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**SPECIFIC MEDICAL TESTS AND EXAMINATIONS
PUBLISHED IN THE LITERATURE
FOR OSHA-REGULATED SUBSTANCES**
(OSHA = Occupational Safety and Health Administration)



[en español](#)

Toluidine, o-

CAS No: 95-53-4

NOTE:

- (1) Efficacy of Medical Tests has not been evaluated by NIOSH.
- (2) NIOSH references include diagnostic, screening, and other tests.
- (3) Revised (2004) OSHA mandated medical tests [OSHA 6(b) (5) standards] are provided in yellow background and are listed first.
- (4) Only OSHA-regulated substances (29 CFR 1910.1000, Table Z-1 -- Air Contaminants) with published medical tests are included.
- (5) N/R = Not Reported.

EDITOR(S) / AUTHOR(S)	SPECIFIC MEDICAL TEST(S) and EXAMINATION(S) ANALYTIC METHOD(S) ANALYTE(S) PAGE(S)	REFERENCE(S)
US DHHS PHS CDC NIOSH and US DOL OSHA.	<p>In General</p> <p>o-Toluidine Absorption, Whether from Inhalation of the Vapor or by Skin Absorption of the Liquid, Causes Anoxia (due to the Formation of Methemoglobin), and Hematuria.</p> <p>The Earliest Symptoms of Poisoning in Humans are Headache & Cyanosis of the Lips, the Mucous Membranes, Fingernail Beds, & the Tongue. Minor Degree of Hypoxia may lead to a Temporary Sense of Well-being. As the Lack of Oxygen increases, there is Growing Weakness, Dizziness & Drowsiness Eventually Leading to Stupor, Unconsciousness and Death if Treatment is not Prompt.</p> <p>Transient Microscopic Hematuria has Been Observed in o-Toluidine Workers Presumably of Renal Origin Since no Alterations in the Bladder Mucosa were Observed by Cystoscopy.</p> <p>Excessive Drying of the Skin May Result from Repeated or Prolonged Contact with o-Toluidine.</p> <p>Pages 1; 2 (1978).</p>	<p>NIOSH/OSHA Occupational Health Guidelines for Chemical Hazards DHHS (NIOSH) <i>Pub No. 81-123; 88-118; Suppls. I-IV. 1981-1995.</i></p> <p>Pages 1 -5 (1978).</p>



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<p>US DHHS PHS CDC NIOSH and US DOL OSHA.</p>	<p>Whole Blood (Chemical/Metabolite) Methemoglobin</p> <p>Toluidine has been shown to cause Methemoglobinemia. Those with Blood Disorders May be at Increased Risk from Exposure. Methemoglobin Determination Should be Performed if Overexposure is Suspected or if Signs and Symptoms of Toxicity Occur. Page 1.</p>	<p>NIOSH/OSHA Occupational Health Guidelines for Chemical Hazards DHHS (NIOSH) <i>Pub No. 81-123; 88-118; Suppls. I-IV. 1981-1995.</i> Pages 1 -5 (1978).</p>
<p>Lauwerys RR, Hoet P.</p>	<p>Whole Blood (Chemical/Metabolite) Methemoglobin</p> <ul style="list-style-type: none"> • N/R <p>Methemoglobin Reference Value: < 2 % Tentative Maximum Permissible Concentration:5% Page 623.</p>	<p><i>Industrial Chemical Exposure. Guidelines for Biological Monitoring.</i> 3rd Edition. Lewis Publishers. CRC Press, Inc. 2001. Page 623.</p>
<p>Hathaway GJ, Proctor NH, Hughes JP, Fischman ML.</p>	<p>Whole Blood (Chemical/Metabolite) Methemoglobin</p> <p>o-Toluidine Causes Anoxia, as a Result of the Formation of Methemoglobin, & Hematuria. In a Report where Chemical Workers were Exposed to o-Toluidine & Aniline, Among 1,749 Workers, 13 Bladder Cancer were Observed versus 3.61 Expected. The Increased Incidence was strongly Associated with Duration of Employment in the Department where o-Toluidine was being Used. Because o-Toluidine was a more Potent Bladder Carcinogen, it was more likely to be the Etiological Agent Responsible for the Bladder Cancer Excess in this Plant . pp 609-610.</p>	<p><i>Proctor and Hughes' Chemical Hazards of the Workplace.</i> 4th Edition. Van Nostrand Reinhold, New York, New York. 1996. Pages 609-610.</p>



