	2	1.6	1.021	4:1	44
21	2	1.8	1.078	4:1	47
22	2	2	1.134	4:1	50
23	2	1	.9728	3.5:1	33
24	2	1	1.134	3:1	33
25	2	1	1.361	2.5:1	33
26	2	1	1.702	2:1	33
27	1.5	1.5	2.269	1.5:1	50
28	1.5	1.5	3.4	1:1	50
29	2	2	3.4	1:1	66

\* Calculated with the thickener density being .8811 gm/cc











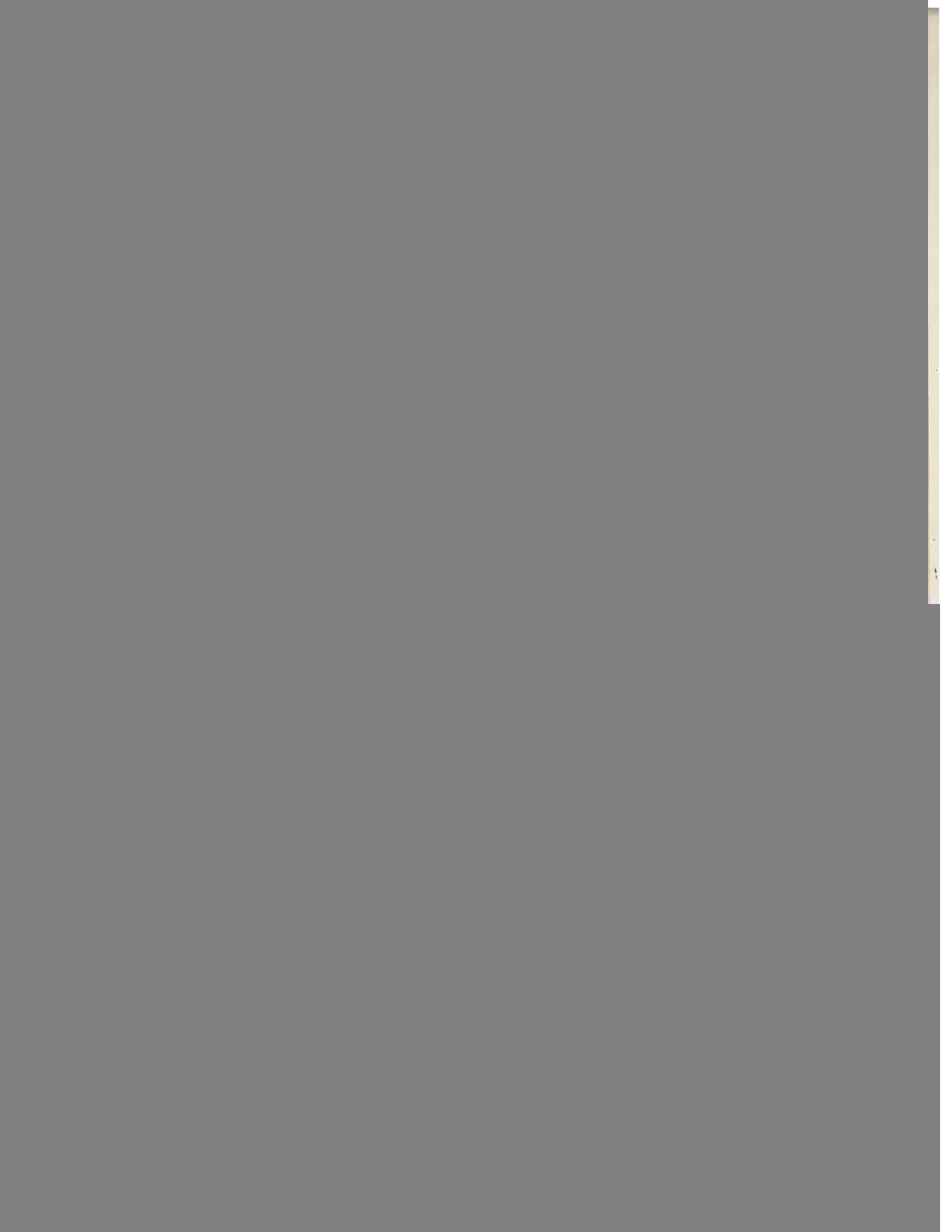
100  
90  
80  
70  
60  
50  
40  
30  
20  
Loss Due To Evaporation (Per Cent)







