Henkel Technologies

TECHNICAL BULLETIN

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LIQUID CHROME REDUCTOR

1. INTRODUCTION

Henkel Surface Technologies supplies a number of chromium containing compounds for various metal treatment procedures. From time-to-time, solutions or rinses containing these compounds may require dumping. Stringent pollution control regulations in many areas prohibit the disposal of hexavalent chromium compounds into sewage systems. This bulletin presents a simple and economical treatment process, which will provide environmentally safe waste water.

2. THE PROCESS

The process removes the chromium compounds via two steps. In the first step, the hexavalent chromium is reduced with **Liquid Chrome Reductor.** The second step involves the formation of insoluble chromium hydroxides, which precipitate and settle to the bottom portion of the solution. The upper, chromium-free water, is safe to dump as waste water. The settled sludge is disposed of via a registered waste disposal company at regular intervals.

3. EQUIPMENT

The whole treatment operation may be carried out in one tank, e.g. the solution tank or rinse tank. However, sufficient time must be available for complete settling of the sludge. It is more convenient to transfer the treated water to another tank for settling so as not to hold up the use of the main solution tank. Adequate stirring must be available to dissolve the treatment products.

Alternatively, treatment may be carried out in a continuous system, consisting of a pH adjustment and chrome reduction tank, a precipitation tank and a final settling tank.

4. TREATMENT PROCEDURE

1. Chromate waste water is pumped into the treatment tank.

2. The pH of the waste water is adjusted to about 2.0 with hydrochloric acid or sulphuric acid, if required. The use of an automatic pH controller is recommended.

3. The amount of hexavalent chromium in the solution is then determined as outlined in Section 5.

4. The amount of **Liquid Chrome Reductor** required is then calculated as in Section 6.

5. The solution is mixed thoroughly and the pH of the bath is maintained between 2.0 and 2.5. The bath will turn a dark blue-green colour as the chromium is reduced to the trivalent form. Allow at least 30 minutes.

6. The treated water may now be pumped over to the precipitation tank.

7. Chrome precipitator is now added in sufficient quantity to raise the pH to between 7.0 and 8.0.

8. The mixer is stopped and solids are allowed to settle. The clear water can then be pumped off into the regular sewage system. Settlement may take from hours to several days.

9. The sludge can be scooped or shoveled into drums for pick up by a waste disposal company. The longer the solution is allowed to settle, the more compact the resulting sludge.

5. HEXAVALENT CHROMIUM TITRATION

The amount of hexavalent chromium present in the waste water is determined via the following procedure:

1. Pipette a 5 ml sample of the waste water into a beaker or flask and dilute to approximately 100 ml.

2. Add a few crystals or 5 ml of 20% Potassium Iodide solution.

3. Add about 15 ml of concentrated Hydrochloric Acid or Sulphuric Acid to the flask and mix.

4. After approximately one minute, titrate the solution with 0.1N Sodium Thiosulphate until a straw colour is obtained.

5. Add several millilitres of Soluble Starch Solution and continue the titration with 0.1N Sodium Thiosulphate until the blue-black colour disappears. (At the end point, a light green colour due to trivalent chromium will be evident.)

5. HEXAVALENT CHROMIUM TITRATION

6. Record the number of millilitres of 0.1N Sodium Thiosulphate used as hexavalent chromium titration.

Note: Where solutions contain only small amounts of hexavalent chromium, larger sample sizes are necessary, i.e. 25 ml or 100 ml. The titration obtained is then reduced proportionately, to that of a 5 ml sample size.

(For a 5 ml sample, number of mls x 350 = ppm hexavalent chrome).

6. LIQUID CHROME REDUCTOR REQUIRED

Add 5.0 ml of **Liquid Chrome Reductor** per litre of waste water for each millilitre of hexavalent chromium titration.

Example : A 100 ml sample titrated 4 ml. Therefore, a 5 ml sample would have titrated 1/20 of that value, or 0.20 ml. Theoretically, this solution would require about 1.0 ml of **Liquid Chrome Reductor** per litre of solution.