



BROWNELLS®

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NitreBlue® Bluing

by the Crew at Brownells

WARNING

USE EXTREME CAUTION - YOU ARE WORKING WITH CHEMICALS HEATED TO 300° F-900° F. READ AND FOLLOW ALL SAFETY PROCEDURES TO HELP PREVENT INJURY OR PROPERTY DAMAGE.

DANGER - SPECIAL CAUTION - READ ALL INSTRUCTIONS AND UNDERSTAND FULLY BEFORE PROCEEDING!

- NEVER immerse parts that have been Cyanide-bath hardened into NitreBlue Bluing Bath unless all traces of cyanide compounds are removed.
- CONTACT with organic material may cause a fire.
- CONTACT with acids may release toxic fumes.
- NEVER allow water to contact molten Nitre Blue Bluing Bath; dangerous steam explosions can result.
- NEVER immerse wet or damp parts in molten NitreBlue Bluing Bath; dangerous steam explosions can result.
- NEVER add any chemical or additives to NitreBlue Bluing Salts or molten NitreBlue Bluing Bath.

Danger: Oxidizer - Contains Sodium Nitrite, Sodium Nitrate and Potassium Nitrate. Avoid contact with eyes and skin. For eyes: Flush with water for 15 minutes. Consult physician immediately. For skin: Wash with soap and water. Do not take internally. If swallowed: Induce vomiting. Consult physician immediately. Use with adequate ventilation. Avoid vapors. If inhaled: Move to fresh air. Rinse mouth and nasal passages with water. Avoid contact with Cyanides, wear face shield, heat resistant gloves and protective apron.

INTRODUCTION

NitreBlue Bluing is a controlled heating process that will color virtually all carbon and tool steels. The same NitreBlue Bluing Salts can be used to draw the temper on steel parts that have been hardened, such as knife blades and tools. Stainless steel blades and tools can be drawn, but will not color due to the composition of the steel. Other uses include heat treating parts, especially springs, to get the proper combination of hardness and toughness to do the job required of them.

Unlike conventional hot salts bluing, NitreBlue Bluing can produce a wide range of color, from a pale yellow "straw" color, to a deep, black blue. The final color of the part is determined by the following four factors: **1)** The temperature of the NitreBlue Bluing Bath; **2)** The time the parts are left in the Bluing Bath; **3)** The way the metal was prepared and polished; **4)** The composition of the alloy being NitreBlue Blued. In recent times, this finish has been used mainly by custom gun makers and restoration shops to achieve a "bright peacock", or "fire" blue finish on pins, screws, springs, sights, and small blue parts not normally subject to a great deal of handling or wear. The advantage of NitreBlue Bluing is more repeatable from part to part, and there is little or no danger of overheating the parts which can soften them past the minimum hardness needed for them to do their job. And, unlike "home-brewed" nitre bluing baths, NitreBlue Bluing Salts are specifically blended for low melting point, stability throughout the entire temperature working range and little possibility of after-rust. And, what NitreBlue Bluing Bath is "dragged out" of the Bluing Tank on the surface of the parts being blued is easily scrubbed off in warm-to-hot water.

NitreBlue Bluing can also be used to closely approximate the blue finish used on Colt and Smith & Wesson revolvers of the 1850's through the 1930's, plus the similar finishes used by other gun makers of that era. NitreBlue Bluing can also be used to properly "straw" color the trigger, safety and safety bar on Luger Pistols during restoration.

Used as part of the overall artistic rendering of the gun, NitreBlue

Bluing is very effective. Drawing on the style of "coloration" of quality old rifles and guns, such as the Mannlicher-Schoenauers, you find nitre blued and "strawed" parts. Usually these are temper colors on hardened parts. But, the effect of a "splash" of color on these guns is very appealing and effective. Springs are excellent candidates for coloring, as well as express rifle sights and Win. M-94 loading gates. A NitreBlue blued part also looks great next to color case hardened or French grayed parts.

The NitreBlue Bluing Procedure is very simple . . .

- 1 - Clean the properly polished gun and parts in cleaner/degreaser.
- 2 - Dry all parts thoroughly.
- 3 - Within a maximum of 2 hours after polishing/cleaning, immerse in molten NitreBlue Bluing Bath until the desired color is achieved. Generally 5 minutes for small parts; 10 minutes for large ones.
- 4 - Remove and quench the parts in a tank of water, or air cool.
- 5 - Rinse and scrub parts in warm-to-hot water to remove residue.
- 6 - Immerse in Water Displacing Oil.

SETTING UP THE BLUING ROOM

Consider the location of your bluing room carefully, and be sure the layout is convenient and efficient. Particularly consider keeping your bluing room separate - or sealed off from - your general shop area. The reasons for this are: you must keep people who are not aware of the extremely high temperatures at which the NitreBlue Bluing Bath operates completely out of the way of the serious burn hazards involved; you must have proper and adequate ventilation for the bluing room, and should bring in outside air and then vent it from the room. And, finally, if you do want to add Oxynate No. 7™ Bluing to your operation later, you will not have to do extensive relocating of lights, vent systems and gas lines to set it up.

LIGHTING: Good, bright lighting is absolutely essential for best results with NitreBlue Bluing. Fluorescent lights are fine for room illumination, however, you must have one good incandescent light directly over the NitreBlue Bluing Tank because you determine the actual color you want a blued part to be by observing the work piece.

A dimly lit work area will make it extremely difficult, if not impossible, to get the final color you want. Therefore, you must have good, bright lighting.

TANK SETUP AND WORKING AREA: All tanks used for NitreBlue Bluing should be washed out with clean shop solvent before their first use. Make sure the tank is clean and dry before setting it up on the heat source. Important - Make sure the work area is kept clean and free from any flammable items. Oils, solvents aerosols, etc., should never come in contact with the heat source or the molten NitreBlue Bluing Bath.

If parts are not to be quenched after they reach the desired color, a heat-proof surface must be provided to place them on while they cool. A large, shallow cookie sheet or a baking pan with a wire cooling rack on top of it is an ideal place for parts to cool. If the parts are to be quenched in water after bluing, a 2½ gallon metal bucket works extremely well.

EQUIPMENT REQUIRED FOR THE BLUING ROOM

TANKS: For small parts such as pins and screws, a new, unused bullet caster's pot or dipper-type electric casting furnace can be used. For springs, sights and larger parts, we recommend Brownells Black Iron Quarter Tank, (6" x 6" x 10" long). This tank is a shortened version of Brownells Standard Black Iron Bluing Tank, and gives the best compromise between heat-up time and quantity/size of work that can be NitreBlue blued at one time.

HEAT SOURCE: A heavy-duty electric hot plate, small gas burner, or camping stove using either propane or liquid fuel can be used to heat a small bullet caster's pot. (Note: A camp stove may not provide enough heat; a gas burner will be best.) To heat the Quarter Tank we recommend a gas ring or other burner set up for either natural gas or liquid propane (LP or Bottle gas), capable of at least 15,000 btu output, proportioned to fit under the 6" x 6" x 10" tank. The stand to hold your NitreBlue bluing tank needs to be built around the heat source, and ideally, will be about waist high (or can be shorter and put on a metal topped, heat proof bench. Weld ¼" rods across the top of the stand about 2 inches apart, to support the Bluing Tank. We found a heavy, rectangular barbecue grill and some bricks work well, too.

We recommend mounting the heat source on a steel plate about 20" long that can be centered under the NitreBlue Tank, pulling it out for lighting, bench clean up and so on. Set up your heat source with the flame height adjusted so that the hottest part of the flame just touches the bottom of the tank. You may find that a heat diffuser plate between the gas flame and the bottom of the Bluing Tank helps give more even heat distribution. A steel plate about ¼" to ⅜" thick and about 2" larger than the overall dimensions of the Bluing Tank is ideal. (An aluminum heat diffuser of similar dimensions can be used for NitreBlue Bluing. But, aluminum **MUST NOT** be used around, or with, either Oxynate No. 7™ or Oxynate 84™, hot caustic bluing salts. For the best heat transfer, the blue tip of the flame should contact the bottom of the tank or diffuser plate.

STIRRING TOOL: A piece of mild steel, flat bar stock, ¼" x 1" x 12" to 18" long, ground or filed on one end into a dull, chisel shape is ideal to stir the NitreBlue Bluing Bath as it is heating up. Also, the Bluing Bath should be stirred occasionally during use. **NOTE: It is vital that the Bluing Bath be stirred frequently and thoroughly during heating. Failure to stir during heating may cause molten NitreBlue Bluing Bath to "erupt" from the Bluing Tank when the Bluing Salts at the bottom melt while the top layer is still solid.** Stirring thoroughly will help prevent overheating the Bluing Salts at the bottom of the tank and help control these potentially dangerous eruptions.

THERMOMETER: Bluing thermometers designed to be used with Oxynate No. 7™ and other usual hot bluing solutions do not have the range necessary for NitreBlue Bluing. We recommend the LT-225 Lead Bath and Heat Treat Thermometer, which has a range of 200° F. to 1000° F. This thermometer must be mounted in the center of the long side of the tank, with the end of the temperature-sensing quill about 1" from the bottom of the tank.

