NewYork-Presbyterian
The University Hospital of Columbia and Cornell

September 2021

To: Clients of the New York Hospital Laboratories **(NYHL)**

From: NYHL Management

Subject: **URGENT:** Under-Filled Sodium Citrate (Light Blue Top) Tube and Proper Collection Guideline

Dear Valued NYHL Client,

We wanted to remind you of the *importance* of following **proper** specimen collection guidelines when drawing **sodium citrate** (light blue) top tubes to avoid inaccurate results and specimen rejection. As a patient safety measure to ensure accurate result reporting, the newly updated FDA approved analyzers (installed in the Central Laboratory in August 2021) now detect and enforce the CLSI guidelines requiring the appropriate 9:1 blood to anticoagulant ratio. Any tubes that do not reach the etched minimum fill line indicator on the sodium citrate (light blue top tubes) will be rejected

When using a *winged blood collection* set (butterfly needle) for venipuncture and a Sodium Citrate tube is the ***first*** specimen to be drawn, a **discard tube** (no additive) must be drawn *first* in order to remove air from the blood collection set tubing. This process *ensures* proper blood volume is obtained within the sodium citrate tube. Kindly note, the discard tube does not need to be filled completely. Once discard tube is drawn, and the sodium citrate tube is being collected, allow the tube *to fill until the vacuum is exhausted and blood flow ceases*. As a reminder, blood volume should be above the etched fill line indicator on the tube. Immediately after collection, invert tube 3-4 times to *prevent* clotting.

*****Please refer to the visual aid following this memo for further information as well as an article from BD Manufacturers'':

"BD VACUTAINER Plus Plastic Citrate Tube" and ***"Tech Talk: Proper handling of BD Vacutainer plus Citrate Tubes."***

Kindly direct any questions regarding coagulation testing to the NewYork-Presbyterian Hospital/Weill Cornell Medical Center Central Laboratory at 212-746-2660 or our Client Service Department at 212-746-0670.

We appreciate your continued support and partnership with the Laboratories at NewYork-Presbyterian Hospital/Weill Cornell Medical Center.

Adult Collection Pediatric collection

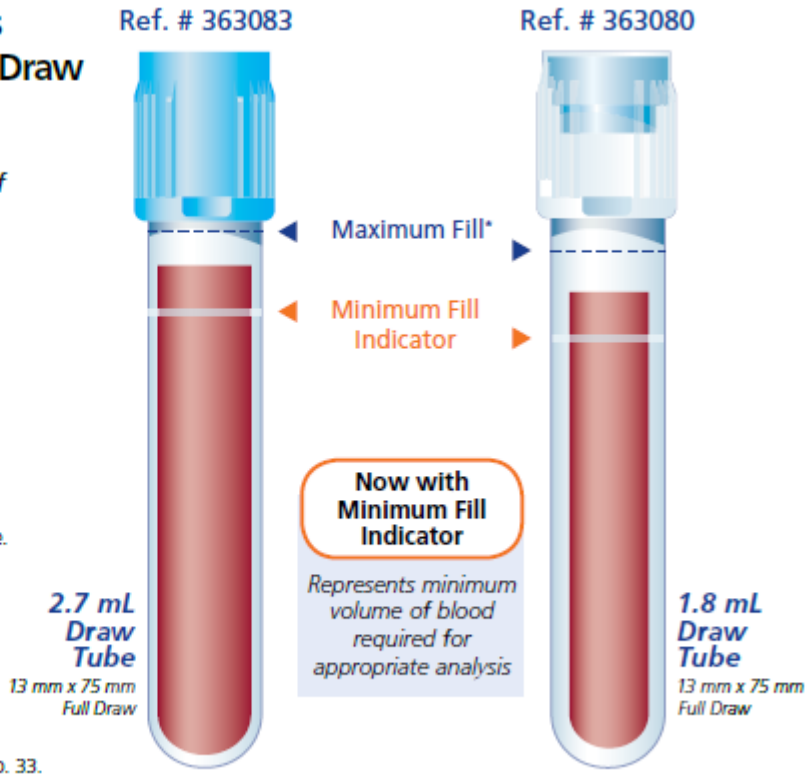
BD Vacutainer® Plus Plastic Citrate Tube

BD Vacutainer® Plus Plastic Citrate Tube Draw Volume Guide

*Sufficient volume achieved if blood drawn falls above minimum fill indicator. For blood transfer, **do not** fill above illustrated dashed maximum line.*

Note: The quantity of blood drawn into evacuated tubes varies with altitude, ambient temperature, barometric pressure, tube age, venous pressure and filling technique.

