



Designation: D501 – 03 (Reapproved 2023)

Standard Test Methods of Sampling and Chemical Analysis of Alkaline Detergents¹

This standard is issued under the fixed designation D501; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 These test methods cover procedures for the sampling and chemical analysis of inorganic alkaline detergents.

1.2 The procedures appear in the following order:

	Sections		Sections
Caustic Soda:		Total Alkalinity as Sodium Oxide (Na ₂ O)	69 – 71
Sampling	5	Matter Insoluble in Water	72 and 73
Total Alkalinity as Sodium Oxide (Na ₂ O)	6 – 8	Tetrasodium Pyrophosphate:	
Sodium Hydroxide (NaOH)	9 – 11	Sampling	74
Carbonate as Sodium Carbonate (Na ₂ CO ₃)	12	Tetrasodium Pyrophosphate	
Carbon Dioxide (CO ₂) by the Evolution Method	13 – 16	(Na ₄ P ₂ O ₇)	75 – 79
Soda Ash:		Matter Insoluble in Water	80 and 81
Sampling	17	Loss on Ignition	82 and 83
Matter Volatile at 150 °C to 155 °C	18 and 19	Borax:	
Total Alkalinity as Sodium Carbonate (Na ₂ CO ₃)	20 – 22	Sampling	84
Sodium Bicarbonate (NaHCO ₃)	23 – 25	Total Borate and Excess Alkalinity or Acidity	85 – 87
Sodium Bicarbonate (NaHCO ₃) by Potentiometric Titration	26 – 28	Matter Insoluble in Water	88 and 89
Matter Insoluble in Water	29 and 30	Sodium Triphosphate:	
Apparent Density	31 and 32	Sampling	90
Modified Soda (Sequicarbonate Type):		Tritratable Na ₂ O	91 – 94
Sampling	33	Total P ₂ O ₅ :	
Total Alkalinity as Sodium Oxide (Na ₂ O)	34 – 36	Preferred Method	95 – 97
Sodium Bicarbonate (NaHCO ₃) and Sodium Carbonate (Na ₂ CO ₃)	37 – 39	Alternative Method	98 – 101
Matter Insoluble in Water	40	pH Titration	102 – 107
Sodium Bicarbonate:		Quantitative Separation and Measurement of Various Phosphates:	
Sampling	41	Reverse-Flow Ion-Exchange Chromatography (Preferred	
Sodium Bicarbonate, Sodium Carbonate, and Free Moisture	42 – 45	Method)	108 – 119
Matter Insoluble in Water	46	Paper Chromatographic Method	120 – 127
Sodium Metasilicate, Sodium Sesquisilicate and Sodium Orthosilicate:		pH of 1 percent Solution	128
Sampling	47	Turbidity	129
Total Alkalinity as Sodium Oxide (Na ₂ O)	48 – 50	Temperature Rise	130 – 134
Total Silica as SiO ₂	51 – 53	Sulfate	135 – 137
Sodium Metasilicate (Na ₂ SiO ₃ ·5H ₂ O)	54	Ignition Loss	140 and 141
Sodium Sesquisilicate (3Na ₂ O·2SiO ₂ ·11H ₂ O)	55	Matter Insoluble in Water	142 – 144
Matter Insoluble in Water	56 and 57	Particle Size	145
Loss on Ignition of Sodium Sesquisilicate (3Na ₂ O·2SiO ₂ ·11H ₂ O)	58 and 59	Orthophosphate	146 – 151
Sodium Orthosilicate (Na ₄ SiO ₄)	60		
Trisodium Phosphate:			
Sampling	61		
Trisodium Phosphate (Na ₃ PO ₄) Content and Phosphorus			
Pentoxide (P ₂ O ₅)	62 – 64		
Trisodium Phosphate Calculated as Na ₃ PO ₄ ·12H ₂ O, Na ₃ PO ₄ ·H ₂ O, Na ₃ PO ₄ , and as P ₂ O ₅	65 – 68		

¹ These test methods are under the jurisdiction of ASTM Committee D12 on Soaps and Other Detergents and are the direct responsibility of Subcommittee D12.12 on Analysis and Specifications of Soaps, Synthetics, Detergents and their Components.

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1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.* Material Safety Data Sheets are available for reagents and materials. Review them for hazards prior to usage.

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*