TWEEZERS: Heavy-duty, 12" long tweezers are recommended for removing pins, screws, etc., from the parts basket.

STAINLESS STEEL DIPPER: This is the ideal tool to safely add NitreBlue Bluing Salts to the Bluing Tank. It is also used to skim off the pink foam that rises to the surface of the Bluing Bath during the

initial melting of new NitreBlue Bluing Salts.

STAINLESS STEEL SCREEN WIRE AND BLACK IRON WIRE: Small parts can be suspended or held by individual wires. Or, small parts baskets may be made of stainless steel screen wire to hold these small parts, plus pins and screws. Larger parts should be suspended by pieces of black iron wire. Also, use black iron wire to make handles for the small parts baskets.

QUENCH TANK: A tank or bucket large enough to hold the largest part being blued, with at least a 2½ gallon capacity, is required for a water quench after the parts have achieved the desired color. Set the Quench Tank several feet away from the NitreBlue Bluing Tank - and well below it - so any water which might be splashed from the Quench Tank will not fall into the Bluing Tank.

WORK LIGHT: A flexible arm bench light, such as the Luxo LS-1A, that will safely accept a 100 watt bulb, should be positioned by the NitreBlue Bluing Tank and adjusted to provide lighting into the tank so you can observe the parts being blued and carefully observe the exact changes in color the parts take on.

ACID ETCH TANK: In the event that you decide to "pickle" the parts to obtain a "satin" finish before you blue it, you must use a Pyrex, Gel-coated Fiberglass or polypropylene tank. A similar tank can be used for the Rust Remover.

CHEMICALS USED IN NitreBlue BLUING

The chemicals listed are in two categories: those you must have and those that are optional, but are extremely helpful and useful in the NitreBlue Bluing process. They are listed alphabetically for your convenience.

CHEMICALS YOU MUST HAVE

d'SOLVE™ GUNSMITH CLEANER - A fast, efficient, tank-type "soak" cleaner formulated for removing all grease, dirt and crud from guns prior to bluing. It is non-hazardous, non-flammable, biodegradable, odor-free and safe for sewer-system disposal.

Mixing: Shipped as concentrate; 1 gallon of d'Solve™ makes 5 gallons of normal strength bench cleaner. For Heavy Dirt and Grease: use full strength, or dilute 1 part d'Solve™ to 1 part clean water (1 to 1 ratio). For light Dirt and Grease: dilute 1 part d'Solve™ to 4 parts clean water (a 1-to-4 ratio). Other ratios can be used. Immerse parts only until they are completely clean; normally less than 5 minutes. Inspect carefully. Replace d'Solve™ Cleaning Solution when it is dirty or stops working.

NitreBlue BLUING SALTS - These custom formulated Bluing Salts are the basis for a remarkably easy nitre bluing system that gives a tough, deep, rich, lustrous blue to gun parts. Reliable, consistent results, giving beautiful colors to match any restoration or, to create your own "peacock" or "fire" blues - plus all the shades of yellow - on parts you are bluing.

NitreBlue Bluing Salts have a specific gravity of 2.14, are nonvolatile, have a pH of 7.5, no odor, and are completely soluble in water. They have no flash point, and constitute no health or fire hazard, and are classified as an Oxidizer, with a reactivity level of 2 on a scale of 5. There are no exposer limits, although do avoid breathing the dust which may be a mild irritant to nose and throat. When the NitreBlue Bluing Salts are molten, forced air ventilation should be used in the Bluing Room. Of course, avoid contact with eyes. Be sure to read - and save - the warning on the container of NitreBlue Bluing Salts, which we have also included in these instructions on Page 1 in the "Warning" Box. (Technical Information On Mixing And Using, page 4.)

NitreBlue NEUTRALIZING SYSTEM - Due to a number of factors, many municipal and local governments have placed restrictions within their jurisdictions on the disposal of potentially hazardous waste materials, which include NitreBlue Bluing Salts and Bluing Bath. With this Neutralizing System, in the majority of cases, the disposal of NitreBlue Bluing Bath can be handled in your own shop to comply with all environmental regulations, making the resulting product safe for sewer disposal. (Complete Technical Instructions on Neutralizing NitreBlue Bluing Baths, page 8.)

WATER DISPLACING OIL - Specially formulated so the molecules of oil actually displace the molecules of water still on the surface of the gun or part after it comes out of the Warm Water Rinse. Gives the gun a completely protected surface. Water Displacing Oil is also a

super rust preventive, neutralizing fingerprints plus body acids and oils that get on the gun from handling and shooting after it leaves your shop. (Detailed Technical Information On Setting Up and Using, page 5.)

CHEMICALS YOU MIGHT WANT TO USE

RUST REMOVER - Formulated to clean off badly rusted parts prior to initial polishing. For removing old bluing from guns, or cleaning up old guns too fragile or time consuming to polish. Or, cleaning out the rust pits on guns so badly rusted you would remove far too much metal trying to polish them out. When used properly, it will not attack anything but rusted steel, not the live steel itself. Removes rust, old blue, scale and crud, leaving nothing but the bright steel.

Mixing: Shipped as concentrate. For Heavy Rust, dilute 1-to-1 with clean water (a 50% solution). For Light Rust, dilute 1-to-3 with clean water (a 25% solution). Immerse parts only until rust is gone. Moderate heating speeds rust removal. Do not exceed 150° F., as components of Rust Remover evaporate out of solution above this temperature. Do not leave parts in Rust Remover for long periods of time.

NitreBlue BLUING ROOM SHOPPING LIST

Many different setups will work when putting together your NitreBlue Bluing System. However, the following equipment and chemicals are recommended as the minimum requirements.

HARDWARE

1. Black Iron Quarter Tank - 1 - for NitreBlue Bluing Bath.
2. Clean 2½ Gallon Metal Bucket - 1 - For Quench Tank.
3. Fiberglass Tank - 2 - for warm water after rinse, and for Water Displacing Oil.
4. Cleaning Tank - 1 - appropriate size to use with d'Solve.
5. LT-225 Lead Bath and Heat Treat Thermometer - 1- for NitreBlue Bluing Bath.
6. Black Iron Wire - 1 roll - to suspend parts and small parts basket.
7. Stainless Steel Screen wire - 1 piece - to make small parts basket.
8. Stainless Steel Dipper - 1 - for adding NitreBlue Salts to Quarter Tank.
9. Rinse Tank Brush - 1 - to scrub parts in Rinse Tank.
10. Steel Wool, #0 or #00 - 1 package - to rub air bubbles off parts when first immersed in the Bluing Bath.

CHEMICALS

1. NitreBlue Bluing Salts - 1 pail - to charge the Bluing Tank initially, and to replenish Salts lost from drag-out.
2. d'Solve™ Gunsmith Cleaner - 1 gallon.
3. TCE Cleaner Degreaser - 1 quart minimum
4. Water Displacing Oil - 1 gallon minimum - to create a dip-soak bath at least 3" deep in Water Displacing Oil Tank.
5. NitreBlue Bluing Bath Neutralizing System - 1.

SAFETY EQUIPMENT

Minimum equipment required to help protect you consists of:

1. Heat resistant gloves, e.g. Temp Tec Gloves or leather welders' gloves.
2. Full-face safety shield.
3. Clean, heavy-duty, cotton or canvas shop apron (not synthetic blends).
4. Long sleeved 100% wool or cotton shirt and pants (not synthetic blends).
5. High-topped leather work shoes or boots.

OPTIONAL EQUIPMENT

1. Rust Remover - 1 quart minimum - to clean up most seriously rusted parts safely.
2. Hydrochloric Acid - 1 gallon - to "pickle" parts for "satin" finish.
3. Fiberglass Tank - 1 for Acid Etcher or Rust Remover.

BLUING STEEL WITH NitreBlue BLUING SALTS

AND PARTS PREPARATION

Because polishing and cleaning of the parts that are going to be NitreBlue blued plays such a critical part in the way the finished part is going to look, we have first described some of the finishes before covering the general steps of polishing and cleaning.

Finish and Color Options: For restoration work, look closely at the polish and luster of the finish of the original gun before deciding which way to polish and prepare the parts. Screws were either polished lengthwise with the slot, or spin-polished. Most of the original screws were polished lengthwise, and depending on the brilliance of the polish job, they either stood out or blended in with the look of the gun's original finish.

For the best "bright peacock" blue, the metal must be given a superbright mirror polish without any flaws of any kind. All parts on which the brightest blue is desired must be mirror polished and entirely free of oils.

A "satin" nitre blue finish can be accomplished by a wide variety of methods - from acid pickling to using brushing wheels of various sizes and densities. Oiled after assembly, this finish blends in with a quality rust blue.

A variation on the "matte surface" effect can easily be achieved by leaving a very light coating of oil on the metal before NitreBlue Bluing. The heat of the Bluing Bath will burn off the surface oil and leave a pleasing "matte" look to the metal surface in the process!

