



# FATS AND PROTEINS RESEARCH FOUNDATION, INC.

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THE DIRECTOR'S DIGEST

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TECHNICAL DIRECTOR

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## ODOR CONTROL TECHNIQUES FOR THE RENDERING INDUSTRY

IIT Research Institute, under contract with FPRF, has underway an extensive study to develop effective, economical techniques for the control of odors from the rendering process. This research is supported in part by special grants from meat industry trade associations and by contract with the Environmental Protection Agency.

Appropriate design calculations were used in a computer program to compare the probable cost of controlling odors by incineration and by chemical scrubbing using a two stage packed tower scrubber. The data (Table 1) show clearly that the cost for odor reduction by a two stage packed tower scrubber is much more economical than incineration except for extremely high odor reduction ratios. Preliminary calculations for catalytic combustion show lower fuel costs than incineration (as expected) but investment and maintenance costs are higher so total costs are just as great as for incineration.

Exploratory "bubbler" experiments have been performed to determine the reactivity of various scrubbing solutions toward some of the compounds present in rendering odors. The results (Table 2) indicate that a number of the chemicals tested should be effective in scrubber solutions to remove rendering odors. Other chemicals tested were ineffective or only slightly reactive to the odorants. These included 5% hydrochloric acid, 5% nitric acid, 5% sodium carbonate, 1% ozone in water, 5% ferric chloride, 5% copper sulfate, 5% barium chloride and 5% aluminum chloride. Water alone completely removed butyric acid.

Preliminary experiments with the laboratory packed tower scrubber have indicated that the solutions effective in the bubbler experiments will remove the odorants in the laboratory scrubber.

Some additional odorous sulfur-containing and nitrogen-containing compounds have been identified in rendering plant emissions. Some of these will be tested in the experimental scrubber.

Table 1. Cost of Odor Control Treatment by Incineration and by Two Stage Packed Tower Scrubber

Flow CFM	Odor Reduction %	Incineration Reactor			Cost	
		Temp. °F.	Time sec.	Vol. cu.ft.	Investment	Total Yearly
5,000	99	1069	.7	164	\$24,500	\$22,540
	99.9	1082	1.0	237	28,500	23,800
	99.999	1111	1.5	362	34,000	25,700

  

Flow CFM	Odor Reduction %	Two Stage Scrubber** Tower			Investment	Total Yearly*
		Depth ft.	Diameter ft.	Pressure Drop in. Water		
5,000	99	5.1	7.1	.49	\$22,600	\$ 7,200
	99.9	7.7	7.1	.74	33,600	10,400
	99.999	12.8	7.1	1.23	55,600	50,000

\*Assuming 5,000 hours operation

\*\*Towers packed with 1½ in. Intalox Saddles

Table 2. Reduction of Various Odorants by Specific Reagents in "Bubbler" Experiments

Odorant	Percent Reduction by:				
	5% Sodium Hydroxide	Satd. Sodium Persulfate	5% Sodium Persulfite	0.6% Potassium Perma- ganate	1% Hypo- chlorite
Valeraldehyde	-	-	99	99	90
Propyl sulfide	90	99	None	99	99
1,6-Heptadiene	50	-	99	95	-
Butanedione	99	-	99	50	90

The work upon which this report is based was performed pursuant to Contract No. 68-02-0260 with the Environmental Protection Agency.