TECHNICAL DATA SHEET

GINPLATE Ni 414

ELECTROLESS NICKEL BATH FOR PLATING ON PLASTICS

GINPLATE Ni 414 is a highly stable electroless nickel bath that rapidly deposits uniform, conductive coating on plastics and other non-conductors. Following treatment in **GINPLATE Ni 414**, plastic parts may be electroplated using conventional electroplating baths. While **GINPLATE Ni 414** is designed primarily for use in no-rerack cycles for plating on plastics, they can be processed in bulk through **GINPLATE Ni 414** with reracking prior to electroplating. Bulk electroless plating may also be followed by plating in bright acid copper as a basis for further plating operations. Specific preparation cycles for the various plateable plastics and for selective plating are available from Growel.

GINPLATE Ni 414 baths are very economical to operate. The inherent stability of the bath allows it to be maintained over long periods of time in heavy production operations. In addition, **GINPLATE Ni 414** baths are easy to operate and maintain. The bath is not sensitive to small deviations in the concentration of its constituents; consequently, less frequent additions are required to maintain the bath. Also, the bath is not sensitive to the types of contaminants normally carried into the electroless bath during the preplate cycle.

GINPLATE Ni 414 is supplied as two liquid concentrates, Ginplate Ni 414A and Ni 414B, which are diluted with deionised water to make the operating solution. Both are also used for replenishment.

HOW TO USE GINPLATE Ni 414

OPERATING CONDITIONS :

Concentration

	Optimum	Range
Ginplate Ni 414A	55 ml/l	47-63 ml/l
Ginplate Ni 414B	50 ml/l	39-55 ml/l
Temperature	30-38^{0}C.	30 -49^{0}C.
pH	8.8 -9.0	8.5 - 9.0
Immersion Time	6 Minutes	5-10 Minutes

Make - up

For convenience a new **GINPLATE Ni 414** bath should be made up with 1 part by volume Ginplate Ni 414 A, 1 part by volume Ni 414B, and 18 parts by volume deionized or distilled water.

To make 100 litres solution :

1. Fill the tank about two-thirds full with deionized or distilled water.
2. Add 5 litres of Ginplate Ni 414A and mix thoroughly.
3. Add 5 litres of Ginplate Ni 414B and mix thoroughly.
4. Fill to final volume with deionized or distilled water and stir.

OPERATION

After the required surface activation treatment for particular plastic, the parts are simply immersed in the **GINPLATE Ni 414** solution. Coverage of the parts is rapid and immersion for 5 to 6 minutes is sufficient for subsequent electroplating for most parts.

The ratio of work area to volume of solution is not critical and any reasonable ratio up to 5 dm^2 per litre is satisfactory.

The life of the **GINPLATE Ni 414** bath is several months and maximum bath life can be attained when recommended replenishment and filteration guidelines are followed.

MAINTENANCE

GINPLATE Ni 414 baths ae relatively easy to maintain on the basis of production volume; normal consumption at a pH of 8.8 to 9.0 is at the rate of 473 ml of Ginplate Ni 414 A and 473 ml of Ginplate Ni 414B for each (100^2ft.)/(1000 dm^2) of work area processed. Occassional analysis of the bath should be made to determine the exact consumption rate for a particular operation.

The pH of the **GINPLATE Ni 414** bath is 8.8 electrometric on make-up and should be maintained at 8.5-9.0. Any deviation from this operating range of pH can be corrected by the additin of AR grade Ammonium Hydroxide, full strength to raise pH. Anhydrous ammonia may be used for continuous replenishment systems. Use 50% Sulfuric Acid to lower pH. Opertion at lower pH values will decrease the thickness of the deposit.

FILTERATION

For optimum results it is recommended that the **GINPLATE Ni 414** solution be batch filtered once a week and the plating tank be cleaned before returning the solution to the tank. A 1 - 3 micron filter medium should be used. Continuous overflow filtration may also be used.

EQUIPMENT

Tanks with polypropylene or polyvinyl liners or tanks made of polyethylene or polypropylene may be used to contain the **GINPLATE Ni 414** solution. Quartz immersion heaters are suitable for heating the solution. When an immersion heater is used it is desirable to have some circulation of solution as provided by a mechanical stirrer or filter pump to prevent localized overheating of the solution adjacent to the heater.