"Straw" and various shades of yellow can be achieved by stabilizing the NitreBlue Bluing Bath at a lower temperature before putting the piece into it. If you don't stabilize at the lower temperature first, you will go right past the yellow color you want in a heartbeat! "Straw" yellow is particularly desirable for triggers, springs, Mauser bolt stop springs, etc.

Polishing marks (grain lines) left in the surface of the steel will give different visual effects to the finished NitreBlue blued surface, and often, even different shades of blue or yellow.

Polishing: Generally, polish and prepare the steel exactly as you would for Oxynate No. 7™ bluing. (NOTE: If you are not familiar with this process, please request a free copy of the *Bluing Instructions & Supplies for Oxynate No. 7™ Hot Bluing* from us which contains detailed instructions on polishing and surface preparation.)

Many of the screws in older guns which were nitre blued were not brilliantly polished, so the bright, fire blue that we are able to get now with NitreBlue Bluing is not seen. If you want a screw to stand out, spin-polish with a 240 or 320 grit polish, then properly and completely degrease. This will give a beautiful "sapphire" effect on the screw head.

When parts are too badly rusted or too fragile to stand the amount of polishing necessary to clean off all the rust and crud, we recommend you use Brownells Rust Remover to clean down to the bright steel before final preparation of the surface for NitreBlue Bluing. (Mixing and using instructions are given under RUST REMOVER, page 3.)

Cleaning: Because NitreBlue Bluing is a controlled heat process, the high temperatures involved essentially "self-clean" the steel being blued. For this reason, it is necessary only to clean the parts being colored enough to remove the majority of dirt, oils, and other contaminants to keep them out of the Bluing Bath.

We recommend that parts be cleaned in Brownells d'Solve Gunsmith Cleaner, shop solvent or TCE Cleaner Degreaser to remove all dirt, oils, lubricants, powder residues and polishing compound residues from all the exterior and interior parts to be NitreBlue blued. Even the super bright parts will be clean enough with these cleaners to get the look you want without the necessity of going to the super-cleaning powers of Dicro-Clean 909.

If a water-based solvent, like Brownells d'Solve, is used to clean the parts, all traces of the solvent and rinse water **MUST BE REMOVED** from the parts. **All parts MUST BE COMPLETELY DRY before being placed in the NitreBlue Bluing Bath.** Any trace of moisture left on the parts and not removed prior to immersion into the heated Bluing bath, can cause a potentially dangerous, violent, steam eruption.

Oxidization: is the bane of all nitre bluing. It is the microscopic rusting (oxidizing) of the surface of the metal which begins immediately after it is polished and cleaned. This can be a real problem, because NitreBlue Bluing does not color well over oxidation, and frequently gives blotching, patchy spots and an overall dull, lifeless color, even on parts where you don't want a "dull" look. Do not delay NitreBlue Bluing parts once they have been polished and cleaned. You should blue the parts within a maximum of 2 hours after polishing and cleaning. Even if you oil the parts, but let them stand over-

TECHNICAL INFORMATION ON POLISHING

night, they may not NitreBlue Blue well.

TECHNICAL INFORMATION ON MIXING & USING NitreBlue BLUING BATH

1) DETERMINE THE TANK SIZE you wish to use and the volume of NitreBlue Salts you wish to put into it. You can calculate the volume capacity of a tank by multiplying the inside length x inside width x desired depth and divide the answer by 231 (the number of cubic inches in a gallon). This answer is the capacity of the tank in gallons. As a rule of thumb, the Brownells Black Iron or Stainless Steel tank, measuring 6" x 6" x 40", holds 6.2 gallons when completely full. The Brownells Quarter Tank, measuring 6" x 6" x 10", holds 1.5 gallons when completely full. NitreBlue Bluing Bath in the molten form contains approximately 17 lbs. of NitreBlue Bluing Salts per gallon of volume. Therefore, to have a molten Bluing Bath depth in a Quarter Tank of 4", you would use approximately 17 lbs. of NitreBlue Bluing Salts.

2) BATH DEPTH depends primarily on the size of the parts that you are going to color. Normally, three to four inches of molten NitreBlue Bluing Bath in a Quarter Tank will be deep enough to blue or Heat Treat most small parts, ie: triggers, springs, screws. However, if you are planning to NitreBlue larger parts, choose the size of your tank to provide a minimum of 1" to 2" of molten Bluing Bath on all 4 sides (above, below, left and right) of the suspended part. When the NitreBlue Bluing Bath is being used for heat treating small parts, follow the same sizing and solution depth guide lines as you do for sizing a Bluing Tank.

3) INITIAL SETUP OF THE BLUING TANK is extremely simple; following are considerations you must keep in mind.

NitreBlue Bluing Salts are used full strength as they come from the shipping container. You Do Not dilute them in any way with anything. In fact, you must be extremely careful that no water comes in contact with either the dry NitreBlue Bluing Salts, the tank they are going to be put into, or the molten Bluing Bath.

NitreBlue Bluing Salts are in a somewhat "fluffy" granular form as manufactured. They are made this way to cut down on dust, and to make them easy to pour and measure. However, the volume of 1 pound in the granular form is nearly 1½ times as great as it is in the molten state. Therefore, when you are adding the granular NitreBlue Bluing Salts to your tank on initial setup, you cannot add the entire amount you wish to use all at one time. You must put in about half of the intended amount, and bring it to the molten state. Then add more NitreBlue Bluing Salts, one dipper full at a time - waiting for each dipper full to melt down before adding another - until the desired level in the tank is reached. If you try to add all the Bluing Salts initially, you will badly overflow your Bluing Tank.

NitreBlue Bluing Salts are pure white when they are manufactured, but a soluble pink dye is added to the white grains of the Salts to prevent misidentification of the product during packaging. When you open the pail of NitreBlue Bluing Salts, you will find a dry, pink granular product. As the NitreBlue Bluing Salts melt in the new Bluing Bath, an opaque pink foam rises to the top of the molten

Bluing Bath. In order to see the color changes that take place on the steel in the NitreBlue Bluing Bath, this foam must be skimmed from the surface and discarded. Anytime more Salts are added to the bath to replace "drag-out", the pink foam will reappear and must be skimmed off and discarded. (See complete Technical Instructions on Neutralizing NitreBlue Bluing Baths, page 7, for proper disposal).

4) AMOUNT OF BLUING SALTS REQUIRED is totally dependent on the tank size you have chosen and the size of the parts you wish to NitreBlue.

5) TEMPERATURE CONTROL OF THE NitreBlue BLUING BATH - The working temperature range of NitreBlue Bluing Bath is from 300° F. to 900° F. Although the Bluing Bath is molten at about 275° F., color changes in the steel will not take place until the Bluing Bath reaches approximately 450° F. For best results, the NitreBlue Bluing Bath should usually operate at 600° F. to 650° F. when blue color is wanted on the parts. Below 600° F., the parts may never completely change color to blue. At higher temperatures, the color change is so rapid you will have difficulty bluing irregular parts, such as triggers, hammers, etc. Remember, bath temperature is a major contributor to the color the part will turn, and you will need to operate the Bluing Bath below 600° F. to get the yellows. **CAUTION:** Do not allow the bath to heat higher than 900° F, because the NitreBlue Bluing Salts will break down chemically.

Regulate the temperature of the Bluing Tank by turning the heat up or down as required, so the actual temperature is just slightly above the one needed for the color you wish. Never rely on your thermometer to determine the color of the work piece because the many different alloys of steel will change color at slightly different temperatures.

See the detailed "Chart of Temperatures as Indicated by the Color of Plain Carbon Steel", page 7, for approximate color changes in carbon steel at various temperatures. NOTE: Other alloys of steel will change color at temperatures slightly above or below those listed on the chart.

6) STIRRING THE BLUING BATH - The NitreBlue Bluing Bath must be stirred to break it up at the beginning of each bluing session, and it must be stirred occasionally during the bluing cycle. Because the heat is applied to the bottom of the Bluing Tank, the Bluing Bath will naturally stratify into heat layers that are several degrees warmer at the bottom, just above the heat source, than they are at the top. Because the color of the NitreBlue blued part is greatly dependent upon the temperature of the Bluing Bath, you must occasionally stir the Bluing Bath to be sure the temperature is constant and uniform throughout the entire Bluing Tank.

7) ADDING NitreBlue BLUING SALTS TO THE BLUING BATH - When the Bluing Bath level in the Bluing Tank has dropped below the minimum depth required, or when you are going to be bluing a larger piece and need more depth, additional NitreBlue Bluing Salts will need to be added to the Bluing Tank. This should be done between jobs when there are no parts in the Bluing Tank, or at the beginning of the session when the Bluing Bath is being brought up to operating temperature. Adding NitreBlue Bluing Salts at either of these times allows all the pink foam that is going to be released by the new Bluing Salts to be skimmed off and disposed of without interfering with your visual checking of the parts in an operating Bluing Tank.

