

Specimen Collection, Preparation, and Transport

The accuracy of any result depends upon the quality of the specimen. Following collection, preparation and transport instructions help to ensure the best possible test results.

Proper identification of each specimen is equally as important. Clearly label each specimen with patient's name (first, last, and middle initial), medical record number (if appropriate), date of birth and/or Social Security number, and date and time of collection. Submit a test request form complete with patient's name (first, last, and middle initial), medical record number (if appropriate), date of birth and/or Social Security number, date and time of collection, test(s), and billing information including diagnosis or ICD-9 code. Any pertinent clinical information is also helpful to our technologists.

Blood Collection Procedures and Transport

When submitting blood specimens, please follow these guidelines:

- Fasting specimen is usually the specimen of choice, especially for chemistry procedures.
- Hemolysis and lipemia frequently interfere with many reactions. Provide serum or plasma free from hemolysis and lipemia if at all possible.
- *Blood Film Preparation (Slides)*
 - Put a small drop of fresh whole blood from needle or finger- or heelstick onto a frosted slide. Draw a second slide toward drop of blood at a 45° angle. (Slide may be held on a flat surface.)
 - Allow blood to spread at junction of slide. Maintain a 45° angle to obtain a smooth, evenly distributed blood film.
 - Push spreader slide smoothly and quickly down the slide. If drop of blood is too large, move slide away from it before starting to make the film.
 - A feathered edge indicates the best film. Allow film to air dry. Write patient's name (first, last, and middle initial) and date and time of collection on frosted end of slide(s) with a soft, lead pencil.
 - Place slide(s) in a slide holder.
 - Place specimen(s) in bag with request form and refrigerate unless test requirements specify different handling conditions.
- *Plasma*
 - Green-top (lithium heparin) tube
 - Green-top (lithium heparin gel) tube
 - Green-top (sodium heparin) tube
 - Grey-top (potassium oxalate/sodium fluoride) tube
 - Royal blue-top (EDTA or sodium heparin) tube
 - Lavender-top (EDTA) tube:
 - Lavender-top tubes submitted for Blood Bank tests (including type and Rh, antibody screen, antibody identification, and antibody titer) should not be spun down. Do not transfer plasma; leave tube intact. Send 1 full, 10-mL tube or two 5-mL tubes unopened.
 - Light blue-top (sodium citrate) tube:
 - Draw blood into a tube containing appropriate anticoagulant. If using a syringe, transfer blood immediately to a tube containing anticoagulant. A citrate tube must be completely filled.
 - Gently invert tube 10 times to adequately mix anticoagulant and blood.
 - Centrifuge for 5 minutes.
 - Taking care not to disturb cells, transfer plasma to a transport tube with a disposable pipette and label tube "plasma."
 - Place specimen(s) in bag with request form and refrigerate unless test requirements specify different handling conditions.
- *Serum*
 - Red-top (no anticoagulant or separating gel) tube:
 - Draw blood for tests requiring serum before drawing blood for tests requiring anticoagulants.
 - Draw blood into an evacuated tube or syringe without anticoagulant or preservative. One full, 10-mL tube is recommended to every 4 mL of serum needed.
 - Allow blood to clot, then centrifuge within 45 minutes of venipuncture. Centrifuge for approximately 10 minutes. (**Caution:** prolonged centrifugation may cause hemolysis and evaporation.)
 - Transfer serum to a clean transport tube with a disposable pipette and label tube "serum."
 - Place specimen(s) in bag with request form and refrigerate unless test requirements specify different handling conditions.
 - Royal blue-top (no additive) tube
 - Serum gel (containing gel and clot activator [mottled red/grey-top]) tube:
 - Draw blood into an evacuated tube containing clot activating gel. One full, 10-mL tube is recommended for every 4 mL of serum.
 - Gently invert serum gel tube 5 times to mix clot activator and blood.

