



SNS COLLEGE OF ALLIED HEALTH SCIENCES

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Affiliated to Dr MGR Medical University, Chennai



**DEPARTMENT OF OPERATION THEATRE AND
ANAESTHESIA TECHNOLOGY**

COURSE NAME: STERILIZATION

TOPIC :- CLEANING

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CLEANING AND STERILIZATION OF CATHETERS



Catheter

- A thin tube that is put into the body to remove or inject a liquid or to keep a passage open.
- Catheters should be cleaned with an alkaline detergent such as trisodium phosphate
- Then it is rinse with water.
- This permits rubber to become hydrated & if sterilised promptly superheating will not occur.
- Catheter is packed in cellophane tubing or in long paper envelopes.
- Sterilised by saturated steam under pressure for 15 min at 250°F.

The vinyl catheters & tubes are also sterilised by the same method.

- These are used for either diagnostic or treatment purpose

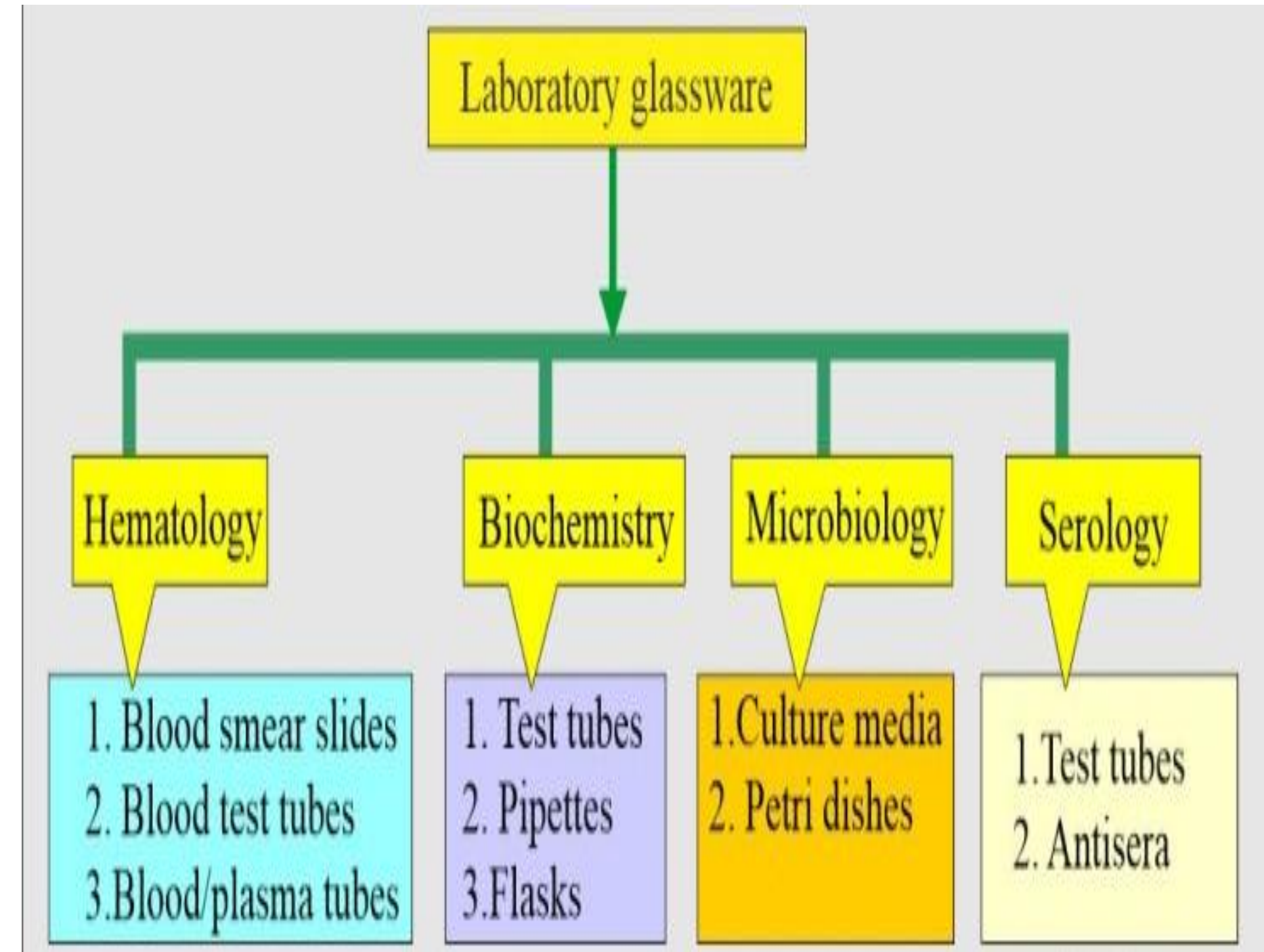
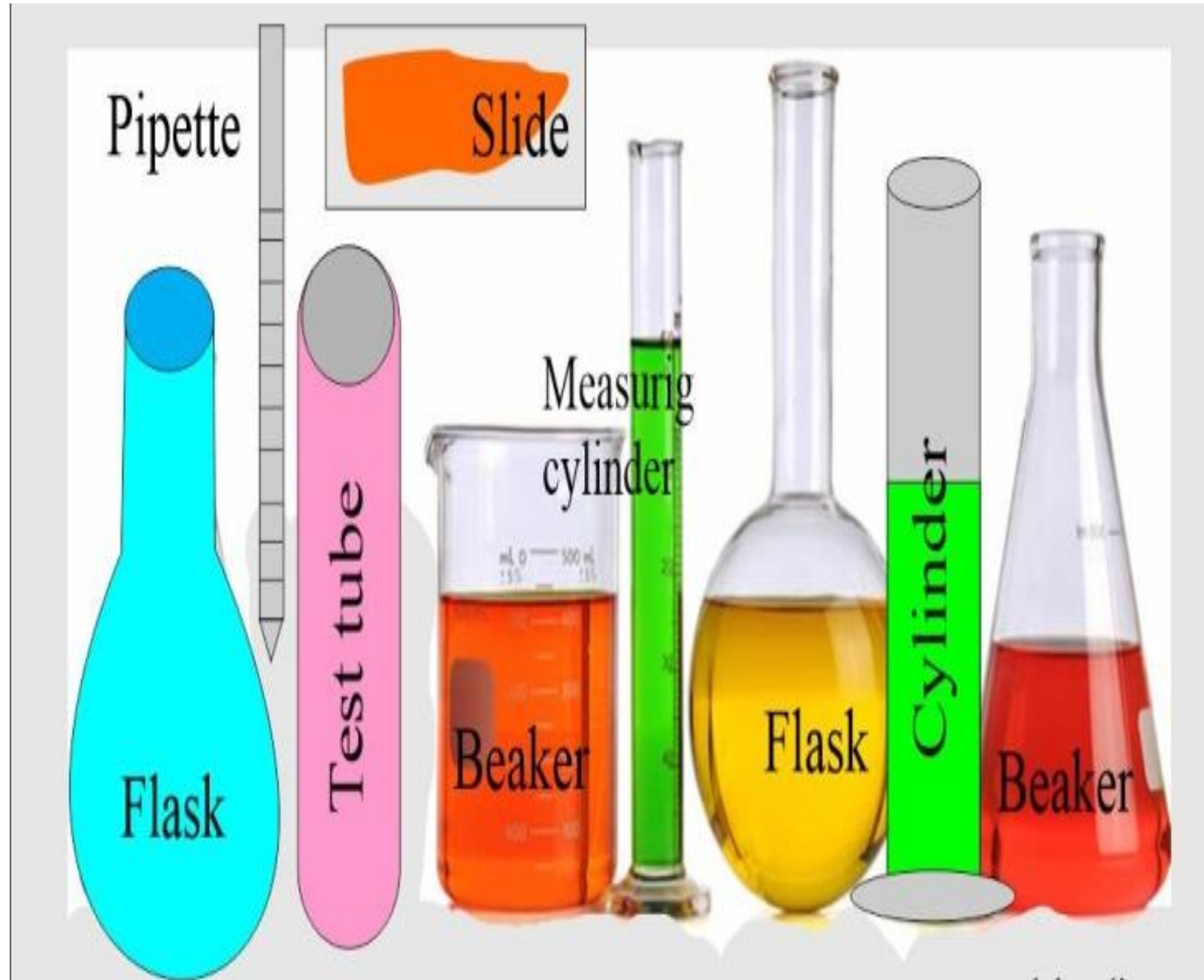