Most of the Bluing Bath lost is the result of "drag out" when guns and parts are removed from the Bluing Bath. The NitreBlue Bluing Bath does not "boil away" or evaporate or get "used up" or "delete" or otherwise "self-destruct" in any way. You may never have to add more than the small amount of NitreBlue Bluing Salts required to make up for the "drag out". However, you can contaminate the Bluing Bath with excessive amounts of dirt and crud that should have been removed during the cleaning cycle. Generally, this "dirt" can be skimmed from the surface of the molten Bluing Bath, and disposed of. If the contamination is too severe, the Bluing Bath will simply have to be replaced, and the contaminated Bluing Bath disposed of properly.

8) COVERING BLUING TANK WHEN NOT IN USE is extremely important for several reasons. NitreBlue Bluing Salts are hygroscopic (means they absorb water easily). In humid areas, the Bluing Bath in an uncovered, cold Bluing Tank will draw moisture from the atmosphere. When you reheat the Bluing Tank, you will have to first pour off what water you can, blot up the rest with paper towels and finally, you will have to boil off any remaining water, which can take a long time.

Also, keeping the Bluing Tank covered keeps general junk and stuff from falling into the tank, and prevents the possibility of someone

TO START-UP A NitreBlue BLUING BATH

- 1) Fill the tank or pot to the depth at which you wish the final NitreBlue Bluing with new NitreBlue Bluing Salts.
- 2) Turn on the heat source.
- 3) When the NitreBlue Bluing Salts reach approximately 275° F., they will start to melt. As they melt, the level in the tank of the new Bluing Salts will decrease approximately 25%.
- 4) Add more Nitre Blue Bluing Salts, one dipper full at a time, waiting for each dipper full to melt down before adding another until the desired Bluing Bath depth is reached in your tank.
- 5) A pink foam will rise to the surface of the new NitreBlue Bluing Bath as the Salts melt. Skim the foam from the surface and discard. (See complete Technical Instructions on Neutralizing NitreBlue Bluing Baths, page 7, for proper disposal.)
- 6) Once the NitreBlue Bluing Salts are completely molten, and the pink foam is skimmed off, the Bluing Bath is a translucent, milky-yellow color.
- 7) Continue heating the NitreBlue Bluing Bath until the desired operating temperature is reached. For best results, the Bluing Bath should operate at 600° F. to 650° F. (See **Temperature Control** below, and the detailed "Chart of Temperatures as Indicated by the Color of Plain Carbon Steel", page 7.)

accidentally getting into the NitreBlue Bluing chemicals.

Once the Bluing Bath has cooled to room temperature, a good, practical cover can easily be made by spreading a couple of layers of heavy 6-mil builders' plastic of 3/4" plywood over the fiberboard and weight the whole works down with a cement block or two to help get as tight a seal as is possible on the top edge of the Bluing Tank. The tighter the seal, the better the chance of controlling the unwanted water absorption. Store the sealed Bluing Tank in a cool, dry place. Do not set the Bluing Tank directly on a concrete floor.

9) STORING THE BLUING BATH - It's far easier just to leave the Bluing Bath in the Bluing Tank. Turn off the heat source under the Bluing Tank and be sure to remove the thermometer, parts baskets and hanging wires from the Bluing Tank. If you forget to remove everything from the Bluing Tank, whatever is left in it will be locked in place as the Bluing Bath cools and solidifies. You will not be able to get it out until the next time the Bluing Tank is heated. The solidified NitreBlue Bluing Bath won't fall out of the Bluing Tank even if it is tipped over. (In fact, we were not even able to knock the block of solidified Bluing Bath out of the Bluing Tank!) Once cooled, the Bluing Bath will have a mottled white appearance and may have entrapped contaminants such as metal particles or dirt showing on the surface. The Bluing Tank must always be covered after it has cooled down to room temperature. See #8 above.

10) STORING NEW, UNUSED NitreBlue BLUING SALTS - If the storage container is completely and totally airtight, NitreBlue Bluing Salts can be stored indefinitely. But, the container must be absolutely airtight or they will absorb large amounts of water from the atmosphere and may partially solidify. Store in an area that has a constant temperature from summer to winter and do not set the container directly on a concrete floor. You want to avoid cooling and heating of the sealed container which could break the seal. If the seal is broken, air and moisture will be drawn into the container and absorbed by the salts.

11) WHEN TO DISPOSE OF A BLUING BATH - To the best of our knowledge, there is no reason for the NitreBlue Bluing Bath to deteriorate except by contamination. Therefore, if you are careful and conscientious about preventing contamination, you may well be using this same NitreBlue Bluing Bath for many, many years.

If disposal of the NitreBlue Bluing Bath finally becomes necessary, see the complete Technical Instructions on Neutralizing NitreBlue Bluing Baths, page 8, for proper disposal.

TECHNICAL INFORMATION ON SETTING UP & USING WATER DISPLACING OIL

The Water Displacing Oil Tank is the final step in the NitreBlue Bluing operation, and one of the most critical if your NitreBlue blued job is to last, once it is returned to your customer. We highly recommend Water Displacing Oil as the oil you use. It is formulated to actually remove all the water on the blued parts, molecule by molecule, and replace it with the oil; hence the name "Water Displacing Oil". In addition, Water Displacing Oil helps neutralize any Bluing Bath residue that may still be on the metal, and gives an amazingly tough, rust-resistant finish to the new blue.

DO NOT: 1) Do Not heat the tank of Water Displacing Oil. We don't care who told you to use "hot oil", you're a damn fool about to burn down your shop if you heat a tank of any oil you can conceivably buy on the industrial or commercial market! They are all flammable; they burn. **DON'T DO IT!**

Water Displacing Oil must be used at room temperature. It **MUST NOT BE HEATED** for any reason, at any time, ever! It has a flash point of 150° F., very close to that of kerosene. Other oils are not intended to be heated by an outside heat source either, and should not be. Even "quenching oils", which have a much higher flash point, and do not flame when only small quantities of heated metals are plunged into a large cold volume of them, will ignite when heated by an outside source.

DO NOT: 2) Do Not use any of the new, exotic rust removing oils (those highly touted ones in the magazines) on brand-new NitreBlue blued steel. These oils may lighten the color of the bluing. They also generally streak, stain and damage new bluing until it has set up thoroughly. Especially avoid WD-40 on "virgin" NitreBlue blued steel. After the blued steel has cured for a few days, it is then perfectly safe to use the modern wonder oils, if you wish.

DO NOT: 3) Do Not lay guns or parts on the bottom of the Water

Displacing Oil Tank. As the water is removed from the guns, it settles to the bottom of the tank with the Water Displacing Oil floating on top of it. Use racks in the tank to keep the guns off bottom. Many 'smiths install a radiator drain cock in the bottom of the Water Displacing Oil tanks to periodically drain off the large quantities of water that accumulate.

DO NOT: 4) Do Not try to save the remains of Water Displacing Oil when it gets too thick and "solidified" for efficient use. Consider it "used up" and replace with new. Trying to save it by diluting with solvents will change the predictability of penetration and protection, and void all warranties, as well as alter the safety and suitability of the product.

After immersion in the Water Displacing Oil tank, set the guns and parts on a wire mesh-bottomed shelf directly above the oil tank so the extra oil drips back into the tank. Keep the Water Displacing Oil Tank tightly covered when not in use, and keep away from open flames.

OPERATING INSTRUCTIONS

TECHNICAL INFORMATION ON THE NitreBlue BLUING BATH PROCESS

The following information is included here before we get into the actual operation of the NitreBlue Bluing Bath to save you as many mistakes and as much grief as possible. If you blued with the NitreBlue Bluing Bath long enough, you would probably discover all these things for yourself, however, we think the more knowledgeable you are before you start, the more success you will have with our first job, and the more satisfactory and satisfying NitreBlue Bluing will be for you.

1) NitreBlue BLUING WORKS ONLY ON STEEL so don't try it on any other metals except steel and its alloys. Stainless Steel will not turn blue, nor will silver soldered joints. Post 1964 production Winchester 94's (above serial number 2,700,000) will not turn blue.

2) DO NOT PLUG THE BORE - Because of the extremely high temperatures necessary to get the blue color using NitreBlue Bluing Bath, the air trapped inside the bore will build to tremendous pressures, and blow the plug out explosively. This is an extremely dangerous situation because the 600° F. + Bluing Bath will be blown out of the Bluing Tank and into the area surrounding it. You stand a very good chance of getting seriously burned if this happens. So, **DO NOT PLUG THE BORE!**

3) DISASSEMBLE THE GUN COMPLETELY - Before bluing, the gun must be completely disassembled. Every piece that can be removed from the part you are going to NitreBlue Blue must be removed.

4) NitreBlue BLUING DOUBLE BARREL SHOTGUN BARRELS, OR GUNS WITH ANY SOFT SOLDERING - In a word, **DON'T**. The heat required to color steel with NitreBlue Bluing Bath will melt solder joints made with Hi-Force 44™ or other soft solders. Regular silver soldered or brass brazed joints will stand up to NitreBlue operating temperatures, although the solder joints will not color. Even if the gun's barrels are silver-soldered together, it is virtually impossible to get all the NitreBlue Bluing Bath out from between the barrels and from under the ribs, and any entrapped Bluing Bath will draw moisture and cause rust. We don't recommend you attempt to NitreBlue double barrels or any parts with soft soldering.

