

# Specimen Collection

## Blood Specimen

In order to obtain serum, plasma, or whole blood specimens, a sample of blood is drawn into color-coded tubes. Those tubes either allow or prevent the natural blood clotting process to occur.

Tubes containing preservatives or anticoagulants prevent clotting and provide either a plasma or whole blood specimen. Plain tubes or tubes containing a clot activator allow clotting to occur and provide a serum specimen after centrifugation.

Tubes with clot activator and a gel-like substance in the bottom of the tube, are called “serum separator” tubes or gold-top serum gel tubes. Generally, gold-top serum gel tubes are acceptable for most tests requiring serum unless specimen requirements for an individual test clearly states “Serum gel tube is not acceptable.”

## Collection Procedures

- Specimens drawn into tubes with anticoagulants (i.e. tubes with lavender, green, or blue tops) should be mixed thoroughly by gentle inversion 8 to 10 times. Avoid vigorous shaking, which can cause hemolysis or destruction of RBCs and inaccurate results for many tests. Place tube in refrigerator or leave at ambient temperature according to specimen requirements.
- Specimens drawn into tubes with red or gold tops should be allowed to clot at ambient temperature for 30 minutes before they are centrifuged or treated according to the specimen requirements. If a gold-top or orange-top serum gel tube is used, mix gently by inversion 8 to 10 times immediately after drawing the specimen. Orange-top tubes (RST) have a rapid clot activator and can be centrifuged in 8 minutes after collection and produce a serum sample.
- To ensure proper identification of specimens, label tube(s) immediately after draw in the presence of the patient. Clearly print patient’s first and last name on tube label and a second identifier, like the patient’s date of birth or medical record number. If you have pre-printed, barcoded labels from a label printer that is part of the laboratory computer system, there is no need to write the patient’s name on the label. Do write the date and time of collection on the tube as well as the initials of the collector.
- Apply the patient label vertically to the tube so that the name is at the left of the tube just under the cap. Try to apply over the tube’s paper label so that some blood is visible from the side to ensure the sample tube is filled appropriately and can be easily checked for hemolysis after centrifugation.

## Color-Coded Tube Definitions

The following is a list of tubes referred to in Providence Alaska Medical Center’s (PAMC) specimen requirements:

- **Gold-top Serum Gel Tube:** This tube contains a clot activator and serum gel separator—used for various laboratory tests.  
**Note:** Invert tube 8 to 10 times to activate clotting; let stand for 30 minutes before centrifuging for 10 minutes at 1000g. If frozen serum is required, pour off serum into plastic vial and freeze. We generally **do not freeze serum gel tubes. Refer to specimen requirements for each test.**
- **Green-Top (Sodium or Lithium Heparin) Tube:** This tube is used for drawing heparinized plasma or whole blood for special tests. The tube with a “mint green” cap uses lithium heparin and a gel separator. This tube is used for most chemistry tests at PAMC. Regular green top tubes without gel are typically used for whole blood samples and have either lithium or sodium heparin as the anticoagulant.  
**Note:** After the tube has been filled with blood, immediately invert tube 8 to 10 times to prevent clotting.
- **Grey-Top (Potassium Oxalate/Sodium Fluoride) Tube:** This tube is used for drawing plasma or whole blood and contains potassium oxalate as an anticoagulant and sodium fluoride as a preservative. Used for lactates which need to be transported on ice.  
**Note:** After the tube has been filled with blood, immediately invert tube 8 to 10 times to prevent clotting.
- **Lavender-Top (EDTA) Tube:** This tube is used for drawing plasma or whole blood and is used most often for hematological procedures and hemoglobin A1c (glycohemoglobin) analysis.  
**Note:** After tube has been filled with blood, immediately invert tube 8 to 10 times to prevent clotting.
- **Light Blue-Top (Sodium Citrate) Tube:** This tube contains 3.2% sodium citrate as an anticoagulant—used for drawing plasma or whole blood for coagulation studies.

**Note:** It is imperative that tube be completely filled. The ratio of blood to anticoagulant is critical for valid coagulation results. Immediately after draw, invert tube 8 to 10 times in order to activate anticoagulant.

