ALKALINE COPPER ELECTROLYTE INSTRUCTION MANUAL

Manual for electrolyte and complete kit

The step-by-step plan in this manual is written for the complete kit, in which all necessary materials are included. If you only have the electrolyte, you can use this step-by-step plan as an example.

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QUICK START

Use this step-by-step plan as a quick reference once you have read the manual completely.

1. Degrease workpiece with an alkaline degreaser.
2. Rinse thoroughly with clean water. *(preferably 2 sinks in a row)*
3. (optional) remove any rust/contamination mechanically.
4. (optional) activate/etch – then rinse thoroughly.
5. Prepare the copper plating bath and bring it to temperature.
6. Check the electrolyte level and place a mark.
7. (optional) Place anodes in anode filters/bags.
8. Hanging anodes opposite each other in the bath.
9. Turn on circulation or air agitation
10. Hang workpiece with unvarnished copper wire on the nylon rod.
11. Black minus wire on the workpiece, red positive wire on the anodes.
12. Calculate area in cm^2.
13. Set starting current: approx. 0.11 A per 10 cm^2 total surface.
14. Copper plate until the surface is fully covered (often 10–30 min).
15. Rinse the workpiece over the bath with clean water.
16. Rinse well again with clean water.
17. Proceed to the next step (e.g. acid copper, nickel, etc.) or dry as a final coat.
18. Dry at room temperature or with blow dryer/heat gun on low setting.
19. (optional) Protect: apply sealer, clear coat (1k/2k) or wax/oil in thin layers according to product label.
20. Close bath with lid; workplace cleaning.

IMPORTANT INFORMATION

WHAT IS V-BRITE ALKALI

V-Brite Alkali is a non-cyanide alkaline copper electrolyte for electrolytic electroplating (copper-plating) of objects. The electrolyte is used in industry as a strike (adhesive layer) and build-up bath in one.

The deposit is fine-grained, smooth, dense and ductile and has good adhesion, which is why this bath is often used as an adhesive layer before nickel, acid copper, silver or other metals.

Important to understand (practical):

- This is an alkaline bath. It is intended to adhere well to "difficult" surfaces (such as zinc (casting)/zamac and steel) before you go to another bath.
- This bath is less forgiving if the preparation and rinsing are poorly done: poor cleaning, oxides, or introduction of other chemicals will ruin your result and contaminate your bath.

The electrolyte is suitable for:

- Zinc (casting) / zamac
- Steel (after activation)
- Copper / brass
- Stainless steel (after activation)
- Aluminium (only after applying zincate)

PAY EXTRA ATTENTION:

- Always work with suitable anodes
    - (no phosphorous copper as with V-brite 100 and 200 acid copper electrolyte).
- Avoid introducing "random" chemicals (residues of degreaser, brake cleaner, inhibitors, etc.).
- This bath is a warm bath (± 49 °C): so extra attention to safety, evaporation and ventilation.

Keeping the bath clean = keeping results. Therefore, good cleaning, short activation, and especially good rinsing between all steps are essential.

REQUIRED EQUIPMENT

The following materials are required for the use of V-Brite Alkali:

(these materials are included in the kit and can be ordered separately on the webshop)

Always work in a well-ventilated room or use an extraction system.

NEEDED FOR THE TANK

- Tanks/baths: alkali resistant PVC, PE or PP. Large tanks must be reinforced to prevent bulging. Also suitable: steel tanks with rubber or plastic (pp/pvc) inner lining.
- Copper anodes: only oxygen-free copper (EN CW008A or EN CW009A).
    - *Do not use phosphorus-containing copper.*
- Anode filter: polypropylene filters to limit contamination of the bath.
- Thick copper or titanium wire: hang the anodes in the electrolyte with this.
- Agitation: Powerful air agitation, circulation pump or filter pump.
    - The pump can be replaced by a filter pump where you replace the sponge in the housing with a 5 or 10 µm polypropylene filter cloth for continuous filtering.
- Hanging system: hang workpiece on a nylon or copper rod with copper wire or wire hooks.
- Power supply: adjustable DC power supply.