5) WHEN REHEATING BLUING BATH, AGITATE FREQUENTLY TO AVOID HEAT ENTRAPMENT AND WATCH FOR ACCUMULATED MOISTURE - After the first time you heat up your NitreBlue Bluing Bath and let it cool down, the Bluing Bath solidifies into a solid block. When ready to reheat the solidified Bluing Bath, first uncover the Bluing Tank and turn on your heat source. The solidified Bluing Bath will begin to melt on the bottom and around the sides of the Bluing Tank where the solidified Bluing Bath is touching the metal, with the "chunk" of solidified Bluing Bath floating on the molten Bluing Bath underneath. Use the stirring tool to lightly move the "chunk" of solidified Bluing Bath around to prevent the molten Bluing Bath beneath it from erupting because of heat entrapment. Continue moving the "chunk", stirring and agitating until the entire Bluing Bath is completely molten and you can insert the thermometer. (Be careful and do not get the "chunk" of solidified Bluing Bath to rocking up and down in the Bluing Tank or you can create enough hydraulic pressure

to blast hot molten Bluing Bath out of the Bluing Tank). Continue heating to bring the Bluing Bath up to operating temperature. Then, stir occasionally to break up the natural heat stratification and to keep the temperature constant and uniform throughout the entire Bluing Tank.

If moisture has accumulated in the Bluing Tank, it will usually be in the form of a thin layer of liquid on top of the block of solidified Bluing Bath. Before turning on the heat source to begin heating the Bluing Bath, pour off the accumulated water and dispose of properly. (See complete Technical Instructions on Neutralizing NitreBlue Bluing Baths, page 8, for proper disposal.) Blot up any remaining accumulated water with paper towels and dispose of them. Any remaining moisture will have to be boiled out of the Bluing Bath.

Place a sheet steel or aluminum cover over the Bluing Tank, leaving one corner open and uncovered to allow moisture to escape as steam during heating of the solidified Bluing Bath. Turn on the heat source. As the solidified Bluing Bath melts, as described above, slide the cover aside and use the stirring tool to lightly move the "chunk" of solidified Bluing Bath around, stirring and agitating the Bluing Bath to prevent the molten Bluing Bath from erupting from underneath the solid "chunk" on the surface. Insert the thermometer into the Bluing Bath through the open corner after the bath becomes completely molten. Use the stirring tool to frequently stir the Bluing Bath until it comes up to the required working temperature.

If the molten Bluing Bath begins to bubble as it is heated to the required working temperature, this indicates that water has been absorbed by the Bluing Bath. **IMPORTANT: do not attempt to color steel until the bubbling stops.** The bubbling action may cause white spots to appear on the parts. The spots are caused by air bubbles that attach themselves to the parts and insulate the part from the hot Bluing Bath. Continue to heat the Bluing Bath until the bubbling stops. A moisture free Bluing Bath will not bubble even at its maximum working temperature of 900° F.

When all the water has been boiled out of the Bluing Bath, it will stop bubbling. **CAUTION: Do not allow the NitreBlue Bluing Bath to heat higher than 900° F.** After all water has been boiled out, adjust the heat source and stabilize at the required working temperature before putting pieces into the Bluing Bath.

6) SUSPEND PART IN TANK - Parts should be suspended in the Bluing Tank because contact with the edges or bottom/sides of the Bluing Tank will cause excessive heat conduction into the part at that point, and affect the uniformity of the color you are trying to get. Small parts, such as pins and screws, should be placed in a stainless steel screen wire parts basket or suspended by individual wires prior to immersion into the molten Bluing Bath. Larger parts, such as barrels, cylinders, triggerguards, and buttplates, should be rigged on black iron wire so the wire forms handles to safely allow the parts to be placed into and removed from the Bluing Tank. Larger parts can be suspended by "Z" hooks. (If you are unfamiliar with "Z" hooks, please see page 12 of the *Bluing Instructions & Supplies for Oxynate No. 7™ Hot Bluing* for suggestions on how to make and use them. Ask us for a free copy of these instructions for your shop.)

7) INSPECTING PARTS DURING BLUING has to be done constantly to be sure to get the part the exact color you want it to be. The real "secret" to achieving consistently good results with NitreBlue Bluing is having proper lighting at the Bluing Tank to reliably "read" the color of the parts as they are in the Bluing Bath. To check the color, you can either look at the part through the surface of the Bluing Bath, or completely remove it from the Bluing Tank to look it over more carefully. In our experience, small parts can be inspected while still in the Bluing Tank but, to be really sure of the color on larger parts, we prefer to take them out of the Bluing Tank and inspect very closely. With proper lighting you can easily observe the color changes. But, the light must be good, and must be incandescent (not a fluorescent tube!)

8) SPOTS AND OTHER DISCOLORATIONS -

WHITE SPOTS: Usually unexplained, and found on otherwise perfect parts, are caused by air bubbles clinging to the surface of the metal while it is in the NitreBlue Bluing Bath. When you first put the parts in the Bluing Bath, the Bluing Bath will "freeze" on the parts. As these "Frozen" crystals melt, you will notice air bubbles on the parts. If these bubbles are not immediately removed from the surface of the parts, they will insulate the metal at those points, and the metal will have a white spot pattern, or it may have purple colored spots while the rest of the part is the proper blue color.

There are two ways of dealing with these air bubbles. On small parts, agitate the parts until the Bluing Bath crystals melt and the bubbles come off the surface. With larger parts, as soon as the Bluing

Bath crystals melt, the part will start to turn a light "straw" color. Remove the part from the Bluing Bath, and very lightly wipe the part with fine, steel wool (#0 or #00). Just go over it thoroughly once, then return to the Bluing Bath. The bubbles will not reform on the part, even though it has cooled down some while out of the Bluing Bath.

RED SPOTS: will sometimes form on old parts, and are caused by rust and oil accumulating deep in the bottom of pitting. When these parts are put into the NitreBlue Bluing Bath, these impurities boil out, and generally cause a red blemish in the color at that spot. A diluted acid bath or treatment with Rust Remover before NitreBlue bluing, or just doing the part over, will often cure this problem.

SPOTS ON CASTINGS: are not much different from the discoloration caused by pitting. Usually, the casting flaws are cleaner and the discoloration less. One cure is to file off the flaws in the casting before bluing. In areas like the "joint" where the trigger bow joins the grip frame on a single action revolver, the discoloration can frequently be concealed with cold blue, such as Brownells T-4™ or Oxpho-Blue™. Be careful, and just spot in the bad areas when they occur. If this is not possible, clean up the flaw, and reblue the part.

PATCHY, DULL COLOR: is most generally caused by microscopic oxidation (rust) of the surface of the metal which begins immediately after it is polished and cleaned. This can be a real problem. NitreBlue Bluing does not color well over oxidation, and gives odd, patchy blotching and frequently a dull, lifeless color. You should blue the parts within a maximum of 2 hours after polishing and cleaning. In our experience, even if you oil the parts and they stand overnight, they may not NitreBlue Blue well.

GENERAL DISCOLORATIONS: Some parts just do not want to take on a uniform color; particularly complicated parts. If this happens, play with the parts. Check to be sure the temperature of the Bluing Bath is correct. Try more agitation. Front sights on pistol barrels are especially bad. Oddly enough, they usually do not turn color as quickly as the barrel. After the barrel has turned the color you want, remove it from the Bluing Bath, and carefully hold the sight in the Bluing Bath with the barrel out until the sight turns the required matching color.

9) GOLD INLAYS are not affected by NitreBlue Bluing Bath. In fact, NitreBlue Blue with a gold line or gold inlay is spectacular!

10) TIME REQUIRED IN THE BLUING BATH - The time the part is kept in the molten Bluing Bath is actually relatively short, and is dependent upon three factors: the temperature of the Bluing Bath; the color desired; and the composition of the alloy being blued. Typically, smaller parts will take about 5 minutes. Larger parts take 10 minutes. But, just as temperature reading on the thermometer cannot determine color of the part, neither can time on a watch. You must leave the part in the Bluing Bath until it is the color that you wish, as seen by visual inspection under a bright, incandescent light.

11) REMOVING PARTS FROM THE BLUING BATH - When the parts reach the desired color as determined by visual inspection, quickly remove them from the Bluing Bath and either set them aside on a heat-proof surface to air cool, or quench them in warm water. Which way you cool the parts is strictly a matter of preference - as far as our own testing has shown. Our only suggestion would be that if you have a large number of big parts - which will retain a lot of heat and take a long time to cool, or may require a very large Quench Tank to keep from boiling the water in it when the part is put into it - you may want to lay the parts aside on a safe, heat-proof surface to air cool. If you are doing a few small parts, water quenching is faster and more efficient. Try both methods in your shop and see which works best for you.

