

Scope

ARDROX 188 is an alkaline powder blend containing an oxidising material. It is primarily intended as an aid in removing difficult heat scale such as those produced on high chromium steels and nickel and cobalt alloys, which are notoriously difficult to remove even with strong acids. ARDROX 188 will not normally remove such scales by itself, but will chemically and physically modify them in such a manner as to make them more easily removable by milder and less dangerous methods than the use of strong acids.

The main field of use for ARDROX 188 is the overhaul of "hot end" components of gas turbine engines. ARDROX 188 has also been found useful for the removal of adherent carbon smut produced after heat treatment.

Chemicals required

ARDROX 188

Method of use

ARDROX 188 is used at a concentration of 160 g/l in water and at an operating temperature of 95-100°C.

When making up a new bath the following procedure should be adopted:-

Fill the tank three quarters full with cold water. Add ARDROX 188 powder whilst agitating the solution. Fill the tank to the required volume with water and then heat up to the operating temperature.

The product must not be allowed to form a concentrated layer at the bottom of the tank.

It is essential that the bath is fitted with an automatic water make-up device to maintain the volume. If evaporation proceeds too quickly the concentrated solution will tend to decompose and lose its efficiency.

The use of ARDROX 188 will normally be combined with ARDROX 1871, ARDROX 1873 or ARDROX 1873A as a process sequence.

Method of control

Changes in the composition of Ardrox 188 solutions occur in the following ways:

- > evaporation of water,
- > drag-out losses,
- > reduction of the oxidising agent,
- > carbonation of the alkali.

Testing chemicals and equipment required

1x 50 ml burette (graduated to 0.1 ml)
1x 10 ml pipette
1x 25 ml pipette
1x 250 ml Erlenmeyer flask
1x 250 ml beaker
3x 100 ml beakers
3x 50 ml measuring cylinders
sintered glass filter
hotplate
pH meter and suitable electrode assembly
magnetic stirrer (optional)
thermometer (0 ... 100°C)
barium hydroxide solution (saturated)
1.0 N sulfuric acid
0.2 N oxalic acid

Method

Before sampling, restore the volume of the solution to its original level with water and thoroughly mix.

Take a sample from the bath and immediately filter through a sintered glass filter. Pipette 10 ml of the hot filtered solution (use a safety pipette or suction device) into a 100 ml beaker containing 50 ml of saturated barium hydroxide solution. Shake well and filter through a sintered glass filter.

Pipette 25 ml of the filtrate into a 250 ml Erlenmeyer flask, add 40 ml of 1.0 N sulfuric acid and 50 ml of distilled water. Heat to 70 ... 80°C on a hot plate and titrate with 0.2 N oxalic acid to the absence of the brown precipitate (MnO_2) produced during the initial stages of the titration. A small quantity of slightly pink or grey precipitate will remain (BaSO_4). Let the volume required to dissolve the last traces of brown precipitate be V1 ml.

Pipette 10 ml of the hot filtered bath sample into a beaker, dilute with 50 ml of distilled water and cool to room temperature. Carry out a pH titration using 1.0 N sulfuric acid to a pH of 11.0. Let this titration be V2 ml.

(NB in view of the etching effect of strong solutions of sodium hydroxide on glass, it is recommended that one pH electrode is used solely for Ardrox 188 determinations. After use it should be thoroughly rinsed in water and left in 1.0 N hydrochloric acid until next required)

Potassium permanganate g/l = 1.517 x V1 ml.

For a new bath this should be 60 g/l.

Sodium hydroxide g/l = 4 x V2 ml.

For a new bath this should be 100 g/l.

Bath replenishment

If the bath is dark purple

Restore the concentration of potassium permanganate to 60 g/l by addition of Ardrox 188 at 2.67 g/l for each 1 g/l of potassium permanganate required. Each 2.67 g/l will also increase the sodium hydroxide level by 1.67 g/l. The concentration of potassium permanganate should not be allowed to drop below 30 g/l; there is no critical upper limit.

The concentration of sodium hydroxide should be in the range 80 ... 120 g/l. If, when the bath has been corrected for potassium permanganate strength, the sodium hydroxide concentration is still low, then add the requisite amount of caustic soda (100° TW) to restore the concentration to 100 g/l.

If the bath is dark green

In this case the potassium permanganate concentration will be found to be very low and the bath should be corrected for sodium hydroxide concentration first by addition of Ardrox 188 at 1.6 g/l for each 1 g/l of sodium hydroxide required. Each 1.6 g/l will also increase the potassium permanganate concentration by 0.6 g/l. When this has been done, make up the remaining deficiency of potassium permanganate by adding potassium permanganate technical grade as required.

Effects on materials

When ARDROX 188 is used in the prescribed manner no significant corrosion will take place on ferrous alloys and "Nimonic" alloys but aluminium, tin and zinc will be attacked.

Technical information

Appearance: Purple and white, speckled powder.

The product will absorb water from the atmosphere and containers should be kept tightly closed.

Equipment materials

Stainless steel (Grade 304 or equivalent) is recommended for the construction of tanks and heating element sheaths.

Safety guidance

Before operating the process described it is important that this complete document, together with any relevant Safety Data sheets, be read and understood.

General information

Chemetal PLC supplies a wide range of chemical products and associated equipment for cleaning, sanitising, descaling, paint and carbon removal, metal protection and non-destructive testing. Sales Executives are available to advise on specific problems and applications.

Labour and environmental protection

All local and national regulations on the transport, storage, use and waste treatment of chemicals in concentrated or diluted form and as working solutions must be obeyed.

Further specific information on the products can be found in the EC Safety Data Sheets supplied. The user should also pay strict attention to information and hazard symbols shown on product labels.

Waste disposal

All waste waters must be treated in accordance with national legislation and local regulations prior to discharge to the sewer.

Ic Feb 2001