FIGURE 11. 0 en-cu Evaporation Loss from Toluene-base Gel at Ambient Temperature



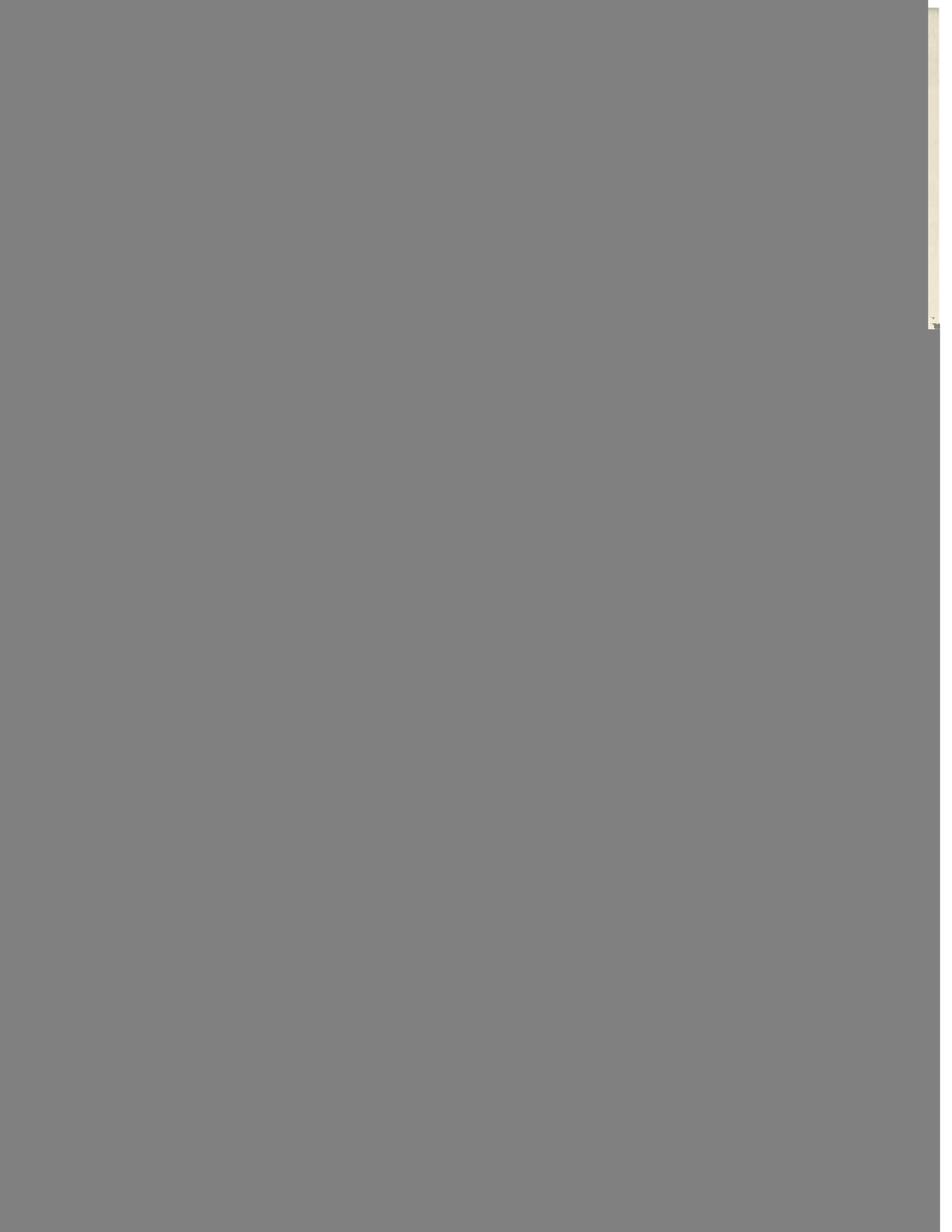






TABLE 8

TRITIATED WATER RECOVERY

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\*Insufficient