ADDITIONAL

- Sinks: tank or container with demi/di water for rinsing between steps. Preferably 2–3 rinsing steps - especially after an acid dip. (not supplied in the kit).
- Workpiece wire: unpainted copper wire for hanging small parts.
- Anode connection cable
- Filter Media:
    - Liquid filters.
    - PP filter media (5–10 µm). (not supplied in the kit).
    - Activated carbon (only in case of a lot of contamination. After this, an additive must be added. Please contact us for this: info@verzinkshop.nl)
- Personal protection: chemical resistant (nitrile, pvc or neoprene).
- Neutralization bucket: sodium bicarbonate (baking soda) dissolved in water for a short dip after acid treatment to neutralize the acid.
- Heating: immersion or aquarium heater to bring the electrolyte to the ideal process temperature; use chemically resistant version (PP/PTFE/titanium) with thermostat, never run dry. (not supplied in the kit)

V-BRITE ALKALI MAINTENANCE

This electrolyte does not require active maintenance in normal use in small baths (hobby/small professional). When used correctly, the bath usually remains stable for a long time.

If the performance does decrease noticeably, it is usually due to introduction (insufficient rinsing after degreasing/activation), contamination or metal contamination. For small baths, replacing is usually the simplest and most reliable solution.

In many cases, the electrolyte can be stabilized again in larger baths, but this is done on the basis of the complaint and any measurements. Please contact us via info@verzinkshop.nl

TEMPERATURE OF THE ELECTROLYTE

- Working temperature: 38–60 °C
- Ideal temperature: ± 49 °C
- Too cold (<38 °C) is more likely to cause problems with coverage, adhesion and "burning" in high current zones.

HEATING THE ELECTROLYTE

- Immersion heater: for PP/PE plastic baths, a glass or titanium immersion heater with thermostat is suitable. Preferably choose a titanium immersion heater and place it in a place with current.
- Water jacket: put the pp/pe process tank in a larger container with warm water and regulate it with an immersion heater.
- Increase room temperature: a warm workspace reduces the cooling of small baths.

PREPARATION

This alkaline copper bath does not clean. Proper pre-treatment is essential for adhesion and even deposits. Ideally, work with 2–3 rinsing steps directly before the copper bath, especially after an acid or activator treatment. Do not allow the workpiece to dry between activation and the copper bath.

Always wear appropriate PPE (safety goggles/face-shield, chemical-resistant gloves and protective clothing) and work in good ventilation. Pay extra attention when heating liquids and when working with (diluted) acids such as sulfuric acid: splashes and fumes can cause serious burns.

General procedure

- Degrease with an alkaline degreaser (e.g. Verzinkshop V-Clean). Then rinse.
- Rinse immediately and thoroughly with clean water (preferably 2–3 rinsing steps).
- Without drying directly to the copper bath.

STEEL

- To activate: short dip in dilute hydrochloric acid or dilute sulfuric acid, 10–30 seconds. Then rinse immediately for 2–3×.
- Verzinkshop Metal Activator hot: 30–60 g/L, 38–49 °C, 30–60 seconds. Then rinse 2–3×.

In case of difficult steel or persistent adhesion problems

- 25% sulphuric acid around 60 °C, 30–60 seconds (short and controlled). Then rinse 2–3×.

STAINLESS STEEL

Option A (with power, most powerful)

- Make a 25% sulfuric acid solution.
- Hang a stainless steel 316 plate/strip in the solution as an electrode.
- Connect the MIN (black) to the workpiece.
- Connect the PLUS (red) to the stainless steel 316 plate/strip.
- Set 0.2–0.5 A per 10 cm² and activate for 30–60 seconds.
- Remove the workpiece and rinse immediately for 2–3×. Do not allow to dry. Straight on to the copper bath.

Option B (without power, less powerful)

- Verzinkshop Metal Activator: 120–240 g/L, 65–80 °C, 2–5 minutes.
- Then rinse immediately for 2–3× and go to the copper bath without drying.