12) QUENCHING THE PARTS - If you have decided to use a water quench for the parts once they are blued, a container large enough to completely surround the part with water works quite well to quench small parts (e.g. pins, screws, hammers, triggers, sights). For larger parts, a 2½ gallon metal bucket generally is sufficient. For barrels or longer parts, a fiberglass tank works, but you must keep the parts out of contact with the bottom or sides of the tank to avoid heat damage to the tank. A rack or your hanging wires will do this for you. However, the water volume in the fiberglass tank is small and may heat up to near boiling if more than one barrel at a time is placed in it.

After the parts have cooled enough to be handled safely, scrub them carefully with a soft brush, like the Brownells Gun/Parts Cleaning Brush, or an old toothbrush, to remove all Bluing Bath residue that may still be clinging to the parts. Be sure to get rid of all "drag-out". You may want to use an additional, separate warm water rinse to be sure that all the Bluing Bath residue is removed.

13) WARM OR HOT WATER RINSE - If the parts have been air-cooled, the “drag-out” coating of the NitreBlue Bluing Bath must be washed off the blued parts. It will dissolve in warm or hot water, and **MUST** be removed as soon as the parts are cool enough to handle safely. If all Bluing Bath residue is not removed completely, the hygroscopic nature of the residue will attract moisture from the air and begin forming rust spots on the surface of the newly blued parts. If the parts are complicated shapes with pin or screw holes, slots, or riveted assemblies, wash and scrub them very thoroughly in hot water with the soft brushes mentioned above to remove any trapped Bluing Bath.

14) WATER DISPLACING OIL IMMERSION AND REASSEMBLY - After the parts have been rinsed and scrubbed in the Hot Water Tank, completely shake off any excess water and immerse in the Water Displacing Oil Tank. Be sure to allow the parts to sit in the drip rack above the Water Displacing Oil Tank overnight to permit all excess oil to drip back into the Water Displacing Oil Tank, and to let the parts cure overnight before reassembling.

NitreBlue BLUING OPERATION STEPS

We are now ready to actually begin bluing with the NitreBlue Bluing Bath. Follow these steps in the order given to minimize potential problems. If you decide to deviate from this order, please understand that we may not be able to solve the problems your deviation creates. The Brownells NitreBlue Bluing System works as outlined below; please use this procedure so we can help you if things go astray for you.

STARTING UP TANKS AND BATHS

(1) PREPARE THE SURFACE OF THE METAL to be NitreBlue blued by polishing as desired, sand blasting, bead blasting, acid etching, wire wheel brushing, etc. NitreBlue Bluing will hide nothing. Clean off all crud, oils, and grease from guns with d'Solve™ or TCE Cleaner Degreaser, and get absolutely clean. Run patched cleaning rod through bore and magazine tubes to clean out all crud. Check for and remove obstructions. All parts must be completely clean and dry before going into the Bluing Bath.

(2) START NitreBlue BLUING BATH - NEW BATH - See page 4, “To Start-up a NitreBlue Bluing Bath”. Follow these steps exactly. Do Not Dilute the NitreBlue Bluing Salts in any way; use only the NitreBlue Bluing Salts as they come from the container.

EXISTING NitreBlue BLUING BATHS -

- a) Turn on your heat source.
- b) As the solidified Bluing Bath melts on the bottom and sides of the Bluing Tank, the “chunk” floats on the molten Bluing Bath underneath. Move the block around, agitating and stirring, to prevent the molten Bluing Bath from erupting from beneath it.
- c) Continue stirring/agitating until the Bluing Bath is completely molten.
- d) Insert the thermometer. Continue heating to bring up to operating temperature. Operate NitreBlue Bluing Bath slightly higher than temperatures shown beside colors.

(3) FILL QUENCH TANK with fresh, clean, room temperature water.

(4) FILL HOT WATER RINSE TANK with fresh clean water at 120° F. to 150° F.

Degrees Centigrade	Degrees Fahrenheit	Color Of Steel
221.1	430	Very pale yellow
226.7	440	Light yellow
232.2	450	Pale straw-yellow
237.8	460	Straw-yellow
243.3	470	Deep straw-yellow
248.9	480	Dark yellow
254.4	490	Yellow-brown
260.0	500	Brown-yellow
265.6	510	Spotted red-brown
271.1	520	Brown-purple
276.7	530	Light purple
282.2	540	Full purple
287.8	550	Dark purple
293.3	560	Full blue
298.9	570	Dark blue
337.8	640	Light blue

(5) REFER TO TEMPERATURES AS INDICATED BY THE COLOR OF PLAIN CARBON STEEL CHART in previous column to choose anticipated operating temperature. Operate NitreBlue Bluing Bath slightly higher than temperatures shown beside colors.

WARNING: Wear face shield; heat resistant gloves; heavy-duty, cotton or canvas shop apron (not synthetic blends); long sleeved 100% wool or cotton shirt and pants (not synthetic blends); and high-topped leather work shoes or boots while operating the NitreBlue Bluing System. Use these products ONLY in a well ventilated area. Keep all products Out of Reach of Children

STEP-BY-STEP NitreBlue BLUING OPERATION

- 1 CLEAN AND DEGREASE ALL PARTS** to remove all dirt, grease, oil and crud to keep contaminants out of the Bluing Bath.
- 2 THOROUGHLY DRY ALL PARTS.** Even the most minute amount of water will flash to steam in the super-heated NitreBlue Bluing Bath and can cause dangerous eruptions of molten Bluing Bath.
- 3 IMMERSE PARTS IN THE BLUING BATH** within a maximum of 2 hours after polishing/cleaning. Typical Operating Temperature: **600° F to 650° F** Typical **Time in Bluing Bath: 5 minutes for small parts; 10 minutes for larger parts. Color of part determines when to remove.**
- 4 REMOVE PART AND QUENCH OR AIR COOL** when color wanted is reached. Check carefully under bright, incandescent light; do not use fluorescent bulb.
- 5 RINSE AND SCRUB PARTS IN HOT WATER TO REMOVE RESIDUE** in Hot Water Tank. Scrub thoroughly to dissolve all “dragged-out” Bluing Bath.
- 6 SUSPEND IN WATER DISPLACING OIL.** Transfer parts quickly to Water Displacing Oil Tank and plunge into tank, agitating vigorously for a minute or so. Allow parts to cool while immersed in the Water Displacing Oil. **Use full strength. Operating Temperature: room temperature; recommended 68° F. min. to 90° F. maximum. DO NOT HEAT OIL. Immersion Time: until parts are cool; typically 45-60 minutes** to allow maximum displacement of entrapped water.
- 7 “CURE” BLUING AND REASSEMBLE GUN.** Remove from Water Displacing Oil Tank, and hang on rack over tank to allow excess oil to drain back into tank. Allow to cure at least overnight. When cured, wipe excess oil off parts with soft cloth and reassemble gun.

IN CASE OF TROUBLE

If a gun does not come out of the NitreBlue Bluing Bath looking like you think it should, do not immediately assume you did something wrong, or the process or chemicals are at fault. Take a good look at the metal of the part that is unsatisfactory:

Stainless Steel will not blue in NitreBlue Bluing Bath.

Win Model 94's post 1964, above serial #2,700,000, will not turn blue in NitreBlue Bluing Bath, but turn a mottled purple with some areas not coloring at all.

Some cast irons will color; others will not. There seems to be no way to tell before attempting to do them, so all you can do is try and see what happens.

The case hardened parts that we tried did take a good blue as long as the surface preparation was uniform. If the color case hardening has been worn through, or damaged, the color achieved by the NitreBlue Bluing Bath may not be uniform and even.

Investment cast parts seem to come out with a good color. Not having tested all the myriad of casting alloys being used in the firearms industry, we are not sure which might not work; everything we have tried so far takes on a good blue color.

One of the unique services we offer all our bluing customers is per-

WHEN ALL ELSE FAILS - CALL US AT 800-741-0015

Monday thru Friday: 9:00 to 4:00 Central Time

**Tell the operator: “I’ve got a NitreBlue bluing problem.”
You will get help!**

sonal, individual help with the problems you may encounter in your Bluing Operation. It's something we enjoy doing because we know bluing is an important part of your shop's success, and we want you to succeed every bit as much as you do. If you have a problem you cannot solve, please call us. We want to help.

NOTE: If you do call, be sure to have answers already worked out to the questions listed below, and we will be able to get to the gist of your trouble almost immediately. Wait to call until you have those answers, for we need the information they will give us to track down the problem...and we're going to ask you for them.

- 1) What gun are you trying to blue?
- 2) How old is your NitreBlue Bluing Bath, and what guns have you blued in it?
- 3) What cleaning solution do you use?
- 4) What is your operating temperature?
- 5) What color do you want to get?
- 6) Did the NitreBlue Bluing Bath boil; was there water in it?
- 7) How often do you stir the NitreBlue Bluing Bath?
- 8) What tank are you using, what heat source, and how deep is the NitreBlue Bluing Bath in the tank?
- 9) What thermometer are you using, and where is it mounted?
- 10) How much time elapsed between polishing the steel? What brand of Polish? Which grit size?
- 11) What method did you use to polish the Steel? What brand of Polish? Which grit size?