CLEANING AND STERILIZATION OF TUBINGS



- Tubing plus attachment or connectors are immersed in 0.5% solution of NaOH.
- Boil for min in order to remove any blood or residual substance remaining in the lumen as result of previous usage.
- During boiling the tubing should be coiled slowly into the solution to avoid formation of air pockets.
- The tubing should then be attached to reservoir of freshly distilled (Pyrogen free) water. & run the water until the all trace alkali or detergent have been removed.
- Tubes are not dry fully, interior tubing are distinctly moist &packed it immediately by wrapping in double thickness of muslin.
- During packaging tubing should carefully coiled but not kinked in the package
- These rubber tubes are place for sterilisation of heat steam for 30 min at temp121°C
- Ethylene oxide sterilisation is generally used for sterilisation of rubber tubes.

Cleaning of Glasswares





Options to clean the glassware



- Glassware is washed in three steps:
 - Automatic washer.
 - Followed by a special rinsing cycle.
 - Then keep it in the automatic dryer (below 100 °C).
 - Or rinse the glassware with a water-miscible organic solvent and then exposing to a stream of air or nitrogen.
- The most commonly used for cleaning are chemicals.



Most common method to clean glassware's



- **Decontaminate** the glassware by preserving it in 5% bleach or boiling it.
 - Can use any detergent or cleaning powder.
 - Autoclave may be the alternate method.
 - If the glassware is soaked in water after use, that is ideal.
 - If leftover, then keeps it in the detergent solution overnight.
 - Now rinse with tap water, followed by a rinse with deionized water.



Most common disinfectants

- Chlorine-releasing chemicals where chlorine is active against gram-positive and negative bacteria, including HIV and HB viruses.
 - Examples are hypochlorite (bleach solution), used in domestic and laundry.
- Aldehydes are formaldehyde and Glutaraldehyde.
- Alcohol used in ethanol or propanol is 70 to 80% V/V.
- Phenols like hycolin, Clearsol, Stericol, and Printol.



- **In the case of new glassware:**
 - Boil the glassware in a detergent solution, which will cause the lysis of the organism.
 - Cool and again wash thoroughly in tap water followed by the distle water.
 - Dry in a hot air oven.
 - Sterilize by autoclave at 15 lbs for 20 minutes.
- **In the case of handwashing:**
 - The detergents must be nonionic, metal-free, and not highly alkaline.
 - Also, ensure adequate rinsing.



Cleaning Basics steps

- It's generally easier to clean glassware if you do it right away.
- When **detergent** is used, it can use commercially available as Liquinox or Alconox.
 - The detergent should meet the following criteria:
 - It can soften the local water supply.
 - It should be able to remove organic material at a temperature of 60 °C.
 - It should have a neutral pH after rinsing with water.
 - Glassware should be free of the microbiological organism after the following rinsing.



Common Chemicals used for Glassware cleaning



- **Water Soluble Solutions:** Sodium chloride or sucrose solutions.
 - Rinse 3-4 times with deionized water.
- **Water Insoluble Solutions:** Hexane or chloroform.
 - Rinse 2-3 times with ethanol or acetone & 3-4 times with deionized water.
- **Strong Acids:** Concentrated HCl or H₂SO₄.
- Wash Under the fume hood.
 - Carefully rinse the glassware with copious volumes of tap water.
 - Rinse 3-4 times with deionized water. Then let it dry.