- **Orange-Top (Rapid Serum Tube with silica) Tube:** This tube has a clot activator and gel separator for serum samples. It is used for many tests needing serum rapidly. Clotting is usually complete in 5 minutes. Allow 8 minutes to be sure complete clotting before centrifugation.

**Note:** After tube has been filled with blood, immediately invert tube 8 to 10 times to mix clot activator.

- **Pink-Top (EDTA) Tube:** This tube is used for drawing plasma for Blood Bank tests.

**Note:** After tube has been filled with blood, immediately invert tube 8 to 10 times to prevent clotting.

- **Red-Top Tube:** This tube contains a silica clot activator but no gel separator which is used for drawing serum for selected chemistry tests as well as clotted blood for immunohematology. Also invert tube 8 to 10 times to mix.
- **Clay-Red-Top (Clear Hemogard cap) Tube:** This tube contains NO ADDITIVE. It is used primarily for urine samples or other samples that can be affected by additives. It can be used for drawing serum for selected chemistry tests, immunohematology or urine tests. It is a plain, sterile tube. Blood will clot, but will require at least 30 minutes for full clot formation before centrifuging.
- **Royal Blue-Top Tube:** There are 3 types of royal blue-top tubes; 1 with anticoagulant EDTA, 1 with heparin, and the other plain with no additive. These are used in drawing whole blood or plasma for trace element analysis. Refer to individual metals in individual test listings to determine tube type necessary. READ labels closely to ensure the correct anticoagulant is used for the specific test. Often there is a color-coded edge on the label; lavender, green or red, to aid in identification which additive is in the tube.
- **Yellow-Top (ACD) Tube:** This tube contains acid citrate dextrose (ACD) used for drawing plasma or whole blood for special tests. This is not the same as the yellow tube used for urine collection.

## Order of Draw

When multiple tubes are drawn from a single patient, the additives can be transferred between tubes. To eliminate interference from these additives when testing is performed, please follow the order of draw listed below. Mix all tubes 8 – 10 times gently by inversion as nearly all containers have an additive that needs to be incorporated into the blood for proper testing.

If microtainer tubes are being collected, start with the Lavender top tube first and mix the tube with a flicking action while collecting the sample. Minimum fill is to the first line for anticoagulant to blood ratio. When filled, cap and mix by inversion slowly for 20 times, rotating to ensure blood mixes with all sides of the tube and verifying the blood is not clotted in the lavender or green top tubes. Order of draw is not affected by the anticoagulant as there should be no cross contamination. This order collection is to minimize the effect of clotting with capillary sample collections.

Order of Draw	
VACUTAINER® System	Syringe
1. <b>Blood culture</b> – use blood culture collection kit with diversion tube if available to minimize contamination. Follow directions in kit for collection.	1. <b>Blood culture</b> – use blood culture collection kit with diversion tube if available to minimize contamination. Follow directions in kit for collection.
2. <b>Blue-top</b> - sodium citrate tube (Coag samples)	2. <b>Blue-top</b> - sodium citrate tube (Coag samples)
3. <b>Red, gold or orange-top</b> serum tube. (Plain no-additive tubes should be drawn here as well. Cap is clay-red colored and clear Hemogard outer cover.)	3. <b>Pink-top</b> - EDTA tube (Blood Bank)
4. <b>Green-top</b> (mint or deep green) - heparin tube with or without gel. Verify if lithium or sodium based on test ordered.	4. <b>Lavender-top</b> - EDTA tube
5. <b>Pink-top</b> - EDTA tube (Blood Bank)	5. <b>Red, gold or orange-top</b> serum tube. (Plain no-additive tubes should be drawn here as well. Cap is clay-red colored.)
6. <b>Lavender-top</b> - EDTA tube	6. <b>Green-top</b> (mint or deep green) - heparin tube with or without gel, verify lithium or sodium.
7. <b>Grey-top</b> - potassium oxalate/sodium fluoride tube	7. <b>Grey-top</b> - potassium oxalate/sodium fluoride tube
8. <b>Yellow-top</b> - ACD tube	8. <b>Yellow-top</b> - ACD tube