COPPER

- Verzinkshop Metal Activator: 30–120 g/L, 30–60 seconds.
- Then flush and go straight through.

BRASS (AND COPPER ALLOYS)

- Verzinkshop Metal Activator: 30–120 g/L, 30–60 seconds.
- Then flush and go straight through.

NICKEL (ELECTROLESS AND ELECTROLYTIC)

- Activate: dip in a 5 to 10% sulfuric acid solution
- Submerge for 10–30 seconds.
- Then rinse immediately and go to the copper bath without drying.
- If the nickel is older, dull or contaminated: first degrease again, possibly mattify slightly, only then activate.

ZINC

Zinc casting / zamac

- Clean/degrease as briefly as possible (1–5 minutes), preferably warm at 49–60 °C. Then rinse.
- Activate: Verzinkshop Metal Activator 11–15 g/L, 30–60 seconds (keep short).
- Then rinse immediately for 2–3× and go to the copper bath without drying.

Galvanized steel (zinc coating on steel)

- Activate: Verzinkshop Metal Activator 7.5–15 g/L, 15–30 seconds.
- Then rinse immediately for 2–3× and go to the copper bath without drying.

ALUMINIUM

- Degrease and rinse.
- Treat with Verzinkshop Zincate Aluminium Activator according to the product instructions.
- Then rinse immediately and go to the copper bath without drying.

Optional: electro-degreasing (extra step in case of adhesion problems)

- After degreasing and rinsing: electro-degreasing in e.g. a warm crystal soda solution (sodium carbonate, 30–50 g/L), 30–60 seconds. Then rinse and move on to the activation step.

PREPARING THE COPPER PLATING BATH

- Prepare the tank/container.
  - Make sure the container is dust-free and clean (no residue from other baths/cleaners).
- Agitation (mandatory)
  - Use a (filter) pump or
  - Place 1 or more air stones on the bottom or -
  - Use an air pump/blower (large airflow, low pressure).
    - Do not use compressor air because of oil, etc.
- Install heating (this is a hot bath).
  - Place a chemical-resistant immersion heater in a place with movement in the tub.
  - Never run the heater dry.
- Electrolyte in the tank.
  - Carefully pour the electrolyte into the tray (watch for splashes).
  - Mark the liquid level with marker/tape.
  - After use (by evaporation): top up with demi/DI water up to the mark.
- Prepare anodes.
  - Use oxygen-free copper: EN CW008A or EN CW009A.
  - Do not use phosphorous copper as with an acid copper plating bath.
  - Wrap the anodes in PP anode filters/sleeves.
  - (New filter material) first rinse well with warm water.
- Hang and connect anodes.
  - Hang the anodes opposite each other in the bath (towards the workpiece).
  - Guide value ratio: ± 1.5 : 1 (anode : workpiece).
    - (An object of 100 cm2 needs approximately 150 cm2 of anode surface)
  - Connect the anodes to the connecting cable.
  - Make sure the power supply is off and connect the red plus to the anodes.
- Attach the nylon staff to the bucket. The objects are hung on this.
  - Cut 2 v-shaped notches in the rim of the bucket with a pair of wire cutters where you can put the nylon rod.
  - Use tape to attach the ends of the wand to the bucket.
  - Drill 2 holes at the top of the bucket and put the staff through them.
- Prepare sinks.
  - Prepare 2 (preferably 3) sinks with clean water / demi-water (before and after the bath).

Tip. Provide an extra drip tray under the electroplating tank, or put the tank in a larger tank. If it ever leaks, the electrolyte will leak into the collection tank and not over the workplace or floor.

CALCULATING AREA AND SETTING CURRENT

V-Brite Alkali works as a starting value at approximately: 0.11 ampere per 10 cm² total surface.

