

TENNESSEE BUREAU OF INVESTIGATION

Forensic Services Division

Forensic Chemistry Standard Operating Procedure Manual

Appendix A: Reagent Preparation and Verification Guidelines

APPENDIX A: REAGENT PREPARATION AND VERIFICATION

⚠ *All reagents will be prepared under a fume hood wearing the proper PPE.*

A.1 Preparation Instructions

Dilute acetic acid

2 drops of glacial acetic acid diluted to 10 mL with high purity water.

9.4 buffer

Mix equal portions of solutions A and B

A - 0.064 N NaOH - 1.28 grams NaOH dissolved in 500 mL with high purity water.

B - 0.1 M Boric acid - 6.2 grams of boric acid dissolved in 1000 mL with high purity water.

1% citric acid

Dissolve 1 gram of citric acid in 100 mL high purity water.

2% citric acid

Dissolve 2 grams of citric acid in 100 mL high purity water.

0.1 N hydrochloric acid

In a liter volumetric flask approximately 1/2 full of high purity water, slowly add 8.3 mL of concentrated hydrochloric acid, and dilute to 1000 mL with high purity water.

2.8 N hydrochloric acid

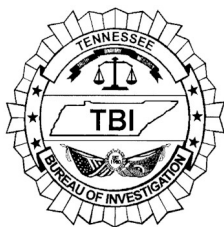
In a 100 mL volumetric flask approximately 1/2 full of high purity water slowly add 24.1 mL of concentrated hydrochloric acid, and dilute to 100 mL with high purity water.

10% hydrochloric acid

In a 100 mL volumetric flask approximately 1/2 full of high purity water, slowly add 10 mL of concentrated hydrochloric acid, and dilute to 100 mL with high purity water.

Saturated sodium bicarbonate

Slowly add sodium bicarbonate to high purity water until no more sodium bicarbonate will go into solution, or dissolve approximately 80.0 grams of sodium bicarbonate in 1 liter of high purity water.



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Saturated sodium hydroxide

In a 500 mL beaker approximately 2/3 full of high purity water, add sodium hydroxide pellets while stirring until no more pellets will dissolve. Decant the liquid.

0.5 N sodium hydroxide

In a 100 mL volumetric flask, dissolve 2 grams of sodium hydroxide pellets in high purity water, and dilute to 100 mL with high purity water.

Dilute sodium hydroxide

Add 2 drops of saturated sodium hydroxide to 10 mL of high purity water.

0.5 N sulfuric acid

In a 1 liter flask approximately 1/2 full of high purity water, slowly add 13.9 mL of concentrated sulfuric acid, and dilute to 1000 mL with high purity water.

Chloroform:methanol (4:1)

In a 50 mL graduated cylinder, mix 40 mL of chloroform and 10 mL of methanol.

1% tartaric acid

Dissolve 1 gram of tartaric acid in 100 mL high purity water.

1 N HCl

In a 250 mL graduated cylinder, add approximately 100 mL of high purity water. Slowly add 10 mL of concentrated hydrochloric acid and dilute to 120 mL.

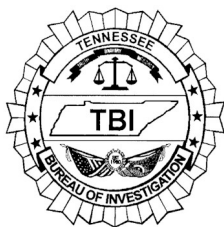
1 N NaOH

In a volumetric flask, dissolve 4 grams of sodium hydroxide pellets in high purity water, and dilute to 100 mL with high purity water.

Tribenzylamine Internal Standard

Dissolve 30 mg into 100 mL of methanol using a traceable 100 mL volumetric flask.

Note: Quantities may be adjusted provided that the proportions of each reagent are consistent.



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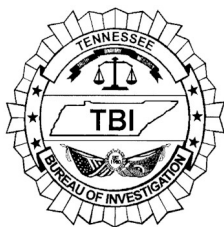
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A.2 Reagent Verification Criteria and Corrective Actions

Any solvent or reagent that fails to produce the expected results should be checked using the guidelines below.

Dilute Acetic Acid	Positive –check with pH paper	pH of 3-4 with pH paper or red with blue litmus
	Negative – n/a	
1% Citric Acid	Positive –check with pH paper.	pH of 3-4 with pH paper or red with blue litmus
	Negative – n/a	
2% Citric Acid	Positive – check with pH paper	pH of 3-4 with pH paper or red with blue litmus
	Negative – n/a	
0.1 N HCl	Positive – check with pH paper	pH of 2-4 with pH paper or red with blue litmus
	Negative – n/a	
2.8 N HCl	Positive – check with pH paper	pH of 0-2 with pH paper or red with blue litmus
	Negative – n/a	
10% HCl	Positive –check with pH paper	pH of 0-2 with pH paper or red with blue litmus
	Negative – n/a	
1 N HCL	Positive –check with pH paper	pH of 0-2 with pH paper or red with blue litmus
	Negative – n/a	
Concentrated (12 N) HCL	Positive – check with pH paper	pH of 0-1 with pH paper or red with blue litmus
	Negative – n/a	
1% Tartaric Acid	Positive – check with pH paper	pH of 3-4 with pH paper or red with blue litmus
	Negative – n/a	
0.5 N H₂SO₄	Positive – check with pH paper	pH of 0-2 with pH paper or red with blue litmus
	Negative – n/a	
9.4 Buffer	Positive –pentobarbital standard	UV absorbance at approximately 240 nm
	Negative – reagent blank	No UV absorbance



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Saturated sodium bicarbonate	Positive – check with pH paper	pH of 8 -10 with pH paper or blue with red litmus
	Negative – n/a	
Saturated Sodium Hydroxide	Positive – check with pH paper	pH of 11-13 with pH paper or blue with red litmus
	Negative – n/a	
0.5 N Sodium Hydroxide	Positive – check with pH paper	pH of 11-13 with pH paper or blue with red litmus
	Negative – n/a	
1 N Sodium Hydroxide	Positive – check with pH paper	pH of 11-13 with pH paper or blue with red litmus
	Negative – n/a	
Ammonium Hydroxide	Positive – check with pH paper	pH of 11-13 with pH paper or blue with red litmus
	Negative – n/a	
Ultra High Purity Water	UV analysis	No UV absorbance
Methanol	GC-MS analysis	Contaminant-free spectrum
Reagent Alcohol	GC-MS analysis	Contaminant-free spectrum
Chloroform	GC-MS analysis	Contaminant-free spectrum
Acetone	GC-MS analysis	Contaminant-free spectrum
Dichloroethane	GC-MS analysis	Contaminant-free spectrum
Hexane	GC-MS analysis	Contaminant-free spectrum
Petroleum Ether	GC-MS analysis	Contaminant-free spectrum
Tribenzylamine Internal Standard	GC-MS analysis	Neg – Clean methanol blank**
		Pos – Tribenzylamine peak only

**The same methanol used to make the standard should be run as a negative control when prepared. Other solvents may be used for quarterly verification blanks after the standard has been put into use.