- **Strong Bases:** 6M NaOH or concentrated NH₄OH.

Wash Under the fume hood.

- Carefully rinse the glassware with copious volumes of tap water.
 - Rinse 3-4 times with deionized water, then let it dry.
- **Weak Acids:** Acetic acid or dilutions of strong acids - 0.1M or 1M HCl or H₂SO₄.
 - Rinse 3-4 times with deionized water and then let it dry.
- **Weak Bases:** 0.1M and 1M NaOH and NH₄OH.
 - Rinse thoroughly with tap water to remove the base.
 - Then rinse 3-4 times with deionized water and let it dry.



Precautions for Hematological glassware



- Do not use detergents because if there is a minute concentration, that may lead to RBCs' hemolysis.
- So for general tubes, pipettes, and slides, wash these thoroughly under tap water.
- Can use a brush to remove any leftover from the glassware.
- Keep the hematology-used material in a dichromate solution for 12 to 24 hours. Then again, wash thoroughly with tap water.
- Allow draining.
- Dry in the hot oven.



Cleaning of Blood Pipettes



- With the help of a suction pump or handheld suction pump, draw tap water through these pipettes.
- Use distilled water for suction and washing.
 - Last, can use acetone for the same purpose.
- Let them dry in the air.
- If there are blood microclots, keep them in 10% potassium hydroxide for 12 to 24 hours.
- Should clean the glassware as soon as possible.
- In the case of delay, put the glassware in water.
- In the case of late cleaning, the residue may not be removed.
- New, slightly alkaline glassware needs to be soaked in acid water (1% HCl or HNO₃) for several hours before washing.



- If a thorough cleaning is not possible immediately, put glassware to soak in water.
- If labware is not cleaned immediately, it may become impossible to remove the residue.
- Put into acid water (a 1% solution of hydrochloric or nitric acid) before washing. Can keep for several hours in this solution.
- Brushes with wooden or plastic handles are recommended as they will not scratch or abrade the glass surface.



Mechanical cleaning apparatus



Washer/decontaminator:

- Used to clean heat-tolerant items.
- **Washers** are used for automated cleaning of surgical instruments and work by combining impingement, water temperature, and detergent to clean heat-resistant and heat-sensitive devices.
- The cycle consists of several washes and rinses, followed by a steam sterilization cycle appropriate for the types of items contained in the load.



- **Flushing** — removes both solid and fluid “gross” debris contamination. A temperature below 45°C is used preventing protein coagulation and fixing of contaminant to the instrument surface.
- **Washing** — removes any remaining debris contamination.
- **Rinsing** — removes the detergent used during cleaning.
- **Thermal disinfection** — heat is used for a specified time to disinfect the instruments.
- **Drying** — hot air is used to dry the instruments.



Ultrasonic Cleaners



- Helps to remove debris from instruments, particularly if the instrument has a hinge or intricate parts.
- Ultrasonic cleaners are typically used for cleaning delicate and difficult-to-clean semi-critical and critical devices such as minimally invasive surgical (MIS) instruments, laparoscopic devices, robotic surgical attachments, microsurgical and ophthalmology devices.
- [Ultrasonic cleaners](#) use acoustic cavitation to clean surgical instruments and devices.
- Cavitation forms microscopic air bubbles that can reach small crevices and hard-to-reach areas on a device such as fine serrations or box lock joints, imploding on the instrument's surface.
- The process is also gentle enough for cleaning delicate items such as microsurgical and ophthalmology devices.



Working of Ultrasonic cleaner

- Works through high-frequency sound waves transmitted through liquid to scrub clean the surface of immersed parts.
- The high-frequency energy sound waves, typically 40 kHz causes microscopic bubbles to form on the surface of the instruments and as the bubbles implode, minute vacuum areas are created, drawing out the tiniest particles of debris from the crevices of the instruments.
- However, higher frequency or even dual frequency systems can provide greater cleaning efficacy for the exposure time.