CALCULATING SURFACE EXAMPLES

(same method as in the other manual)

- Slab (both sides): 2 × length × width (cm²)
- Cube (all sides): 6 × side × side (cm²)
- Cylinder (side only): 3.14 × diameter × length (cm²)
- Cylinder (total, with both ends): 3.14 × diameter × length + 2 × 3.14 × (diameter/2)² (cm²)
- Disc (two faces): 2 × 3.14 × (diameter/2)² (cm²)
- Disc edge: 3.14 × diameter × thickness (cm²)

BREAKING DOWN COMPLEX SHAPES

An estimate is acceptable in practice. Split the object into plates/cylinders/discs and add up the areas.

ANODE & CATHODE RATIO

Guide value: ± 1.5 : 1 (anode : workpiece).

Practical: you want sufficient anode surface for even operation, but also sufficient anode current density so that copper anodes actually continue to dissolve and the bath can "keep up" with its copper content. If you notice that copper is "receding" (less build-up / instability), the anode arrangement is one of the first points to check.

SETTING CURRENT (CALCULATION RULE)

The sum is:(area in cm² ÷ 10) × 0.11 amps

Example with an object of 280 cm²:

- 280 ÷ 10 = 28
- 28 × 0.11 A = 3.08 Amps

This is a starting value. When burned (dark corners) power down; with poor coverage, the current will go up slightly.

THE ELECTROPLATING PROCESS

Before you start the process, you first set the power supply. Make sure the red positive wire is disconnected.

- Turn on the power supply and turn the ampere knob all the way to the lowest setting.
- Turn the voltage knob (volts) all the way up to the highest position.
- Turn off the power supply again.

As a result, the power supply will automatically supply the necessary voltage required by setting the calculated ampere for the surface of the object. By adjusting the power supply to 0 amps, you cannot accidentally turn on the power supply with a setting that is too high, which can cause the workpiece to burn.

STEP-BY-STEP PLAN FOR PLATING

1 - Hang the object and connect the power supply

- Turn on the agitation.
- Attach copper wire to the workpiece (long enough to hang from and fully submerge).
- Hang the workpiece on the rod on the bucket in the electrolyte. Attach the copper wire to the wand with the clips provided.
- Attach the black wire (min) from the power supply to the copper wire of the workpiece.
- Attach the red wire (plus) from the power supply to the copper anodes.

2 – Set the current and start the process

- Calculate the surface of the object in cm².
    - Use 0.11 amps per 10 cm² as the starting value.
    - Example: 250 cm² object
        - 250 ÷ 10 = 25
        - 25 × 0.11 A = 2.75 A
- Turn on the power supply and set to the calculated current. The process starts now.

3 - time and layerThis bath is usually used as an adhesive layer (pre-layer) before a subsequent bath, such as acid copper or nickel. Electroplating until the surface is completely closed and opaque and the adhesion is good. A thick layer is usually not necessary for this.

4 - Removing and rinsing

- Remove the workpiece from the bath.
- Spray it well with a water spray with demi/di water over the bath. This will cause most of the electrolyte to run back into the bath.

5 - rinse

- Then rinse thoroughly again with clean water (preferably 2–3 rinsing steps).

6 - Drying

- Let the object dry or use a heat gun/hair dryer on low setting.
- Do not use compressed air from a compressor (risk of oil/water impact and rings).

The object is now ready and can be treated with another metal (e.g. acid copper or nickel) or a coating, lacquer or other sealer of your choice.

DUMMY PLATING

With the first few uses, contamination from the electrolyte or anodes may become visible in the result. To reduce any start-up contamination, it is advisable to first copper a piece of dummy metal. For example, hang a piece of steel or copper of about 25 cm² in the bath and let it plate for 30 to 60 minutes at about 0.3 amps (starting value 0.11 a per 10 cm²). Then rinse the workpiece over the bath and close the bath again.

PROTECTING THE COPPER

If no follow-up coat is applied, protect the copper finish with a sealer, lacquer or wax after the process to prevent oxidation and discoloration and preserve the color.

Sealers

- Verzinkshop deep seal: maintainable transparent, water-repellent and anti-rust oil-based sealer for copper and other metals; Protects and deepens the color.
- Verzinkshop acrylic sealer: clear lacquer layer for hard, glossy protection.