*According to CLSI guideline, Dec. 2003, Doc. H1-A5, Vol. 23, No. 33.



BD Vacutainer® Plus Plastic Citrate Tube

Minimizing Preanalytical Variables for Coagulation Tests

- Assemble needle in holder; always fully seat and **hold** a citrate tube on the back end of the needle while filling.
- Allow the tube to fill until the vacuum is exhausted and blood flow ceases.
- Tubes should fill between ±10% of the stated draw volume of the tube (CLSI guideline, Dec. 2003, Doc. H1-A5, Vol. 23, No. 33).
- Minimum fill indicator represents the minimum volume of blood required for appropriate analysis.
- When using a winged blood collection set for venipuncture and a coagulation (citrate) tube is the first specimen tube to be drawn, a discard tube should be drawn first. It is important to remove the air from the blood collection set to ensure the proper blood volume is obtained in the tube.
- Do not fill tubes from other tubes or combine two partially filled citrate tubes.
- If the specimen is drawn with a syringe, do not fill the BD Vacutainer® Citrate Tube beyond the level as illustrated on the reverse side of this guide. Allow the tube to draw the blood from the syringe using a BD Vacutainer® Blood Transfer Device if available. Do not force blood into tube.
- Immediately after draw, **gently** invert tube 3 to 4 times. **Do not shake.**

Cat#	Size	Draw	Citrate
363083	13 x 75 mm	2.7 mL	3.2% (0.109M)
363080	13 x 75 mm	1.8 mL	3.2% (0.109M)

BD Global Technical Services: 1.800.631.0174
www.bd.com/vacutainer

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Tech Talk

Volume 5, No. 1 May 2007

The BD Technical Services Department receives many questions about its products. To address these questions, we have developed a periodic news bulletin, called "Tech Talk".

Proper Handling of BD Vacutainer® Plus Citrate Tubes

Introduction:

At BD, we understand that it's not just a test… it's a patient, and the accuracy of your test result is what matters most. This starts with managing the preanalytical variables to yield a high quality specimen. Proper handling ensures the correct blood-to-additive ratio, which is critical to obtaining accurate test results. Improper handling can lead to erroneous results and may impact patient care. This Tech Talk reviews the proper handling instructions as well as common causes for underfilling tubes.

Q. What could cause the BD Vacutainer® Plus Citrate tubes to be underfilled?

A. Use product within shelf life

Product used past its shelf life may result in an underfilled tube.

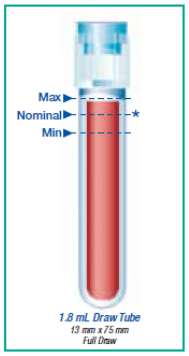
DESCRIPTION	SHELF LIFE
Plastic 13x75 mm tube 1.8 mL draw volume Translucent Clear BD Hemogard™ Closure with light blue stopper	6 months
Plastic 13x75 mm tube 2.7 mL draw volume Light blue BD Hemogard™ Closure with light blue stopper	9 months

Special note on the 1.8 mL draw volume tube:

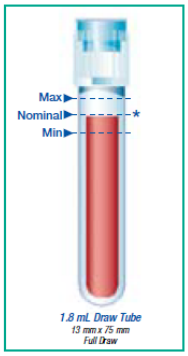
BD manufactures the 1.8 mL tube by adhering to the Clinical and Laboratory Standards Institute (CLSI) guidelines of +/- 10% of the stated draw volume throughout the shelf life of the product.[1] Additionally, BD has very tight manufacturing specifications to ensure adherence to the draw volume guidelines and proper clinical results.

