

Key Performance Advantages

- Excellent solvent
- Promotes rapid drying
- Improves film properties



Paints and Coatings

NIKANE® MS 5000

Multifunctional Solvent

NIKANE® MS 5000 is a multifunctional solvent that provides unique performance in solvent-based systems. Not only does it readily dissolve a wide range of materials, but it also can impart properties to the resulting solutions that make its utilization desirable, if not essential, in many applications. As such, the NIKANE MS 5000 benefits are of particular interest for many specialty applications. Some of the performance benefits offered by NIKANE MS 5000 include:

- Excellent solvency for a variety of polymers
- Medium evaporation rate
- Unique properties afford economical approach to formulation
- Improves film properties

Selected Formulating Properties

The following are selected formulating properties of NIKANE MS 5000 that will be useful for its optimum inclusion in a formulation. They are not to be considered product specifications.

Specific Gravity @ 20/20°C	~1.01
Weight per U.S. Gallon @ 20°C, lb	~8.4
Evaporation Rate, by Volume (n-butylacetate=100)	95
Flash Point, Tag Closed Cup, °C/F	34/94
Solubility in Water @ 20°C, % by Weight	~2.1

Excellent Solvent for Many Types of Systems

NIKANE MS 5000 can be used as a typical additive to cut the polymer during formulation manufacture, or by end-users as a reducer to improve performance. The greatest benefit will result, however, if NIKANE MS 5000 is used from the very beginning of the manufacturing process.

This solvency benefit can be illustrated by the improved solubility of two high-solids coatings systems, one based on a polyester resin and the other on an acrylic polymer (shown below). In both systems, the use of NIKANE MS 5000 provides a significant lowering of viscosity in comparison to the viscosity obtained with other typical solvents.

High-Solids Coating System (Polyester Resin)			
	Parts by Weight		
Polyester resin	120	120	120
Melamine Crosslinker	41.1	41.1	41.1
Methyl Isobutyl Ketone	22.6	-	-
n-Butyl acetate	-	24.8	-
NIKANE MS 5000	-	-	29.8
Solids, % by vol.	67	67	67
Brookfield Viscosity (No. 3 spindle @ 100 rpm)			
Initial, cps	679	699	380
14 days, cps	800	788	441

High-Solids Coating System (Acrylic Resin)			
	Parts by Weight		
Acrylic resin	100	100	100
Melamine Crosslinker	25	25	25
Methyl Isobutyl Ketone	22.1	-	-
n-Butyl acetate	-	24.2	-
NIKANE MS 5000	-	-	29.1
Solids, % by vol.	60	60	60
Brookfield Viscosity (No. 3 spindle @ 100 rpm)			
Initial, cps	498	528	367
14 days, cps	607	600	448

Medium Evaporation Rate

Specifically, NIKANE MS 5000 has a midrange evaporation rate that is highly desirable for improved dry-time performance of films. NIKANE MS 5000 will promote more rapid drying in several ways. First, NIKANE MS5000 prevents surface skinning of the film, which allows for better through drying of the film and elimination of any subsequent retained solvents that cause pinhole defects or blocking problems. Second, the NIKANE MS 5000 forms azeotropes with numerous solvents which aid their evaporation from the film, and will allow faster application times. Third, NIKANE MS 5000 will increase the vapor pressure of the solvent blends to speed the release of the solvent from the film, which can result in lower energy requirements during cure cycles. Improvement in dry time can be demonstrated in a typical polyamide resin system. As the amount of NIKANE MS 5000 is increased in the solvent system, dry time decreases:

NIKANE MS 5000						
% in Solvent Blend	0	5	10	15	20	25
Dry Time, seconds	105	105	92	85	85	82

In this example, 15% NIKANE MS 5000 Multifunctional Solvent constitutes the optimum level. It is desirable that the optimum level of NIKANE MS 5000 be used for each particular system. This optimum will usually vary from system to system, but will normally be in the range of 10% to 25% of the solvent blend.

Unique Properties Afford Economical Formulation Approach

NIKANE MS 5000 possesses a unique combination of values for its hydrogen bonding index and its solubility parameter number. The hydrogen bonding index for NIKANE MS 5000 of ~2.5 is lower than that of typical active solvents that are in the range of 5-9. And with a solubility number of ~10.9, NIKANE MS 5000 is among a select group of solvents at the upper end of this range. This combination of properties makes NIKANE MS 5000 an excellent choice in a solvent blend to match the solubility parameters of the resin. Hydrocarbon solvents with low solubility parameters are particularly useful in mixtures with NIKANE MS 5000 to provide solvent systems having a lowered solubility number. Similarly, alcohols can be incorporated with NIKANE MS 5000 to provide a higher degree of hydrogen bonding. Since both hydrocarbons and alcohols are low-cost components, NIKANE MS 5000 will allow for cost effective formulation of solvents in a system. This benefit can be illustrated in the solutions of vinyl resin by comparison of the results obtained with NIKANE MS 5000 and with another active solvent, methyl isobutyl ketone (MIBK) (shown on the next page). Vinyl resins, in general, can tolerate only moderate dilution with aliphatic hydrocarbons. Using MIBK, viscosities of a vinyl resin solution increase as the aliphatic solvent level is increased until, at 20 parts aliphatic, a gel is obtained. In contrast, using NIKANE MS 5000, a useful solution exists, even with 20 parts of aliphatic solvent. This is indicative of the unique formulating capabilities of NIKANE MS 5000.

Solvent Blend, 20% Vinyl Solution			
	Parts by Weight		
MIBK	40	30	20
Aliphatic hydrocarbon	0	10	20
Xylene	40	40	40
Viscosity, cps	295	490	Gel
NIKANE MS 5000	40	30	20
Aliphatic hydrocarbon	0	10	20
Xylene	40	40	40
Viscosity, cps	305	305	576

Improves Film Properties

Many hydrophobic resin vehicles have difficulty in thoroughly adhering to the surface to which they are being applied. The intimate contact of the vehicle with the substrate is a necessary element for good film performance. Often, surfaces contain a molecular layer of moisture that restricts good vehicle contact with these surfaces, which ultimately diminishes performance of the applied film due to microvoids left in the film structure. Since NIKANE MS 5000 will displace the film of moisture on a substrate, the adherence of the vehicle is improved along with film longevity. Hence, NIKANE MS 5000 Multifunctional Solvent will play a vital role in developing film properties.

Formulation Considerations

The level of NIKANE MS 5000 (as a portion of the total solvent) which is required to maximize its benefits will vary depending on the specific resin, solvents, and pigments that are contained in the formulation. A general recommended starting point to fully receive the benefits of NIKANE MS 5000 is in the range of a 10 to 25 percent replacement of the total solvent system. Usage within this range provides substantial improvements in many specialty applications.

Product Stewardship

ANGUS encourages its customers to review their applications of ANGUS products from the standpoint of human health and environmental quality. To help ensure that ANGUS products are not used in ways for which they are not intended, ANGUS personnel will assist customers in dealing with environmental and product safety considerations. For assistance, Safety Data Sheets, or other information, please contact your ANGUS representative at the numbers provided in this document. When considering the use of any ANGUS product in a particular application, review the latest Safety Data Sheet to ensure that the intended use is within the scope of approved uses and can be accomplished safely. Before handling any of the products, obtain available product safety information including the Safety Data Sheet(s) and take the necessary steps to ensure safety of use.

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