

Cleaning Components To Ensure Corrosion Has Been Effectively Eliminated

Components such as aluminum, carbon steel, and chrome are normally part of your rebuilding project. For the past 20 odd years, I have been involved in chemical cleaning activities. During this time period, procedures have been developed to deal with corrosion problems in industrial applications. We have discovered a procedure to clean the piston from Albert's motorcycle, which was badly rusted and had aluminum oxide contaminates. Albert attempted to release the piston and rings from the cylinder wall utilizing a commercial product called muriatic acid (or hydrochloric acid). It is very important that we understand if aluminum is placed in contact with a mineral acid such as this, or a basic solution such as caustic soda, it will completely destroy the aluminum components by dissolving them. I've discovered that a cleaning solution we use to pickle new components (remove millscale and welding slag of piping systems for water, oil, etc) can be used to clean the aluminum components.

To clean the piston and carbon steel rings, I prepared a bath of 1L water, with a blend of 4% citric acid, 4% aqua ammonia, and 0.1% corrosion inhibitor. The pH of this must be adjusted to 7.5 either with the addition of acid or ammonia. Utilizing a hot plate and thermometer, the mixture of chemicals and water was heated to 85C (180F). The piston and rings were placed in the solution for approximately 2 hours and monitored very closely to ensure no excess corrosion took place to the components of the piston (which included a carbon steel wrist pin keeper). Following 2 hours of close monitoring, the piston was removed and the rings were free. The rings were removed from the piston (very carefully) and placed in the cleaning solution to finish the job. One hour later, the precleaned piston and rings were reassembled and returned to the owner, ready for installation.

During the rebuilding processes, sandblasting activities take place to remove rust, etc from components prior to painting. If some of the rust is not reached because of the construction of the piece, the chemical cleaning method is able to penetrate and take care of the hidden corrosion. The piece can then be finished with painting, rechromeing, polishing, etc. This process can easily be done at home (not in the kitchen, the wife will kill you, do to the stink of ammonia).

***Important* Make sure area is well ventilated before handling chemicals. Also, wear safety glasses and rubber gloves.**

1. For every 1L (1000 mL) of water, blend the following:
 - 40g of citric acid equals a 4% concentration *by weight*.
 - 40mL of 30% aqua ammonia
 - 1mL of corrosion inhibitor
2. This balance of citric acid and aqua ammonia will achieve a pH balance of approx 7.5 (critical). If pH is slightly off, adjust with addition either ammonia or acid.
3. Add in 1mL corrosion inhibitor to achieve a 0.1% concentration.

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Equipment required:

- Container for mixing and cleaning of components
- Stir stick (e.g. paint stir stick, spoon, etc.)
- Hot plate (electrical)
- Thermometer
- Syringes for measuring liquid chemicals (10 mL and 1mL syringe)
- Scale for measuring solid chemicals
- pH paper to measure pH levels of mixture

For the removal of aluminum oxide (whitish powder corrosion that is found on aluminum components) a blend of phosphoric acid and surfactants will remove this corrosion at room temperature. This particular blend was developed for cleaning of aluminum fin-fan type aerial coolers.

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Note: If you want to attempt these procedures, contact George Kerr, 403-487-8688 or email him at george91@telus.net