INCREMENTAL CHANGE Release Notification Date: 12/01/2023

SPM 70-00-99 S1217 - ACID STRIPPING SOLUTION FOR NI-CR-AL-Y PLASMA COATINGS

DISCLAIMER

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HIGHLIGHTS

HIGHLIGHT REFERENCE	DESCRIPTION OF CHANGE
sk70-00-99-110-007	Technical Change: Changed information for solution S1217.

TASK 70-00-99-801-816

1. Composition.

   A. The following acid solution is designed to strip nickel/chrome aluminum yttrium thermal spray bond coat from RENE 65 parts.

Consumable Product	No.	Concentration (Initial Mix)
Hydrochloric Acid, 31.5 wt %	C04-071	45-55% v/v (164-200 g/l)
Phosphoric Acid, 75 wt %	C04-093	45-55% v/v (533-650 g/l)

NOTE: If a different concentration is used, the volume must be adjusted to obtain the same weight of acid per unit volume. Consult standard data tables to determine the nominal acid content if an acid of different concentration is used.

2. Preparation.

Subtask 70-00-99-110-007

WARNING: ACID SOLUTIONS ARE VERY ACTIVE AND MAY CAUSE SERIOUS BURNS. AVOID CONTACT WITH SKIN, EYES, AND CLOTHING. AVOID BREATHING OF VAPORS. IF CONTACT OCCURS, WASH IMMEDIATELY WITH LARGE QUANTITY OF WATER.

WARNING: OPERATOR SHOULD WEAR FACE SHIELD, PROTECTIVE CLOTHING, AND PROTECTIVE SHOES.

A. Fill a locally manufactured acid-resistant tank with a continuously mechanically agitated solution of C04-071 Hydrochloric Acid and C04-093 Phosphoric Acid.

NOTE: Hydrochloric acid has a very high degassing rate even at room temperature. Expect rapid concentration decrease in

dissolved HCl in the solution. It is strongly recommended that the solution tank is designed to close lids/covers and not allow other open gaps (except loading/unloading parts or to collect bath samples) to lower the loss of HCl in the solution.

B. Maintain the mixture at a uniform temperature with a maximum of 120°F (48.8°C) throughout the tank.

3. Check.

Subtask 70-00-99-110-008

A. Determine the concentration of the solution as follows:

Checks	Limits	Recommended interval
Hydrochloric Acid, 31.5 wt %	30-55% v/v (109-200 g/L)	weekly or before use
Phosphoric Acid, 75 wt %	45-65% v/v (533-770 g/L)	weekly or before use

B. Reagents.

(1) 1.0 Normal Sodium Hydroxide

(2) 1.0 Normal Sulfuric Acid

(3) 0.5N AgNO3

(4) Dry indicator: 3 grams of Potassium chromate mixed with 47 grams of Sodium Bicarbonate (use mortar and pestle to get even consistency)

(5) Methyl orange indicator

C. Equipment.

(1) pH meter

(2) 1.0 ml and 2.0 ml pipettes

(3) 125 ml or 250 ml Erlenmeyer flask

(4) 25 ml or 50 ml burette

(5) Magnetic Stirrer

D. Procedure.

(1) Analyze the 50/50 hydrochloric/phosphoric acid solution as follows:

NOTE: It is recommended to centrifuge the tank sample for at least 15 minutes to separate NiCrAlY coating residue accumulated in the process bath. NiCrAlY coating residue may interfere with the titration solution and mislead the concentration calculation.

(a) Pipet 1.0 ml of tank solution to be tested into an Erlenmeyer titration flask.

(b) Add 60 ml of DI water.

(c) Use magnetic stirrer.

(d) Level the burette of 1.0 Normal Sodium Hydroxide to a whole number on the graduated scale.

(e) Titrate the sample solution with 1.0 Normal Sodium Hydroxide to 4.50-4.75 pH endpoint.

(f) Record ending volume in pipette as "E".

(g) Continue titrating the sample solution with 1.0 Normal Sodium Hydroxide to 9.50-9.75 pH end point.

(h) Record ending volume in pipette as "A".

(i) Subtract, (A-E) to get the difference. This is the total volume added to reach endpoint, record as absolute value Volume "B".

(j) Calculate the acid percentages as follows:

1 Percentage volume of HCl = [A-(2xB)]x10.01

2 Percentage volume of H3PO4 = B x 8.28 for 75% H3PO4

2 A. Percentage volume of H3PO4 = B x 6.83 for 85% H3PO4

(k) Calculate the acid g/liters as follows:

1 g/l of HCl = Percentage volume of HCl x 3.64

2 g/l of H3PO4 = Percentage volume of H3PO4 x 11.84 for 75% w/w H3PO4

2 A. g/l of H3PO4 = Percentage volume of H3PO4 x 14.36 for 85% w/w H3PO4

E. Alternative Procedure.

(1) Determination of hydrochloric acid quantity.

(a) Pipet 2.0 ml of 50:50 solution to be tested into an Erlenmeyer titration flask.

(b) Add 50 to 60 ml of DI water.

(c) Add 5 grams of mixed indicator and mix well. Using a magnetic stirrer is preferred to make sure most or all of the indicator is dissolved. Solution should be clear yellow at this point.

(d) Titrate to a reddish-brown endpoint with 0.5 N AgNO3. Record ml of 0.5 N AgNO3 to end-point.

(e) Calculate the acid percentages as follows:

1 g/l HCl = ((ml of AgNO3) x (N of AgNO3) x 36.45)/(2.0 ml sample)

2 N of HCl = ((ml of AgNO3) x (N of AgNO3))/(2.0 ml sample)

(2) Determination of phosphoric acid quantity.

(a) Pipet 1.0 ml of 50:50 solution to be tested into an Erlenmeyer titration flask.

(b) Add 50 to 60 ml of DI water.

(c) Add 5-7 drops of Methyl orange indicator. The solution should turn red.

(d) Titrate to a yellow end-point with 1.0 N NaOH. Record ml of 1.0 N NaOH to end-point.

(e) Calculate the acid percentages as follows:

1 N of total acid = ((ml of 1.0 NaOH) x (N of NaOH))/(1.0 ml sample)

2 g/l H3PO4 = (N of total acid) - (No of HCl) x 98

4. Regeneration.

Subtask 70-00-99-110-011

A. Maintain the solution within check limits by addition of appropriate products.

B. Replace the solution when it loses its effectiveness.