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TO: E.W. O'Rorke - R.C. Aungst

PRELIMINARY EVALUATION OF PENNSALT A-10 AND TURCO "AVIATION"
 CLEANER FOR CLEANING ALUMINUM CAPS AND CANS

INTRODUCTION

The Process Unit has requested the Present Canning group to evaluate two alkaline cleaners, Pennsalt A-10 and Turco "Aviation" Cleaner, as possible substitutes for the present trichloroethylene vapor degreaser and Duponol wash. Disadvantages of the present cleaning procedure are:

1. Ineffectiveness
2. Expense
3. Toxicity of trichloroethylene.

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SUMMARY

The alkaline cleaners Pennsalt A-10 and Turco "Aviation" Cleaner were tested and compared with an alkaline cleaner made from Na_2CO_3 and Na_3PO_4 and with the present cleaning method. With available equipment Pennsalt A-10 and Turco "Aviation" Cleaner did not remove grease and dirt as well as the present cleaning method. A solution of Na_3PO_4 and Na_2CO_3 was the best degreaser tested although it did etch the surface of the cap.

DETAILS

Experimental Procedure: Machined caps for four-inch slugs were used to compare Pennsalt A-10 and Turco "Aviation" Cleaner to the standard procedure of degreasing aluminum components as they are the dirtiest and greasiest

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components available. The grease and dirt found on these machined caps are easily wiped off of polished surfaces but are unusually resistant to chemical cleaners. Grease and dirt are also found in imperfections on the cap caused by mechanical marring during machining. Grease and dirt are more difficult to remove from these irregular surfaces than from smooth surfaces. The recommended conditions for use of these cleaners were:

1. *Pennsalt A-10; 3/4 to 1-1/2 oz/gal at 60 to 82°C; spray type machine.
2. *Turco "Aviation" cleaner; 5 oz/gal at 80 to 84°C.
3. **Sodium carbonate (Na_2CO_3); 3 oz/gal.

Trisodium phosphate (Na_3PO_4) 3 oz/gal.

Temperature: 60 to 82°C

Time: 1 to 3 minutes

4. Standard Degreasing Method.

Trichloroethylene vapor degreaser

- a. Suspend in vapors for 4 to 5 minutes.
- b. Immerse in cold side of degreaser for 2 minutes.
- c. Cool in air for 10 minutes.
- d. Suspend in vapor for 3 minutes.
- e. Cool to room temperature.

Duponol wash consisting of:

Duponol ME 0.1% $\pm$ 0.01% by weight

Tetrasodium pyrophosphate 0.1% $\pm$ 0.01% by weight

Temperature: 60°C $\pm$ 5°C

- a. Immerse in Duponol wash for 6 1/4 min. $\pm$ 1/4 min.
- b. Rinse in hot flowing water at 50 to 60°C.
- c. Rinse in cold flowing water.

For use in this test the following degreasing methods were used:

1. Pennsalt A-10 with a concentration of 1 1/2 oz/gal with a pH of 11.8 and at a temperature of 72 to 78°C. Immersion time was 8 minutes with an intermittent stirring action of each cap with a pair of tongs. The cleaning bath was followed by a hot water wash of 53°C and a cold water wash of 19°C.

* Manufactures recommendations

** "Plating", p. 265, March, 1952.

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2. Turco "Aviation" Cleaner with a concentration of 5 oz/gal with a pH of 11.9 and at a temperature of 80 to 84°C. Immersion time was 8 minutes with an intermittent stirring action of each cap with a pair of tongs. The cleaning bath was followed by a hot water wash of 56°C and a cold water wash of 19°C.
3. The normal cleaning method of a trichloroethylene vapor degrease followed by a standard Duponol wash with a pH of 9.6. The method used is the same as the standard degreasing method previously mentioned.
4. Na_2CO_3 and Na_3PO_4 solution with a concentration of 3 oz/gal of each compound with a pH of 11.7 and at a temperature of 70 to 72°C. Immersion time for each cap was 1 minute with no stirring action. The cleaning bath was following by a cold water wash of 19°C.
5. A standard trichloroethylene vapor degrease. (No Duponol wash)
6. A standard trichloroethylene vapor degrease followed by Pennsalt A-10 as described above. (No Duponol wash.)
7. A standard trichloroethylene vapor degrease followed by Turco "Aviation" Cleaner as described above. (No Duponol wash.)

Experimental Results: The results on each cleaning method were:

1. Pennsalt A-10. This cleaner was analyzed by the Spectrochemical Laboratory and was found to contain strong amounts of sodium and silicon. The cleaning action of this cleaner was very slight and did not remove the grease from the polished surfaces. This cleaner upon use became cloudy in appearance but did not precipitate or float any solid material.
2. Turco "Aviation" Cleaner. This cleaner was analyzed by the Spectrochemical Laboratory and was found to be strong in sodium and silicon, moderate in phosphorous, and moderate to strong in boron. The cleaning action of this material was somewhat better than that of Pennsalt A-10 but it still did not remove all of the grease from the polished surfaces. This material foams easily and floats grease and dirt to the surface forming a scum on the bath surface.
3. Normal Cleaning Procedure. (Trichloroethylene followed by a Duponol wash). This method removes all but the most tenacious grease and dirt in the marks and imperfections on the surface of the cap.

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4. Na_2CO_3 and Na_3PO_4 Solution. This cleaner not only removes all of the grease and dirt but also slightly etches the surfaces of the cap. The change in diameter was -0.0015 in. to -0.0001 in. with an average change of -0.0005 in. This solution produces a large amount of floc which settles out as a sludge in the bath container.
5. Trichloroethylene. This method removes most of the grease and dirt on the polished surfaces and some of the grease and dirt from the mars and imperfection on the surface.
6. Trichloroethylene Followed by Pennsalt A-10. There is no apparent difference between this method and trichloroethylene degreasing alone.
7. Trichloroethylene Followed by Turco "Aviation" Cleaner. There is no apparent difference between this method and trichloroethylene degreasing alone.

A list of the various methods of degreasing in order of their descending ability to remove grease and dirt is as follows:

1. Na_2CO_3 and Na_3PO_4 .
2. Normal cleaning method (trichloroethylene plus Duponol wash).
3. (a). Trichloroethylene.
(b). Trichloroethylene plus Pennsalt A-10.
(c). Trichloroethylene plus Turco "Aviation" Cleaner.
4. Turco "Aviation" Cleaner.
5. Pennsalt A-10.

This is a preliminary investigation of the use of Pennsalt A-10 and Turco "Aviation" Cleaner. These cleaners will be re-evaluated when spray cleaning equipment is available.

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