Lacquering

- Clear coat: (1k or 2k) provides a hard, durable protective layer.

Wax or oil

- Wax provides a thin, maintainable protective layer with a natural look.
- Light oil or a product such as wd-40 provides temporary protection.

Application

- Clean and degrease the workpiece.
- Apply thin layers; Allow each layer to dry according to the product label.
- For outdoor or high loads: choose a sealer or 2k clear coat instead of just wax or oil.
- For patinated copper: first achieve the desired color, then fix with sealer or lacquer.

MAINTENANCE, CONTAMINATION & FILTERING

Dirt in the bath is usually caused by dust, metal particles, loosened oxides, or organic contamination due to insufficient cleaning and rinsing. Most solid dirt sinks to the bottom and has limited effect as long as the bath remains clean and stable.

Dirt in the bathDirt is usually caused by:

- Dust and metal particles
- Loosened oxides from the workpiece
- Introduction from cleaning/activation due to insufficient rinsing
- Organic contamination (residues of degreaser, inhibitors, polishes, etc.)

Refilling evaporates waterThe working temperature allows water to evaporate. Top up with distilled or demi/DI water up to the marking line.

Filtering (solid particles)Continuous filtration is recommended for a stable bathing result. The guide value is a fine filter of about 5 µm with 2–3 tank revolutions per hour.

- Use PP-rated filter media (polypropylene).
- Rinse/flush new filter cartridges with warm water first to remove production residue.

Activated carbon (organic pollution)If fine filtering does not help and the deposit remains dull, discolored or "dirty", organic pollution is a common cause. Then you can apply a carbon treatment. Procedure:

- Remove anodes and cables from the tub.
- Circulate the bath through a carbon filter (carbon cartridge) or use a separate filter jar filled with activated carbon.
- Let it pump around for 1–2 hours.
- Then filter through a 5 or 10 µm polypropylene fine filter.
    - Important: no activated carbon should remain in the electrolyte.
- Then check pH and bath condition and correct where necessary.

Dissolved metal ions / contaminationMechanical filtering and activated carbon do not remove dissolved metal contamination. Examples of contaminants that can cause problems are lead, iron, zinc, silver and (in exceptional cases) cyanide.

- Zinc introduction is mainly caused by insufficient rinsing before the bath.
- Iron/lead introduction often occurs after acid dips due to insufficient rinsing.
- Silver contamination can be caused by incorrect anode quality.
- Cyanide pollution is especially relevant if cyanide processes or residues are present in the environment or equipment (now or in the past).

Approach to contamination is usually: eliminate source, improve rinsing steps and apply dummy plating. In some cases, filtration and/or carbon treatment (only in the case of organic contamination) also helps.

Electrolytes with a lot of organic contamination or dissolved metal ions are not always easy to repair. Replacing is then the best choice.

STORAGE

- Keep the bath closed with a lid.
- Always label (content + date).
- Rinse loose parts (rod, wire, anodes) with water after use and let dry.
- Prevent dust or other contaminants from falling into the bath.

Save pump

Rinse the pump well with clean water before storing it.

Storing anodes

Anodes should be rinsed and dried, or stored in water with 5% sulphuric acid so that they do not oxidise. Do not leave in the bath as this will increase the copper content of the electrolyte.

If the anodes are oxidized after a longer period of storage, you can lightly sand or etch them in a bath of water with 5% sulfuric acid so that they are clean again. Rinse them well and let the bath run for 15 minutes on a piece of dummy metal to remove contamination from the anodes.

Rinse them well before placing them back in the bath.

WASTE & DISPOSAL

Never pour anything down the sink. Collect all process fluids and rinse water as chemical waste.

Save

- Use closed HDPE canisters or screw-top bottles (chemical resistant), preferably un-approved.
- Always label: content, date, contact.
- Place bottles or jerry cans in a drip tray/tub.
- Cool, dry, out of sunlight; out of reach of children/pets.

Don't save

- No beverage bottles, glass jars without protection, open buckets or metal cans.
- No fragile PET/PP bottles of consumer products.

