

Blood Collection Tube Top Colors



Light Blue top



Red top tube - Serology and Immunohematology



Red top tube - Chemistry



Light Green top or Green top



Lavender top



Pink top tube (Blood Bank EDTA)





Gray top



Yellow top tube (ACD solution A) or (ACD solution B)



Royal Blue top; serum, no additive or sodium heparin



White top

Order of the Draw

To prevent contamination of tubes with additives from other tubes it is important to draw the tubes in a SPECIFIC order called "the order of the draw". For example, if the additive in the purple stopper tube contaminates the green stopper tube this would cause a falsely decreased calcium and increased potassium. The sequence of collection of evacuated tubes in a multi-draw should be in this order:

1. Sterile/Blood cultures (yellow stopper or bottles, most institutions use bottles)
2. Light Blue coagulation tube **-NOTE:** If coagulation tests only are ordered AND you are using a butterfly, draw a discard tube to collect the air in the tubing into the discard tube. Failure to do so will result in a short draw which will be rejected by the lab.
3. Red - Non-Additive - has clot activator
4. Red Gel separator tube (speckled or "tiger" top or gold)
5. Green (heparin)
6. Green/Gray mottled Plasma Separator Tube (PST) with heparin
7. Lavender/purple and/or pink (EDTA)
8. Gray top (Potassium Oxalate/sodium fluoride tube)

<http://www.pathology.med.umich.edu/bloodbank/faqs.html> - has the following picture. Visit their website as it has some other nice pictures and explanations.

The picture below is accurate EXCEPT for the royal blue tube. Since it has a red label it would follow the light blue coagulation tube. If the royal blue tube is glass the picture may be illustrating the use of a discard tube if a butterfly was used as there is a significant amount of air in the tubing which will result in a short draw in the light blue stopper tube.



LIGHT BLUE



ADDITIVE: Sodium Citrate either 3.2% or 3.8% Citrate, theophylline, adenosine, dipyridamole (CTAD)

ACTION: Citrate is an anticoagulant which binds calcium in the blood. Calcium is required for blood clotting. Since it is bound up the blood cannot clot resulting in a whole blood sample, red blood cells and PLASMA. Coagulation tubes are filled with buffered tri-sodium citrate solution. Citrate concentrations of either 0.109 mol/l (3.2 %) or 0.129 mol/l (3.8 %) are available. The choice of the concentration depends upon the policies of the laboratories. *The mixing ratio is 1 part citrate to 9 parts blood.* CTAD tubes contain besides the buffered citrate solution, theophylline, adenosine and dipyridamole.

These tubes ***MUST BE COMPLETELY FILLED*** due to the amount of additive in the tube. Short draw tubes will be rejected.

DEPARTMENT: The *Coagulation* department in the clinical laboratory performs various tests on citrate-anticoagulated blood specimens to determine coagulation disorders and to monitor patients receiving anticoagulation therapy such as heparin, coumadin or warfarin. A clotting profile is performed on specimens, as a screening test. According to the results of the profile, further specialized tests may be performed to determine coagulation factor deficiencies, platelet abnormalities, hypercoagulability, etc.

TESTS PERFORMED

- Routine coagulation tests include:
 - Prothrombin Time (PT)
 - Partial Thromboplastin Time (PTT)
 - Thrombin Time (TT)
 - Fibrinogen
 - Fibrin degradation products (FDP)
 - D-dimer
- Many special coagulation tests can be performed to diagnosis various bleeding disorders, these are usually sent out to reference labs:
 - Factor activity assays (II, V, VII, VIII, IX, X, XI, XII)
 - Factor antigen assays (VII, X)
 - Factor inhibitor assays (II, V, VII, VIII, IX, X, XI, XII)
 - von Willebrand factor assays (vWF Ag, Ristocetin cofactor, Multimers, RIPA)
 - Platelet aggregation studies (collagen, ADP, epinephrine, arachidonic acid, ristocetin)
 - Lupus Inhibitor assay (DRVVT)
 - Thrombophilia assays (protein C, protein S, antithrombin)
 - Activated Protein C Resistance/Factor V
 - DNA screening
 - Fibrinolysis assays (t-PA activity and antigen, PAI-1 activity, plasminogen, antiplasmin)

Site with list of some very special coagulation tests: [Duke University Regional Referral Laboratory Services](#)

PURPLE LAVENDER



ADDITIVE: EDTA K2, EDTA K3

ACTION: The interior of the tube wall is coated with either EDTA K2 or EDTA K3. The tube is also available with an 8% liquid EDTA solution. The EDTA binds calcium ions thus blocking the coagulation cascade. EDTA tubes can be used in direct sampling analysers without actually being opened. Erythrocytes, leukocytes (white blood cells) and thrombocytes (platelets) are stable in EDTA anticoagulated blood for up to 24 hours. Preparation of blood smears should be done within 3 hours after blood collection. EDTA tubes are used for testing whole blood in the clinical laboratory. EDTA K2 tubes are used for testing whole blood in molecular diagnostics.

EDTA K2/gel tubes are used for testing plasma in molecular diagnostics and viral load detection. HIV and HCV are stable for up to 72 hours in a non-centrifuged sample at room temperature (20–25°C). However centrifugation for EDTA K2/gel tubes should be done within 6 hours after blood collection for best results. Mid- term storage (up to 2 weeks) in primary tubes is recommended at –20°C. For long-term storage (over 2 weeks) at –70°C or at lower temperatures please store aliquots in cryo vials.

DEPARTMENT: *Hematology* is concerned with the study of the formed elements of the blood: red blood cells, white blood cells, and platelets. Diseases of the blood forming tissues can be detected and identified through appropriate testing and examination.