It is important to understand that the draw volume decreases over time. This occurs on all tubes, especially plastic, due to the PET (polyethylene terephthalate) being a permeable material. However, due to the narrow inner tube diameter of the 1.8 mL tube, the appearance of the draw change is significantly magnified.

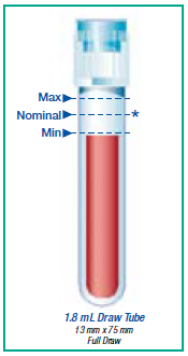
Maximum Fill



Nominal Fill



Minimum Fill



Beginning of shelf life → End of shelf life (6 months)

When customers receive a "fresh" product, the tube will draw just below +10%. As time passes, the tube will lose vacuum and at the end of shelf life will still draw within the CLSI recommendations, but more in the nominal to –10% range. However, if "fresh" and "older dated" tubes are compared to one another, it may appear that there is an issue due to the column height difference. As indicated above, the narrow inner tube diameter of the 1.8mL tube appearance of the draw change is significantly magnified. The difference between +10% and nominal is about 4 drops of blood (equivalent to 0.2 mL). The draw change is not as magnified in the 2.7 mL tube. Customers may want to consider using this tube as an alternative.

Store tubes at 4-25°C (39-77°F) to maximize performance

Hold tube in place until draw is completed

The citrate stopper was designed to minimize the amount of calcium, zinc, and magnesium since these metals are known to chemically bond to the citrate in the additive, which could lead to erroneous coagulation results. This results in a softer stopper material compared to other BD Vacutainer® tubes, resulting in greater pushback forces. When drawing a patient with a citrate tube, the soft blue stopper can push back or stretch against the non-patient (NP) end of the needle. This can occlude or block flow of blood through the NP end. Occasionally, this gives the perception that there is insufficient or no vacuum in the tube.

To alleviate pushback, one must hold the blue top citrate tube in place until it has completed the required draw volume and blood flow ceases. This should control the pushback force and ensure that the NP end properly pierces the stopper, providing an adequate blood flow for a quality collection.

Draw a discard tube first when collecting with a blood collection set

A discard tube (tube with no additives) must be used if a citrate tube is the first tube to be drawn using a blood collection set. It is important to remove the air from the blood collection set tubing to ensure the proper blood volume is obtained in the citrate tube. The citrate tube will underfill by 0.35 mL when using a 12" blood collection set and 0.23 mL when using a 7" blood collection set. Pulling in this air will result in the incorrect blood-to-additive ratio.

Use a non-sharp device to transfer sample from syringe to evacuated tube

Transferring samples from a syringe to an evacuated tube using a non-sharps device should be performed with caution as this may cause over or under filling of tubes, resulting in an incorrect blood-to-additive ratio and potentially incorrect analytical results. Allow the tube to draw the blood from the syringe using a BD Vacutainer® Blood Transfer Device.

Altitude can affect draw volume

The quantity of blood drawn can vary with altitude. For this reason, BD recommends that each facility conducts their own validation and determines the adequate draw volume for their location.

Be aware of patient factors

- Small and fragile veins may cause occlusion of the IV needles, resulting in an inadequate sample collection. Use the correct needle product for these patients and allow extra time for the draw to complete.
- In extremely fragile patients (neonates or small children), clinicians may choose to draw less blood without realizing the impact on test results. Clinicians should be re-educated about the importance of preanalytical variables on correct test results.

Quick Checklist for Proper Citrate Draw Volume

- ☐ Use product within shelf life
- ☐ Store tubes at 4-25°C (39-77°F)
- ☐ Draw a discard tube first when collecting with a blood collection set
- ☐ Hold tube in place until draw is completed
- ☐ Use a non-sharp device to transfer sample from syringe to evacuated tube
- ☐ Validate the appropriate draw volume for your facility
- ☐ Be aware of patient factors

Please call BD Global Technical Services for clinical support material.

BD Global Technical Services: 1.800.631.0174
BD Customer Service: 1.888.237.2762

1. CLSI, Evacuated Tubes and Addirive for Blood Specimen Collection – Fourth Edition. Doc. H1-A4, Vol. 16, No. 13. Dec 1996.

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