data







TABLE 10

C-14 TAGGED TOLUENE RECOVERY



















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... at ...  
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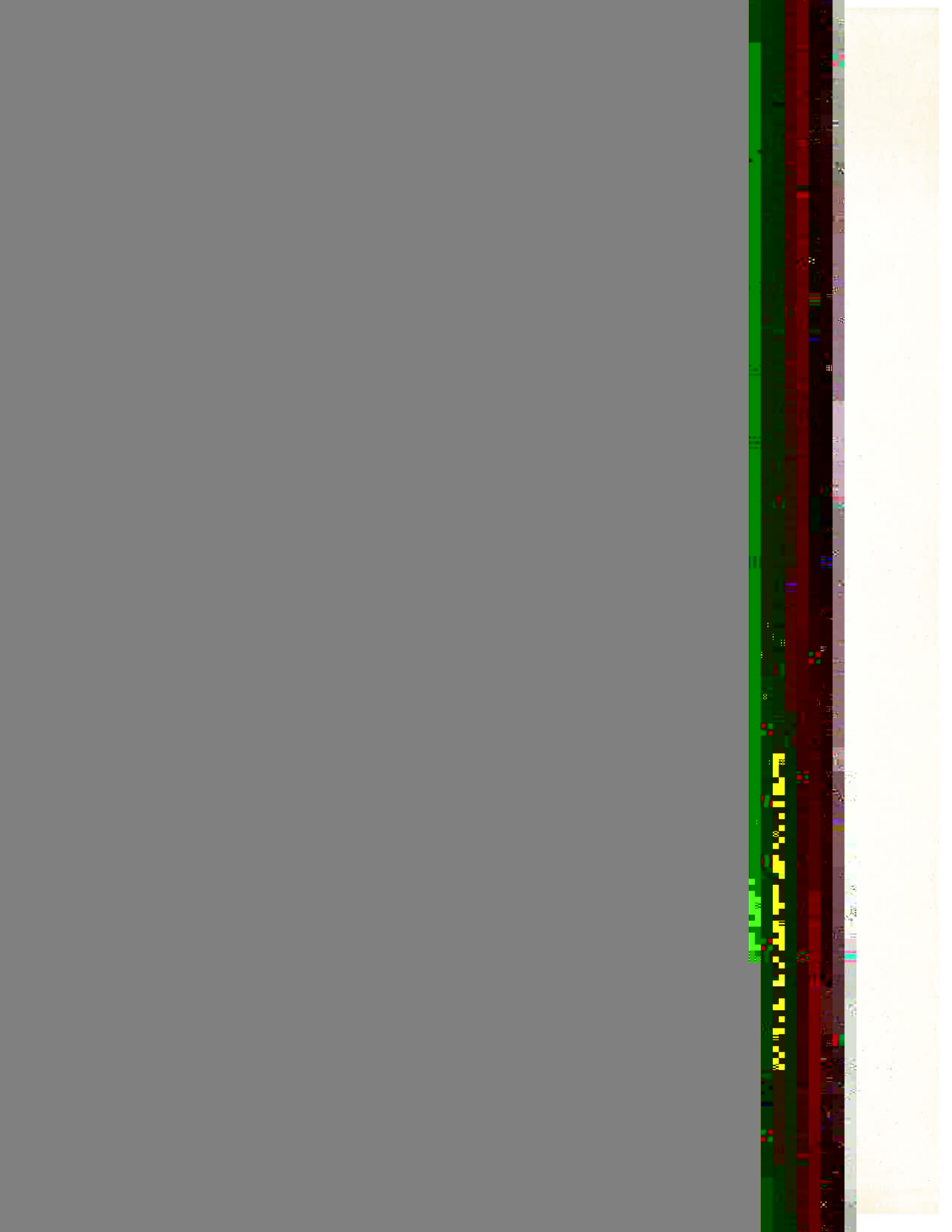
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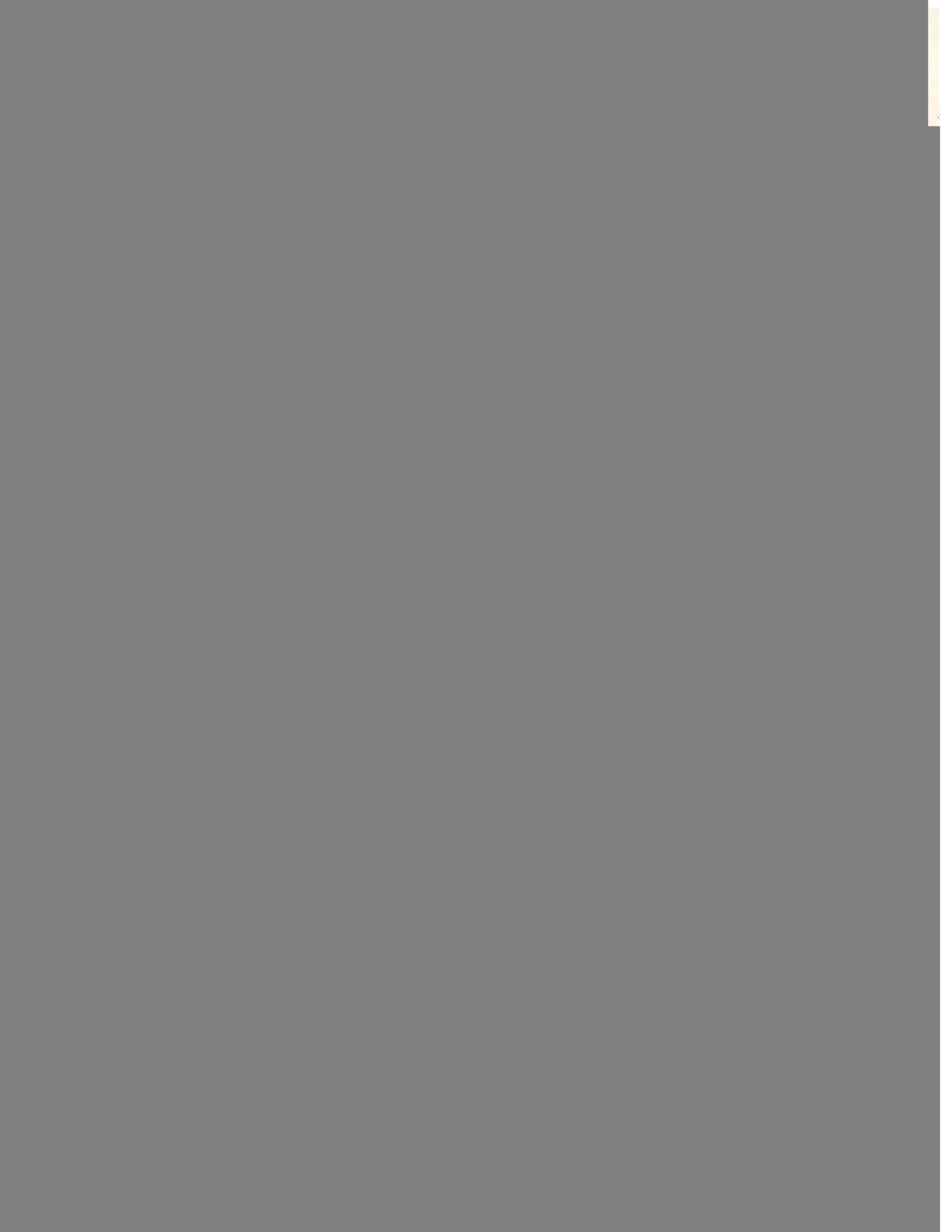
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