Cavitation

- Think bubbles.
- [Cavitation](#) “bubbles” form when sonic energy creates a void (or cavity) which gets trapped as a bubble in a liquid solution of water or solvent.
- An **ultrasonic parts cleaner** scrubs surfaces clean through implosions of tiny bubbles.



Mix enzymatic (Enzol) or other neutral pH or mild alkaline detergent (Alconox)

- Use deionized water, if available, Run ultrasonic cleaner for several minutes to degas the solution and obtain correct temperature.
- Place instruments in open position into the ultrasonic cleaner.
- Do not allow instruments with sharp blades to touch other instruments.
- Do not place dissimilar metals (stainless, copper, chrome plated, etc.) in the same cleaning cycle.
- Instruments should be processed in cleaner for 5-10 minutes.
- After cleaning, rinse instruments with water to remove ultrasonic cleaning solution and any remaining soils.
- Dry instruments thoroughly, this minimizes the risk of corrosion and formation of water spots.
- Use spray lubricant in the hinges to improve function of instrument.



- **Ultrasonic cleaners** are suitable for cleaning a wide variety of materials, including metals, glass, rubber, ceramics and some hard plastics.
- An ultrasonic parts cleaner is especially useful for removing tightly-adhered contaminants from intricate items with blind holes, cracks and recesses.
- Examples of contaminants removed through ultrasonic cleaning include dust, dirt, oil, grease, pigments, flux agents, fingerprints and polishing compound.



Ultrasonic bath



- The “bath” part of ultrasonic bath refers to the liquid or solvent solution in a tank, while “ultrasonic” refers to the method of cleaning using high-frequency sound waves.
- Ultrasonic cleaning machines are widely used in many industries, including [medical device](#), automotive, [aerospace](#), dental, electronics, jewelry and weapons.
- Ideal items for ultrasonic parts cleaning include medical and surgical instruments, carburetors, firearms, window blinds, industrial machine parts and electronic equipment.
- The time required for ultrasonic cleaning depends on the material and soils, but typical cleaning times range from 3 to 6 minutes.
- Higher heat helps loosen dirt and chemical bonds faster, so most industrial parts cleaners apply heat in the range of 135 – 150 °F.



HOSPITAL CART WASHERS



- **Hospital cart washers** provide efficient cleaning, disinfecting, and drying of surgical instrument case carts, containers, utensils, and other reusable non-critical items used in hospitals and healthcare facilities.
- Hospital cart washers are used in SPDs to automate the cleaning process
- Provide low- to intermediate-level thermal disinfection for stainless steel case carts, wire supply carts, tote bins, basins, and rigid sterilization containers.



Working of Hospital Cart Washers

- Cart washers work similarly to single chamber washer/disinfectors and use various cleaning phases such as washing, rinsing, a thermal rinse, and finally drying to provide low- to intermediate-level thermal disinfection.
- Cart washers can use low or high impingement with the addition of a chemical solution to dislodge soils from the surfaces of these items.
- Some cart washers offer an instrument cycle and are validated to wash and disinfect specific surgical instruments.



Inspection



- After cleaning, all instruments should undergo inspection before being packaged for reuse or storage.
- Box locks, serrations, and crevices should be critically inspected for cleanliness.
- Instruments with cutting edges such as scissors, rongeurs, chisels, curettes, etc., should be checked for sharpness.
- There should be no dull spots, chips, or dents.
- Hinged instruments such as clamps and forceps should be checked for stiffness and alignment of jaws and teeth.
- Tips should be properly aligned, jaws should meet perfectly, and joints should move easily.



- Ratchets should close easily and hold firmly.
- Any instruments with pins or screws should be inspected to make sure they are intact.
- Plated instruments should be checked to make sure there are no chips, worn spots, or sharp edges.
- Worn spots can rust during autoclaving.
- Chipped plating can harbor soil and damage tissue and rubber gloves.
- If any problems are noticed during the inspection process, these instruments should be either cleaned again, or sent for repair depending on the problem observed.



THANK YOU