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<p>ACGIH.</p>	<p>Whole Blood (Chemical/Metabolite) During or End-of-Shift</p> <ul style="list-style-type: none"> • N/R <p>As: Methemoglobin</p> <p>ACGIH Considers o-Toluidine to Be a Confirmed Animal Carcinogen with Unknown Relevance to Humans.</p> <p>The BEI is 5% of Hemoglobin with a Notation of “Nonspecific” Since the Determinant is also Observed after Exposure to Other Chemicals. It is also Assigned a ‘B’ Notation -- a Notation Assigned to a Determinant when the Observed 95th Percentile Value of a Random Sample from National Population Studies, such as the NHANES Surveys, is more than 20% of the BEI.</p> <p>Pages 60; 77; 104; 112.</p>	<p><i>2021 Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. ACGIH Worldwide. 2021. Pages 60; 77; 104; 112.</i></p>
<p>US DHHS PHS CDC NIOSH and US DOL OSHA.</p>	<p>Complete Blood Count</p> <p>o-Toluidine has been Shown to Cause Methemoglobinemia. Those with Blood Disorders May be at Increased Risk from Exposure.</p> <p>A Complete Blood Count Should Include a Red Cell Count, a White Cell Count, a Differential Count of a Stained Smear, As Well As the Amount of Hemoglobin and Hematocrit.</p> <p>Page 1 (1978).</p>	<p>NIOSH/OSHA Occupational Health Guidelines for Chemical Hazards DHHS (NIOSH) Pub No. 81-123; 88-118; Suppls. I-IV. 1981-1995.</p> <p>Pages 1 -5 (1978).</p>



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<p>US DHHS PHS CDC NIOSH and US DOL OSHA.</p>	<p>Ophthalmic Examination</p> <p>o-Toluidine can Affect the Body if it is Inhaled, Comes in Contact with the Eyes or is Swallowed. Liquid Toluidine is Irritating to the Eyes.</p> <p>Recovery from Eye Exposure May take a very Long Time unless the Eyes are flushed with Water Immediately. In the Eye of a Rabbit, the Liquid Caused a Severe Burn.</p> <p>Pages 1; 2 (1978).</p>	<p>NIOSH/OSHA Occupational Health Guidelines for Chemical Hazards DHHS (NIOSH) Pub No. 81-123; 88-118; Suppls. I-IV. 1981-1995. Pages 1 -5 (1978).</p>
<p>Lauwerys RR, Hoet P.</p>	<p>Red Blood Cells/Count Hemoglobin Adduct</p> <p>Several Aromatic Amines undergo Metabolic Activation Leading to Electrophilic Metabolites, which Bind to Nucleophilic Sites on Biological Macromolecules Such as DNA or Proteins. Only free, non-acetylated Active Metabolites can lead to the Formation of Conjugates with Hemoglobin (Hb). Such Hemoglobin Adduct Determination in Humans Has been Reported in o-Toluidine.</p> <ul style="list-style-type: none"> • N/R <p>As: Hemoglobin Adduct</p> <p>Page 401.</p>	<p>Industrial Chemical Exposure. Guidelines for Biological Monitoring. 3rd Edition. Lewis Publishers. CRC Press, Inc. 2001. Page 401.</p>