TESTS PERFORMED

- Routine hematology tests include:
 - Hemoglobin
 - Hematocrit
 - White blood cell (WBC) count
 - Red blood cell (RBC) count including MCV, MCH, and MCHC which are calculations used to determine size and shape of RBCs
 - Platelet Count
 - Differential - the microscopic examination of blood
 - Complete Blood Count - the complete blood count includes ALL of the following tests: red blood cell count, platelet count, white blood cell count, hemoglobin and hematocrit.
 - Reticulocyte count
 - Eosinophil count
- Other special tests can be performed in the hematology department:
 - Erythrocyte sedimentation rate AKA Sed Rate or ESR
 - Sick cell test
- Body fluid counts - Cerebrospinal Fluid (CSF), pleural fluid, pericardial fluid, peritoneal fluid, and synovial fluids may be submitted for cell counts.

Chemistry

Hemoglobin A1C

RED



ADDITIVE: Glass - NONE

Plastic - clot activators to enhance the clotting of blood, tube inversions are necessary to ensure mixing of clot activator with blood. Blood clotting time 30 minutes.

For serum determinations in chemistry, serology and Immunohematology (blood banking).

DEPARTMENTS: **IMMUNOHEMATOLOGY** (BLOOD BANK)- Patient blood is tested to determine ABO/D type as well as to detect the presence of unexpected antibodies which may cause reactions with donor blood. Compatibility testing involves testing patient and donor blood to ensure that the blood is compatible. Components are prepared for transfusion.

NOTE: Some facilities use a special system for blood bank testing that requires an EDTA samples. Some facilities will use the [purple stopper tube](#) others will use the [pink stopper tube](#) so it can easily be identified as being for blood bank.

TESTS - BLOOD BANK

ABO/D type aka ABO/Rh Testing:	Blood Component Requests:
Antibody Screen AKA Indirect Antiglobulin Test (IAT)	Packed Red Blood Cells (RBC)
Type and Screen (T&S)	PLATELETS
Crossmatch or Type and Cross (T&C)	CRYOPRECIPITATE (CRYO)
Rh Immune Globulin AKA Rhogam	FRESH FROZEN PLASMA (FFP)
Antibody Titer	
Antigen Typing	

SEROLOGY OR IMMUNOLOGY - originally, the study of the in vitro reactions of immune sera, e.g., precipitin, agglutination, and complement fixation reactions. Currently, the term is used to refer to the use of such reactions to measure serum antibody titers in infectious disease (serologic tests), to the clinical correlations of the antibody titer (the serology of a disease), and to the use of serologic reactions to detect antigens (e.g., "serologically defined" HLA antigens).

TESTS - SEROLOGY

- Infectious Mononucleosis such as Monotest or Monospot
- Rheumatoid Arthritis (RA) AKA Rheumatoid Factor (RF)
- Syphilis testing such as Rapid Plasma Reagin (RPR), Venereal Disease Research Lab (VDRL) or Fluorescent Treponemal Antigen Test (FTABS)
- Rubella titer
- Strep testing such as Streptozyme or Anti-streptolysin O (ASO) Titer
- Pregnancy test
- Cold Agglutinins (CAG) - Keep sample warm after collection
- Haptoglobin (HP)
- C-Reactive Protein (CRP)

GRAY



ADDITIVES

Potassium Oxalate and Sodium Fluoride

Sodium fluoride/Na₂ EDTA

Sodium Fluoride (no anticoagulant, will result in serum sample)

ACTION

Sterile blood collection tubes for laboratory procedures requiring plasma or whole blood chemistry procedures where glycolytic inhibition of specimen is required. The anti-glycolytic properties prevent the blood cells from using the glucose in the sample. Used instead of red top when there will be a delay in getting blood to the lab for a glucose level.

Oxalate and EDTA are anticoagulants which will prevent the blood from clotting, sodium fluoride is a stabilizer. The resulting supernatant fluid is PLASMA. Sodium fluoride is an anti-glycolytic only, resulting fluid is SERUM.

The tube must be inverted 4-5 times after collection to allow adequate mixing of the blood with the additive. Failure to mix may result in the sample clotting. Clotted tubes will be rejected.

DEPARTMENT

Clinical Chemistry -The clinical chemistry laboratory performs a wide variety of analytic procedures, both specialized and routine. These include tests for the evaluation of endocrine and metabolic disorders, therapeutic drug monitoring and toxicology, protein electrophoresis, lipid panels, as well as those tests commonly called routine such as hepatic function tests, electrolytes and markers of cardiac damage.

TESTS PERFORMED

Glucose Levels

Blood Alcohol Levels

Lactate

Bicarbonate

GREEN



These are PST "Plasma Separator Tube"

ADDITIVE

Sodium Heparin
Lithium Heparin
Ammonium Heparin

ACTION

The interior of the tube wall is coated with lithium heparin, ammonium heparin or sodium heparin. The anticoagulant heparin activates antithrombins, thus blocking the coagulation cascade and producing a whole blood / plasma sample instead of clotted blood plus serum. Plasma separator tubes (PST) are tubes with lithium heparin and gel contain a barrier gel in the tube. The specific gravity of this material lies between that of the blood cells and plasma. During centrifugation the gel barrier moves upwards providing a stable barrier separating the plasma from cells. Plasma may be aspirated directly from the collection tube, eliminating the need for manual transfer to another container. This barrier allows for the stability of certain parameters in the primary tube under the recommended storage conditions for up to 48 hours. Check the heparin additive before use. Do not use heparin plasma tubes for TDM measurements, lithium heparin for lithium determinations, sodium heparin for sodium determinations, ammonium heparin for ammonia determinations or any type of heparin for blood banking procedures.

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TESTS

For plasma determinations in the chemistry department. Many institutions use red stoppered tubes for routine chemistry tests and green stoppered tubes for STAT chemistry tests.