



K25 Presumptive Identification of Nitrite by Griess Reagent Test Strips—Applications in Suicide Investigations

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Learning Overview: After attending this presentation, attendees will understand the utility of a simple, commercially available color test to triage potential sodium nitrite poisoning cases.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by illustrating the use of a supplemental presumptive screening tool for an analyte that is not conventionally included in forensic toxicology panels. This knowledge may prevent expensive, undirected private laboratory testing while confirmatory methods are developed or laboratories with validated ion monitoring procedures are identified.

Nitrite poisonings have been documented for decades, with incidents including fertilizer contamination of well water, ingestion of improperly cured meats, and infant exposure to vegetables high in nitrites and nitrates. More recently, sodium nitrite and sodium azide have been advocated by online suicide forums as an effective means of fatal overdose. Three cases submitted to the University of Florida (UF) Forensic Toxicology Laboratory initially indicated suspected sodium nitrite poisoning. The fourth case underwent exhaustive toxicological testing with inconclusive test results before scene evidence implicated intentional sodium nitrite ingestion.

Spectrophotometry, ion chromatography, and Gas Chromatography/Mass Spectrometry (GC/MS) methods exist for the quantitation of nitrite and nitrate ions and are commercially available for postmortem livestock samples. However, such testing involves specialized detection equipment and/or preparation methods that are not part of standard human toxicological testing schemes, including those of the UF laboratory and its reference laboratory. Until validated methods are developed, it was hypothesized that a common Griess reagent color test (MQuant™ Nitrite Test Strips) could be used as a presumptive triage method in cases where ingestion of sodium nitrite is suspected.

Initial testing was performed on four suspected nitrite ingestion cases using available clear fluid samples. The unconfirmed presumptive test results are presented below:

Case	Sample Type	Presumptive Test Result
Negative Control	Urine	None Detected
20mg/L Standard	Aqueous (Water)	Positive
5mg/L Control	Urine	Positive
Case 1	Urine	None Detected
	Vitreous Humor	Positive
	Serum	None Detected
	Stomach Contents	Positive
	White Crystals from Water Bottle	Positive
Case 2	Urine	Positive
	Vitreous Humor	Positive
	Stomach Contents	Positive
Case 3	Urine	Positive
	Vitreous Humor	Positive
Case 4	Vitreous Humor	Positive
	Serum	None Detected
	Stomach Contents	Positive

The test strips provide a color scale for the semi-quantitative measurement of nitrite concentrations between 2 to 80mg/L, a range higher than typical urine concentrations in healthy individuals. While the test strips used in this study are intended for the monitoring of nitrite in water, the same Griess reagent color test is routinely performed in urinalysis panels indicated for the detection of urinary tract infections and endocrine disorders.

Due to the ubiquitous nature of nitrogen oxides, their association with common diseases, such as diabetes, and potential interferences (chromate, permanganate, other oxidants), test results must be interpreted with caution. Of 27 randomly selected postmortem cases of varying sample quality and exogenous content, none produced positive test results in serum, urine, vitreous humor, or stomach content samples. Therefore, in conjunction with physical indicators such as brown discoloration of the blood and cyanosis from peri-mortem methemoglobinemia (MetHb), medical history, and/or scene evidence, nitrite screening test kits can provide toxicologists with insight on suspected nitrite poisoning cases.

Nitrite, Suicide, Presumptive Testing