NEUTRALIZING NitreBlue Bluing Bath

Due to a number of factors, many municipal and local governments have placed restrictions on the disposal of potentially hazardous waste materials, which includes depleted NitreBlue Bluing Bath and the skimmed off foam. In the majority of cases, the disposal of NitreBlue Bluing Bath can be handled in your own shop to comply with all environmental regulations. The procedures that follow were developed in conjunction with research chemists at one of the largest chemical facilities in the world. These scientists have developed a simple, effective method which removes any hazards that old NitreBlue Bluing Bath pose to the environment, and allows them to be disposed of in a sanitary sewer.

The compound in NitreBlue Bluing Bath and skimmed foam we must deal with is Sodium Nitrite. If it were simply dumped into a sewer system, it could, under certain conditions, create problems with normal solid waste disposal. If it is simply dumped on the ground or buried, it could contaminate the ground water. Therefore, before safe disposal is possible, it is necessary to neutralize, convert and make the Sodium Nitrite non-hazardous.

MATERIALS REQUIRED

To properly neutralize NitreBlue Bluing Bath and the skimmed foam, you will require the following materials:

1. Neutralizing Vat - 1 - capable of holding a volume at least 8 to 10 times the volume of the solidified NitreBlue Bluing Bath to be neutralized. Vat must be non-galvanized steel, stainless steel or heat and acid resistant polypropylene or fiberglass.
2. Dry Sulfamic Acid - 1 bag - to do the neutralizing.
3. 31° Hydrochloric Acid.
4. Litmus Paper with a range of 0 to 14.
5. Potassium Iodide-Starch Test Paper.
6. Can of Household Lye.

TO NEUTRALIZE

WARNING - PERSONAL PROTECTION REQUIRED

As with any chemical solution, care should be taken when working with the bluing solutions. ALWAYS wear proper protective clothing, including a Long-Sleeved Cotton Shirt, Heavy Rubber Gloves, Neoprene Rubber Apron, Rubber Boots, Full-Face Safety Shield and Filter Mask. Avoid contact with the bluing salts solution. Work only in a well ventilated area. (We do our neutralizing outside, and if there is no breeze to clear the fumes out of the area, we use a large floor fan flowing on the operator to keep a constant supply of fresh air available). In addition, have first aid materials consisting of a bottle of white vinegar, a bucket of clean, cool water and several paper or cloth towels on hand in case of an accident.

Under normal conditions, it takes about 15 minutes to neutralize approximately 1 gallon of NitreBlue Bluing Bath, which typically weighs approximately 17 pounds after it has been dissolved and transferred into the neutralizing vat. Because the same process is used to neutralize both the skimmed foam and the Bluing Bath, we have written these instructions treating both the skimmed foam and the Bluing Bath the same. Each step covers the differences between them, if any exist. The pink dye incorporated into new, unmelted NitreBlue Bluing Salts is not hazardous by itself. When the NitreBlue Bluing Salts are initially melted, the dye forms a foam that should be skimmed from the surface of the Bluing Bath to permit you to carefully and accurately observe the color changes of the parts being blued. It is impossible to skim off the foam without also dipping out some of the molten Bluing Bath, which will have mixed into the foam itself. When skimming off the foam, have a heat-proof container available to place these "skimmings" into.

NOTE: STRONG TOXIC FUMES WILL BE CREATED WHEN THE SULFAMIC ACID IS ADDED TO THE NitreBlue BLUING BATH. YOU MUST PROVIDE STRONG, FORCED VENTILATION WITH LARGE AMOUNTS OF FRESH AIR THROUGH THE BLUING ROOM WHEN NEUTRALIZING THE BLUING BATH. Better yet, move the operation outside, and set a large fan blowing directly at you to clear the toxic fumes out of your vicinity as quickly as possible.

(1) Determine the weight of the cold foam/solidified Nitre Blue Bluing Bath that needs to be neutralized, and note this weight.

(2) Determine the volume of the cold foam/Bluing Bath, and slowly add about 8 to 10 times that volume of hot-to-boiling (150°-212° F.) water into the foam container or Bluing Bath Tank. Stir thoroughly until all the solidified foam and Bluing Bath is dissolved before going on to the next step.

If the Bluing Tank is not large enough to hold all the hot water specified, add hot water to dissolve as much solidified Bluing Bath as possible and pour the dissolved solution into the neutralizing vat, in step 3 below. Continue adding hot-to-boiling water to the solidified Bluing Bath until it is all dissolved and transferred to the vat.

(3) Transfer the dissolved foam/Bluing Bath into the neutralizing vat.

(4) You can assume that about 40% of the total weight of the foam/ NitreBlue Bluing Bath determined in step (1) is Sodium Nitrite, which will have to be neutralized prior to safe disposal. Multiply the total weight x .40 = 6.8 lbs. of Sodium Nitrate to neutralize 6.8 lbs. of nitrate x 1.5 lbs. Sulfamic per pound of Sodium Nitrate = 10.2 lbs. of Sulfamic Acid required to neutralize 17 lbs. of solidified NitreBlue Bluing Bath.

FORMULA: For each pound of Sodium Nitrite present by weight in the Bluing Bath, add 1½ pounds dry weight of Sulfamic Acid to the solution in the neutralizing vat. (REMEMBER: Because the Bluing Bath is only 40% (.4) Sodium Nitrate, each pound of Bluing Bath contains only about 6.4 ounces of Sodium Nitrate!) Do not add the Sulfamic Acid all at once. Measure out the amount required and divide into separate lots, not exceeding ½ lb. per lot. (½ lb. of dry Sulfamic Acid is approximately one (1) 8 oz. cupful by volume.)

(5) Take one of the measured ½ lb. lots of measured dry Sulfamic Acid and add it slowly along the top of the solution in your neutralizing vat.

(6) Continue adding ½ lb. amounts - or the measured portions thereof - of dry Sulfamic Acid to the solution until you have added about one half (½) of the amount required in step (4).

(7) Check the PH of the solution with Litmus Paper having a range of 0 to 14. The solution will start with an initial pH of approximately 7.5 to 10, but may run higher. When you test the solution at this time, the pH should read lower, in the 5 to 7 range. **NOTE:** Always read Litmus Paper colors under good, bright light.

(8) Continue adding the measured portions of the dry Sulfamic Acid until you have added enough to equal 1½ lb. dry weight of Sulfamic Acid for 1 lb. of Sodium Nitrite in the solution as determined from your multiplication in step (4).

(9) Check the pH again. At this point, the pH should be in the area of 3 to 4. You must lower the pH to 2.5 to 3, and continue adding small amounts of Sulfamic Acid to accomplish this. With small quantities of liquids, this is tricky because the pH changes so quickly. Use a teaspoonful (or less for a small solution) at a time of dry Sulfamic Acid, checking frequently with the Litmus Paper until the pH reaches the range of 2.5 to 3.

(10) When the pH reads between 2.5 and 3, check for Sodium Nitrite concentration by dipping a piece of the Potassium Iodide-

Starch Test Paper into the solution, and then putting just one drop of 31° Hydrochloric Acid on the wetted part of the paper. (This is standard, full strength 31° Hydrochloric Acid, frequently called 18° Baume' Muriatic Acid. It is available from Brownells or any chemical supply house or high school chemistry lab.) If the wetted part of the paper turns any shade of purple, nitrites are present. Continue adding small amounts of dry Sulfamic Acid. If the color of the wetted part of the paper is unchanged, then the nitrites have been removed.

The dry Sulfamic Acid not only lowers the pH level of the solution, but at the same time it also complexes (chemically ties up) the nitrites and makes them non-hazardous. Thus, if you do show color change, you will need to add very small amounts of dry Sulfamic Acid to complex the remaining nitrites. When you do this, you will continue to lower the pH, but very slowly.

(11) When you have no purple color showing using the Potassium Iodide-Starch test, the neutralized foam/Bluing Bath must now be raised back to the 6.5 to 7.5 pH range before it can safely be disposed of. In order to raise the pH, you must add small amounts of straight household Lye, available from any grocery store. Begin by adding Lye into the bath, one tablespoonful (or less for a small solution) at a time, stirring as you add it, and watching for foaming on the top of the solution. (If you are adding very small amounts of Lye, you may not see visible foaming.) Just as adding the dry Sulfamic Acid to the solution caused foaming when the solution had a pH above neutral (7 pH), the Lye will cause foaming on the surface as long as the solution has a pH that is below neutral (7pH). Once you add a few more granules of Lye and the solution does not foam, stop adding Lye and check the pH. It should be in the range of 6.5 to 7.5. With a little practice, you will have to do very little "balancing" as you learn how the solution reacts with the addition of each chemical.

(12) Once the solution has been neutralized with all the nitrites complexed and removed, and the pH adjusted to the range of 6.5 to 7.5, the solution can be disposed of in a sanitary sewer system. This must be done in accordance with local ordinances, and you should check them to see what further requirements - if any - you might have to meet. (The neutralized solution must not be dumped into a closed, recirculating sanitary system, or a storm drain system.)