Vanton, Serfilco seal-less, or Sethco seal-less magnetic drive pump units are satisfactory for use with the Ginplate 414 solution. Filter chamber of lucite or polypropylene and cartridge with polypropylene core and polypropylene fiber 1 to 3 microns density are recommended. Certain lubricants used in the manufacture of filter cartridges are harmful to the **GINPLATE Ni 414** bath. Therefore, filter cartridge must be leached with running hot water before use with the **GINPLATE Ni 414** bath. Install the cartridge in the filter pump and run hot water straight through until no foam appears at the discharge end of the hose. For overflow filtration, polypropylene bag type filters of 10 to 25 microns density are recommended. Ventilation is recommended.

CONTROL

While replenishment additions to the **GINPLATE Ni 414** bath can be made on the basis of production volume (see "Maintenance") occasional analysis of the bath is recommended to ensure that the concentration of Ginplate Ni 414A and Ni 414B are within proper range.

ANALYSIS FOR GINPLATE Ni 414A

Apparatus needed :

5 ml pipette
50 ml burette with 0.1 ml graduations
250 ml Erlenmeyer flask

Reagents needed :

0.1M EDTA solution.

Murexide Indicator - mix 0.2 gms of murexide (acid ammonium purpurate) with 100 gms of AR grade Sodium Chloride. Grind together with a mortar and pestle.

Ammonium Hydroxide solution, concentrated AR grade.

Procedure:

1. Pipette a 5 ml sample of the bath into the 250 ml Erlenmeyer flask.
2. Add 50 ml deionized water.
3. Add 100 ml Ammonium Hyudroxide solution.
4. Add a pinch of murexide indicator. Add only sufficient indicator to develop a pale straw colour; too much indicator obscures the end point.
5. Titrate with EDTA solution to a purple end point.

Calculation :

ml of 0.1M EDTA titrated x 20 = ml/l of Ginplate Ni 414A solution.

Add sufficient Ginplate Ni 414A to maintain concentration at 47- 63 ml/l of solution. For each ml of Ni 414A required, add 1 ml of Ni 414B.

ANALYSIS FOR GINPLATE Ni 414 B

Normally the additions of Ginplate Ni 414B are based on the analysis for Ginplate Ni 414A and will keep the concentration of Ni 414B at the recommended level. However, since the rate of consumption of Ginplate Ni 414B may vary slightly, it is advisable to run occasional checks on the concentration of Ni 414B to ensure that it is in the recommended range of 39 -55 ml/l of solution.

Apparatus needed :

250 ml glass stoppered iodine flask
10 ml pipette
50 ml pipette
5 ml dropping pipette
25 ml graduate cylinder
50 ml burette

Reagents needed :

6N CP grade Hydrochloric Acid (HCL)
0.1N Sodiumthiosulfate solution* ($Na_2S_2O_3$)
0.1N Iodine solution* (I_2)
Starch indicator solution*
* Instructions for make-up and standardization of these solutions are available from Growel. They are also available as ready-to-use solutions or as measured concentrates in ampoules from your local laboratory/chemical supply house.

Procedure :

1. Pipette a 10 ml sample of the bath into a 250 ml glass stoppered iodine flask.
2. Add 25 ml of 6N HCL using it to rinse down the neck of the flask.
3. Pipette 50 ml of 0.1N I_2 solution into the flask.
4. Rinse down the neck of the flask with 3 - 5 mls of 6N HCL.
5. Stopper the flask and set in the dark for 30 minutes.
6. Rinse stopper and neck of flask with a small amount of distilled or deionized water.
7. Titrate immediately with 0.1N $Na_2S_2O_3$ solution to a straw colour, Add about 0.5 ml of starch indicator solution; sample will turn dark blue. Continue titration to absence of blue colour.

Calculation :

13.12 x [(ml I_2) x (Normality I_2) - (ml $Na_2S_2O_3$ titrated) (Normality $Na_2S_2O_3$)] = ml Ni 414B/litre of solution.

WASTE TREATMENT

GINPLATE Ni 414 operating solution contains Nickel Metal and is alkaline. The pH of **GINPLATE Ni 414** solution must be adjusted to 6-8 after treatment for Nickel Metal and prior to disposal in to the sewage system. Consult local agencies with regard to regulations governing waste effluent disposal.

CAUTION

PROTECTIVE CLOTHING NORMALLY USED FOR HANDLING CHEMICALS SHOULD BE WORN WHEN HANDLING GINPLATE Ni 414A, Ni 414B, AND THE Ni 414 SOLUTION. DO NOT ALLOW THELIQUID CONCENTRATES OR THE OPERATING SOLUTION TO COME IN CONTACT WITH THE SKIN OR EYES. IN CASE OF SUCH CONTACT, FLUSH THE SKIN OR EYES WITH PLENTY OF COLD WATER; FOR EYES, OBTAIN MEDICAL ATTENTION.

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