

乳制品设备原位清洗低泡清洗剂的制备

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摘要: C_{08-10} APG AES Na_2CO_3 Na_2SiO_3
 $Na_3C_6H_5O_7$
0.4% C_{08-10} APG/AES 3:1 4%
 $Na_2CO_3/Na_2SiO_3/Na_3C_6H_5O_7$ 6:5:9 20%
95.3% 0.001%
92.33% 93.14% 7 d 91.08% 92.93%

关键词:

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Preparation of the low foam cleaning agent for in situ cleaning of dairy equipment

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Abstract The low foam cleaning agent for in situ cleaning of dairy equipment was formulated with alkyl polyglycoside C_{08-10} APG sodium polyethoxy fatty alcohol sulfate AES sodium carbonate Na_2CO_3 sodium silicate Na_2SiO_3 sodium citrate $Na_3C_6H_5O_7$ and glutaraldehyde as main constituents. The composition and dosage of the surfactants were screened and determined in accordance with the standard of low foam volume requirement through the Shaking - flask method. The formulation of additives was decided by using orthogonal experimental design results. The laboratory test results show that with the mass ratio of C_{08-10} APG to AES as 3:1 and the total surfactant content as 4% foaming power of the detergent product achieves rather lower level with a mass fraction of 0.4% dimethicone as the defoaming agent. With the mass ratio of $Na_2CO_3/Na_2SiO_3/Na_3C_6H_5O_7$ as 6:5:9 as well as the total additives mass fraction of 20% the detergent product offers a high cleaning rate of 95.3% with high stability. The antibacterial test results show that the sterilization rate for *Escherichia Coli* and *Staphylococcus aureus* of the sample with 0.001% glutaraldehyde achieves 92.33% and 93.14% respectively as well as 91.08% and 92.93% respectively after 7 d.

Key words low foam cleaning agent dairy equipment glutaraldehyde

10 2014

1.3 表面活性剂的选择方法

2%

2009

11

100 mL

500 mL

20

0 5 10 min

3

2

CIP

1:0 4:1 3:1 2:1 1:1

0:1

2%

1 实验部分

1.1 主要试剂与仪器

C₀₈₋₁₀ APG

8 ~ 10

50%

LAS

2%

20

α -

AOS

92%

AES

70%

EDTA

DF - II

GFL - 45

FA25

FLUKO

RE - 201D

YXQ - LS - 50A

1.2 实验过程

1 L

60 ~ 70 °C

20 min

EDTA C₀₈₋₁₀ APG AES

20

pH = 8.0 ~ 8.8

1.4 配方助剂的选择

1.5 去污率的测定

m₁

6 h

m₂

2%

500 mL

1 L

60 °C

50 r/min

10 min

60 °C

6 h

m₃

D

1

$$D = \frac{m_2 - m_3}{m_2 - m_1} \times 100\%$$

1

1.6 杀菌试验及效果对比

1

120 °C

2 h

2

1 L

250 mL

100 mL

3

1 L

250 mL

100 mL

4

0.1 MPa

0.5 h

5

37 °C

24 h

6

1 mL

37 °C

24 h

7

1 μL

8

10 50

100

20 mL

1 μL

9

表1 表面活性剂的泡沫性能

Tab. 1 Foaming performance of surfactants

t/min	V/mL			
	C ₀₈₋₁₀ APG	LAS	AES	AOS
0	525	537	496	552
5	373	423	263	446
10	253	302	132	413

1.7 稳定性试验

24 h 40 ± 1 °C
 5 ± 2 °C 7 d
 - 10 ± 2 °C

表2 加消泡剂后各表面活性剂的泡沫性能

Tab. 2 Foaming performance of surfactants with defoaming agent

t/min	V/mL			
	C ₀₈₋₁₀ APG	LAS	AES	AOS
0	365	401	361	502
5	11	17	19	213
10	6	10	10	175

24 h

2 结果与讨论

2.1 表面活性剂的选择

2.1.1 单一表面活性剂的泡沫性能

1 0.4% 2
 1.3 0.4% 3
 0 5 10 min 3

2.1.2 复配体系的泡沫性能

表3 各复配体系加消泡剂后的泡沫性能

Tab. 3 Foaming performance of blend systems with defoaming agent

	V/mL								
	C ₀₈₋₁₀ APG/AOS			C ₀₈₋₁₀ APG/LAS			C ₀₈₋₁₀ APG/AES		
	0 min	5 min	10 min	0 min	5 min	10 min	0 min	5 min	10 min
1:0	365	11	6	365	11	6	365	11	6
4:1	449	93	59	513	59	38	332	29	12
3:1	463	88	40	423	83	46	226	9	3
2:1	521	129	83	398	100	42	243	13	9
1:1	463	103	73	371	43	21	313	10	6
0:1	502	213	175	401	17	10	361	19	10

3 C₀₈₋₁₀APG/AES 0.4% 6%
 3 C₀₈₋₁₀APG/AES 5% 9% 95.3%
 m C₀₈₋₁₀APG : m AES = 3:1 33.6%

2.2 正交试验确定最佳助剂配方

4%
 m C₀₈₋₁₀APG : m AES = 3:1
 0.4%

2.3 杀菌试验

2.3.1 杀菌清洗剂的杀菌效率

L₉ 3⁴ 4 100 1.6 10 50
 4 6.8 1.4 0.7 5

表4 去污率正交试验表
Tab.4 Orthogonal design of stain removal

	<i>w</i> /%	<i>w</i> /%	<i>w</i> /%		<i>D</i> /%
1	2	3	7	1	84.3
2	2	5	9	2	86.9
3	2	7	11	3	85.6
4	4	3	9	3	86.7
5	4	5	11	1	87.1
6	4	7	7	2	85.6
7	6	3	11	2	92.6
8	6	5	7	3	93.1
9	6	7	9	1	91.6
<i>k</i> ₁	85.6	87.9	87.7	87.7	
<i>k</i> ₂	86.5	89.0	88.4	88.4	
<i>k</i> ₃	92.4	87.6	88.4	88.5	
<i>r</i>	6.8	1.4	0.7	0.8	

表5 杀菌试验结果
Tab.5 Results of antibacterial test

<i>w</i> /%	/	5 min	/%
10	0.01	98.36	97.69
50	0.002	95.25	96.52
100	0.001	92.33	93.14

5 3

6 750 000 CFU/mL
4 930 000 CFU/mL

5

0.001%

92.33% 93.14% QB/T 2850 - 2007 ≥90%

2.3.2 清洗剂的杀菌持续性

7 d

6

表6 持续杀菌试验结果
Tab.6 Results of continuous antibacterial test

<i>w</i> /%	/	5 min	/%
10	0.01	96.57	96.63
50	0.002	95.12	95.72
100	0.001	91.08	92.93

6 3

5 450 000 CFU/mL
9 330 000 CFU/mL

6

7 d

90%

2.4 稳定性试验结果

40 ± 1 - 10 ± 2 °C

24 h

5 ± 2 °C 7 d

3 结论

1 C₀₈₋₁₀ APG/AES 3:1

4% 0.4%

Na₂CO₃/Na₂SiO₃/

Na₃C₆H₅O₇ 6:5:9

20%

95.3%

2

100

92.33%

93.14% 7 d

91.08% 92.93%

3

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