Solid residues

Drain used filters, anode sludge, cloths and gloves, then collect separately in a sturdy, sealable bag/bucket and dispose of as chemical waste.

Discharge

- Take everything to the municipal KCA collection or an approved processor. Do not mix waste streams to "dilute".

What to avoid at all costs

- Do not mix with bleach or ammonia (dangerous reactions).
- no compressed air in waste containers; don't build up pressure.

TECHNICAL CHARACTERISTICS

Feature	Value
Electrolyte	V-Brite Alkali Copper Electrolyte (Non-Cyanide)
Metal	Copper
pH target	9.2 – 10.0 (optimum ± 9.6–9.8)
Operating Range Temperature	38 – 60 °C
Optimal temperature	± 49 °C
Starting current	0.11 A per 10 cm² (≈ 1.1 A/dm²)
Anode	Usage: • oxygen-free Cu-OF (CW008A/C10200) • oxygen-free Cu-OFE (CW009A/C10100) Do not use: • Do not use phosphorus-containing copper!
Anode/cathode ratio	± 1.5 : 1
Agitation	Powerful agitation
Maintenance	• Maintenance additive can be ordered by mail. • pH control with pH regulator (pH down: 10% sulphuric acid if necessary)
Usage	Adhesion layer/strike and functional copper deposits; often as a pre-layer before nickel/acid copper/tin/silver

PROBLEMS AND SOLUTIONS

Problem	Cause	Solution
Poor adhesion (especially in low current zones)	Too little maintenance additive / bath condition	Dose maintenance additive in 1% steps, test in between.
Poor adhesion / blisters	Insufficient cleaning / oxide / insufficient rinsing	Improve pre-treatment + 2–3 rinsing steps before the bath.
Dull/discoloured deposit (chalky / brick red / dark)	Organic contamination due to introduction (cleaners) or insufficient cleaning	Improve filtration, eliminate source; possibly carbon treatment.
"Burned" in corners/HCD zones	Current too high / too little air / too cold	Decrease current, increase air, temperature towards 49 °C.
Poor build-up / unstable	Copper content drops (anodes do not dissolve properly)	Check anode setup, sufficient current density on anodes, possibly anode mix (inert) only if you know what you are doing.
pH drops	Introduction of acid (activation/acid dip) + insufficient rinsing	Improve rinsing; measuring pH; Adjust pH with pH regulator.
pH runs too high	Alkaline contamination	Eliminate source; pH reduced by 10% sulphuric acid (no routine correction).

WARNING!

The electrolyte is alkaline. Avoid contact with eyes, skin and clothing. Wear eye protection (goggles, goggles, or face shield), chemical-resistant gloves, and protective clothing when preparing solutions and while working with the electrolyte. Do not mix the electrolyte with acids or other chemicals. The electrolyte is harmful when used internally.

- Do not work with the electrolyte or other products without first reading and understanding the safety information.
- The safety data sheet can be found on the product page or can be requested from verzinkshop.nl by e-mail: info@verzinkshop.nl
- Do you have any questions? Contact us via:
  - Mail: info@verzinkshop.nl
  - Whatsapp or call: +31 6 28090022
  - www.verzinkshop.nl

SAFETY

- Always wear a dust mask, respirator, gloves, and apron when necessary.
- Always treat any chemical as if it could kill you.
- Always label buckets and storage containers with a permanent marker so that you and others know what's inside.
- Never pour water into acid; it can heat up and explode. Always pour acid into water.
- Never leave electroplating baths or other systems that use power unattended. These products may cause a short circuit and cause a fire.
- Never come into direct contact with chemicals. They can cause serious burns or other damage and are very dangerous substances if not treated with respect.
- Never think you can get away without taking safety precautions! That is not possible!
- Never leave the lids off the tanks when not in use.
- Always work safely and ensure good protection and ventilation.
- The safety data sheet can be found on the product page or can be requested from verzinkshop.nl by e-mail: info@verzinkshop.nl

DISCLAIMER

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