(13) Rinse out your neutralizing vat and repeat the neutralizing sequence as necessary to neutralize all the foam/NitreBlue Bluing Bath you wish to dispose of.

NOTES

The size of the neutralizing vat is not critical. You can safely neutralize up to two gallons of raw foam/NitreBlue Bluing Bath at a time just as well as one. However, you must use a large enough container to have sufficient surface area to allow for rapid dispersion of the heat and fumes generated by the mixing of the dry Sulfamic Acid in the solution.

For your own edification, test the Potassium Iodide-Starch Test Paper in raw foam/NitreBlue Bluing Bath (it turns purple), and with 31° Hydrochloric Acid alone (again, purple). The unwetted part of a test piece used in a properly neutralized solution turns purple. Do not read test results at the margin where the wetted surface meets the dry surface of the paper. Read only in the center of the wetted area. Read only under good, bright lighting to get accurate color readings.

HEAT TREATING WITH NITREBLUE BLUING SALTS

INTRODUCTION

Because it is a stable, non-contaminating, controlled heat product, NitreBlue Bluing Salts can be used to draw the temper of parts that have been heated to a high temperature and quenched in either oil or water. This tempering (drawing) will provide the correct combination of hardness and toughness for that part. The most common gun parts which need correct, controlled heat tempering (drawing) are flat or "V"-type gun springs. Therefore, these instructions are written using a spring as our example. Of course, the same techniques will work on all parts on which the temper needs to be drawn in a controlled heat process. Consult the steel manufacturer for the proper temperature and time range for tempering (drawing) parts to a specific hardness.

PROFESSIONAL TECHNIQUE OF SPRING MAKING AND DRAWING TEMPER USING NITREBLUE BLUING SALTS

- (1) Heat the shaped spring blank to cherry red and quench it in the proper oil.
- (2) Once the spring has cooled sufficiently to be handled safely,

carefully clean and repolish it without flexing because prior to tempering, the spring is extremely brittle.

(3) Turn on the heat under the NitreBlue Bluing Tank, and stabilize the NitreBlue Bluing Bath at the correct operating temperature for the work the spring is going to have to do. (Refer to the chart "Temperature Guide for Heating and Tempering of Carbon Steel", given below.)

(4) Wrap a black iron wire "handle" around the spring and immerse it into the NitreBlue Bluing Bath. Make sure the spring does not touch the bottom of the Bluing Tank and stays completely immersed in the Bluing Bath.

(5) For a light spring (e.g.: shotgun top lever or sear spring) ten minutes immersion at the required operating temperature is sufficient. Heavier springs (e.g.: Trapdoor Springfield mainspring) require fifteen to twenty minutes immersion for consistent tempering properties.

(6) Remove the spring from the NitreBlue Bluing Bath and allow to air cool.

(7) Clean the spring thoroughly in hot or boiling water to remove any NitreBlue Bluing Bath residue that may still be on the spring.

(8) Immerse the spring in Water Displacing Oil to remove any traces of rinse water.

(9) Test spring through its normal range of movement before putting it into service.

NOTES

CARBON STEEL HEAT TREATING			
Colors vary slightly with steel analysis and length of time held at temperature. For details see GUNSMITH KINKS® I .			
TEMPER COLORS			
Color	Degrees F.	Hardness	Hardness Rockwell "C"
Faint Yellow	420	Extra File Hard	63
Light Straw	435	File Hard	62
Dark Straw	465	Knife Hard	60
Yellow-Brown	490	Extra Hard	58
Purple	520	Hard	56
Dark Blue	570	Half Hard	53
Blue Gray	620	Spring Temper	50

Most spring steels will require tempering at about 625° F. This temperature is *generally* hotter than what is required for NitreBlue Bluing. If the alloy of the spring steel is unknown, it is best to start at a higher temperature and make the spring too soft rather than too brittle. If it is too soft, the spring will simply take a "set" and can be rehardened, then retempered (redrawn) at a lower temperature. If tempered (drawn) at too low a temperature, the spring will be too brittle and break when flexed through its normal range of motion.

Spring steels can be NitreBlue Blued after tempering (drawing) if a specific color is required to match with the other parts of a gun. Repolish the spring and NitreBlue Blue to the desired color along with the matching parts. The spring will not lose or change its temper if it's blued at a lower temperature than the one at which it was tempered (drawn).



BROWNELLS

NitreBlue™ BLUING SALTS

Gorgeous "Fire Blue" Colors & No- Scale Tempering
A Master Metal Finisher's Secret, Useable In Any Shop

Turn parts and small pieces a deep, rich, lustrous blue with a finish that's tougher and prettier than most of the cold blues. The process is really quite simple: Heat the salts up to 570°F - 650° F. (They are NOT dissolved in water, they're used straight). Dip the parts in, watch for the color change. Lower temperatures give a "straw" color like the older Luger parts. As an added bonus, the salts can be used for the drawing operation when heat-treating springs and parts.

SPECS: 20 lb. (9.1kg) in plastic, resealable plastic pail. 1 lb. of salts will take up approximately 15 cubic in. (245 cubic cm).

#082-090-020 *NitreBlue Bluing Salts 2H00AYB \$ 41.09

*Requires Additional Hazardous Materials Surcharge

BROWNELLS QUARTERTANK

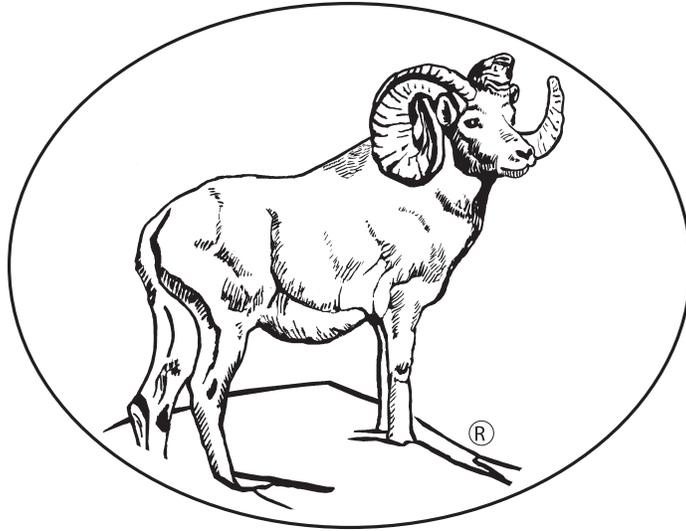
Specialty For NitreBlue™ Bluing
Perfect For Small Parts Hot Bluing



Just the right size for NitreBlue Bluing of handgun barrels, frames, slides, cylinders and all the small parts that go with them. Holds about 17 lbs. of our NitreBlue Bluing Salts or, holds 1 gallon of Oxynate No. 7™ and Oxynate No. 84™ solutions for bluing handguns one at a time.

SPECS: Black iron. 6" (15.2cm) x 6" x 10" (25.4cm). Welded seams, rolled edges. Holds 1 gallon of solution.

#082-003-661 Quarter Tank 2H00TPU \$ 26.39



BROWNELLS®

Orders: 800-741-0015 www.brownells.com
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200 SOUTH FRONT STREET MONTEZUMA, IA 50171

NitreBlue™

STEP-BY-STEP BLUING PROCEDURE

1

CLEAN AND DEGREASE ALL PARTS to remove all dirt, grease oil and crud to keep contaminants out of the Bluing bath.

2

THOROUGHLY DRY ALL PARTS even the most minute amount of water will flash to steam in the super-heated NitreBlue Bluing Bath and can cause dangerous eruptions of molten Bluing Bath.

3

IMMERSE PARTS IN THE BLUING BATH within a maximum of 2 hours after polishing/cleaning. Typical Operating Temperature: **600° F. to 650° F.** Typical **Time in Bluing Bath: 5 minutes for small parts; 10 minutes for larger parts.** **Color of part determines** when to remove.

4

REMOVE PART AND QUENCH OR AIR COOL when color wanted is reached. Check carefully under bright incandescent light; do not use fluorescent bulb.

5

RINSE AND SCRUB PARTS IN HOT WATER TO REMOVE RESIDUE in Hot Water Tank. Scrub thoroughly to dissolve all "dragged-out" Bluing Bath.

6

SUSPEND IN WATER DISPLACING OIL. Transfer parts quickly to Water Displacing Oil Tank and plunge into tank, agitating vigorously for a minute or so. Allow parts to cool while immersed in the Water Displacing Oil. **Use full strength. Operating Temperature: room temperature; recommend 68° F. min. to 90° F. max. DO NOT HEAT OIL.** **Immersion Time: until parts are cool; typically 45-60 minutes** to allow maximum displacement of entrapped water.

7

"CURE" BLUING AND REASSEMBLE GUN. Remove from Water Displacing Oil Tank, and hang on rack over tank to allow excess Oil to drain back into tank. Allow to cure at least overnight. When cured, wipe excess oil off parts with soft cloth and reassemble gun.