- Allow blood to clot for 30 minutes. **DO NOT REMOVE STOPPER.** Centrifuge at full speed for 15 minutes. A barrier will form between serum and cells. Whether or not red cells are visible above gel, if it does not form a complete barrier above cells, either respin immediately for 5 more minutes or transfer serum to a plastic tube and label tube “serum.”
 - Place specimen(s) in bag with request form and refrigerate unless test requirements specify different handling conditions.
- *Whole Blood*
 - Green-top (lithium heparin) tube
 - Green-top (lithium heparin gel) tube
 - Green-top (sodium heparin) tube
 - Grey-top (potassium oxalate/sodium fluoride) tube
 - Lavender-top (EDTA) tube
 - Light blue-top (sodium citrate) tube
 - Royal blue-top (EDTA or sodium heparin) tube
 - Yellow-top (ACD) tube
 - Draw blood into an evacuated tube containing specified anticoagulant.
 - Promptly and gently invert tube (do not shake). Repeat 10 times to mix blood and anticoagulant.
 - When using a syringe to draw specimen, immediately transfer blood to proper evacuated tube. To prevent hemolysis, puncture rubber stopper with syringe needle at an angle so blood is drawn into tube. Do not force blood from syringe into tube. Overfilling may cause hemolysis, alter blood to anticoagulant ratio, or cause stopper to become loose.
 - Place specimen(s) in bag with request form and refrigerate unless test requirements specify different handling conditions.
- Use a waterproof pen or marker to label specimen with specimen type on tube/container (eg, lithium heparin plasma, serum, etc.).
 - Use a waterproof pen or marker to label specimen with patient’s name (first, last, and middle initial), medical record number (if appropriate), date of birth and/or Social Security number, and date and time of collection. Include total volume and hours of collection if specimen is a timed urine collection.
 - Freeze specimen immediately.
 - If more than 1 test is ordered on a specimen that requires freezing, please send a separate specimen for each test ordered. Thawing a frozen specimen to split it for different procedures damages specimen integrity.
 - Place specimen(s) in bag with request form.
 - **SHIP SPECIMEN FROZEN** with dry ice. Specimen must remain frozen during transit.

Order of Draw

When multiple blood specimens are drawn, special attention should be given to order in which tubes are filled. Specimen for blood cultures should be drawn first to prevent possible contamination from non-sterile stoppers. Sterile tubes should be drawn before non-sterile tubes. Tubes with no anticoagulants are drawn before tubes with anticoagulants. If blood is inoculated into tubes from a syringe, the same order should be followed.

General Order of Draw:

- First in draw—blood culture tubes, sterile tubes
- Second in draw—coagulation tubes
- Third in draw—tubes with no anticoagulants
- Last in draw—tubes with anticoagulants

Specimen Collection Tubes Available

The following is a list of tubes referred to in “Specimen Required” in the Alphabetical Test Listing of this catalog.

- *Green-Top (Lithium Heparin) Tube*: Used for lithium heparin whole blood or plasma specimens. Send plasma in plastic transfer tube labeled “plasma-heparin.” Send whole blood in evacuated tube.
- *Green-Top (Sodium Heparin) Tube*: Used for heparinized whole blood or plasma specimens. Send plasma in plastic transfer tube labeled “plasma-heparin.” Send whole blood in evacuated tube.

Frozen Specimen Collection Procedures

When submitting random urine, serum, plasma, or whole blood for tests requiring frozen specimens, please follow these guidelines to assure specimen integrity:

- Allow enough empty space in plastic container to accommodate expansion of specimen during freezing. Specimens should not be frozen in glass containers.

- Grey-Top (Potassium Oxalate/Sodium Fluoride) Tube: Used for potassium oxalate/sodium fluoride whole blood or plasma. Send plasma in plastic transfer tube labeled “plasma-fluoride.” Send whole blood in evacuated tube.
- Lavender-Top (EDTA) Tube: Used for EDTA whole blood or plasma. Send plasma in plastic transfer tube labeled “plasma-EDTA.” Send whole blood in evacuated tube.
- Light Blue-Top (Sodium Citrate) Tube: Used for sodium citrate whole blood or plasma. Send plasma in plastic transfer tube labeled “plasma-citrate.” Send whole blood in evacuated tube.
- Red-Top Tube (No Anticoagulant or Preservative): Used for serum or clotted whole blood. Serum must be separated from cells within 45 minutes of venipuncture. Send serum in plastic transfer tube labeled “serum.”
- Royal Blue-Top Tube (Contains EDTA for Trace Metal Studies): Used for EDTA whole blood or plasma metal specimens. Send plasma in plastic transfer tube labeled “plasma-EDTA-metals.” Send whole blood in evacuated tube.
- Royal Blue-Top Tube (No Anticoagulant for Drug Studies): Serum must be separated from cells within 45 minutes of venipuncture. Remove serum and place in another royal blue-top tube labeled “serum-no anticoagulant.”
- Serum Gel Tube (Contains Clot Activator and Gel for Separating Serum from Cells, But No Anticoagulant): Used for assays requiring serum. Separate serum from cells within 45 minutes of venipuncture. Serum may be sent in tube with intact barrier.
- Yellow-Top (Acid Citrate Dextrose [ACD]) Tube: Contains 1 mL of ACD solution. Used for ACD whole blood. Send whole blood in evacuated tube.