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<p>US DHHS PHS CDC NIOSH and US DOL OSHA.</p>	<p>Skin Examination</p> <p>o-Toluidine can Affect the Body if it is Inhaled, Comes in Contact with the Skin or is Swallowed. It May Enter the Body through the Skin. Excessive Drying of the Skin May Result from Repeated or Prolonged Contact. The Skin Should be Examined for Evidence of Chronic Disorders. Pages 1; 2 (1978).</p>	<p>NIOSH/OSHA Occupational Health Guidelines for Chemical Hazards DHHS (NIOSH) <i>Pub No. 81-123; 88-118; Suppls. I-IV. 1981-1995.</i> Pages 1 -5 (1978).</p>
<p>Lauwerys RR, Hoet P.</p>	<p>Urine (Chemical/Metabolite) Aromatic Amines are Excreted in Urine Partly as N-Acetyl and N-Glucuronide Conjugates.</p> <ul style="list-style-type: none"> • N/R As: o-Toluidine As: N-Acetyl Conjugate As: N-Glucuronide Conjugate <p>The Determination in Urine Collected at the End of a Working Day of “ Free” Toluidine or the Total Amount i.e., Unchanged Toluidine plus the Amount Released from Conjugates, can be Used to Assess the Absorption of o-Toluidine. o-Toluidine was Detected in the Urine of Nonsmoking Subjects who were not Exposed to Arylamines. Significantly Higher Concentrations were Detected in Smoking Control Subjects in Comparison to Nonsmoking Subjects. Since the Intra- and Interindividual Variations in the Amounts Excreted were Relatively Large, it is Suggested that Sources Other than Cigarette Smoke Contributed to their Concentrations in the Urine. Pages 403-404.</p>	<p><i>Industrial Chemical Exposure. Guidelines for Biological Monitoring.</i> 3rd Edition. Lewis Publishers. CRC Press, Inc. 2001. Pages 403-404.</p>



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<p>Brown KK, Teass AW, Simon S, Ward EM</p>	<p>Urine (Chemical/Metabolite) Urine Samples were Hydrolyzed by Sodium Hydroxide, Extracted with Butyl Chloride and Hydrochloric Acid & Concentration of o-Toluidine in the Aqueous Phase was determined by High Performance Liquid Chromatography (HPLC) and Colorimetric Electrochemical Detection.</p> <ul style="list-style-type: none"> High Performance Liquid Chromatography (HPLC) <p>As: o-Toluidine Analysis of Urine Specimens from Chemical Factory Workers Demonstrated Median Pre-shift Values for o-Toluidine for Exposed Workers of 11 mg/L and for nonexposed workers of 0.7 mg/L. The median post-shift value for Exposed Workers was 65 mg/L, while that for nonexposed workers was 2.6 mg/L. Based on these Results, it was Concluded that a Significant Uptake and Accumulation of o-Toluidine Occurred During and Across Work Shifts. Page 559.</p>	<p><i>A Biological Monitoring Method for o-Toluidine and Aniline in Urine Using High Performance Liquid Chromatography with Electrochemical Detection. Appl Occup Environ Hyg 10(6):557-565, 1995.</i></p>
<p>US DHHS PHS CDC NIOSH.</p>	<p>Urine (Chemical/Metabolite)</p> <ul style="list-style-type: none"> High Performance Liquid Chromatography/Electron-Capture Detector (HPLC-ECD) <p>As: o-Toluidine This Method Monitors the Parent Compound & Removes the Ambiguity from the Aminophenol's Origin. Pages 1-6.</p>	<p><i>NIOSH Manual of Analytical Methods. 4th Edition. DHHS (NIOSH) Publication No. 94-113. Method # 8317. Pages 1-6.</i></p>



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<p>Proctor NH, Hughes JP.</p>	<p>Urine (Chemical/Metabolite) Whole Blood</p> <p>Examination of Urine for Blood: Determination of Methemoglobin Concentration in the Blood when o-Toluidine is Suspected & at Regular Intervals until the Methemoglobin has been Completely Reduced to Normal Hemoglobin.</p> <p>Page 485.</p>	<p><i>Chemical Hazards of the Workplace.</i> JB Lippincott Company. 1978. Pages 484-486.</p>
<p>US DHHS PHS CDC NIOSH and US DOL OSHA.</p>	<p>Urinalysis (Routine)</p> <p>Since Kidney Damage has been Observed from Exposure, Urinalysis should Include, at a Minimum, Specific Gravity, Albumin, Glucose, and a Microscopic Evaluation of Centrifuged Sediment.</p> <p>Page 1 (1978).</p>	<p>NIOSH/OSHA Occupational Health Guidelines for Chemical Hazards DHHS (NIOSH) <i>Pub No. 81-123; 88-118; Suppls. I-IV. 1981-1995</i> Pages 1 -5 (1978).</p>