



## Synesstic™ alkylated naphthalene (AN) portfolio

Synesstic AN, ExxonMobil's API Group V base stock, can enable formulators to create new formulations that meet the growing need for long-lasting, varnish-free, high-thermal oxidative stability, and excellent hydrolytic stability lubricants.

As legislative demands on emissions have increased, global markets too have continued to increase their use of new technologies and new equipment capable of handling higher power densities. In turn, this has pushed formulators to create higher performing lubricants and greases which can provide improved energy efficiency and extended durability. Using Synesstic AN as part of those base fluids, formulators can gain these benefits when used in high-performance lubricating applications.

Grade	SG at 15.6/15.6°C	KV at 100°C cSt	KV at 40°C cSt	VI	Pour point °C	Flash point (COC) °C	Biodegradability	Passenger car motor oil	Heavy duty motor oil	Automatic transmission fluid	Automotive gear oil/ Heavy duty transmission	2 & 4 stroke oil	Electric vehicle driveline	Industrial gear oil	Turbine lube	Chain lube	Hydraulic fluid	Compressor oil	Grease	Food processing/textile lube	
	ASTM D4052	ASTM D445	ASTM D445	ASTM D2270	ASTM D97 / D5950	ASTM D92	ASTM D92														
Synesstic™ 5	0.908	4.7	29	74	-39	222	Inherently	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Synesstic 12	0.887	12.4	109	105	-36	258	Inherently		○			○		○	○	○	○	○	○	○	○

The data shown are typical that may vary with time. The colored circles represent the treat rates of each Synesstic grade in various applications. In a number of cases, different treat rates can be chosen to achieve specific formulation goals.

○ >80%    ○ 40-60%    ○ ≤20%

### Alkylated naphthalene

With unique structures that resist oxidation and prevent the formation of deposits and varnish, alkylated naphthalene is a family of low and high viscosity base stocks that offer superb oxidative, thermal, and hydrolytic stability.



A double-ring aromatic center with 1,2 or more alkyl side chains

#### Performance benefits

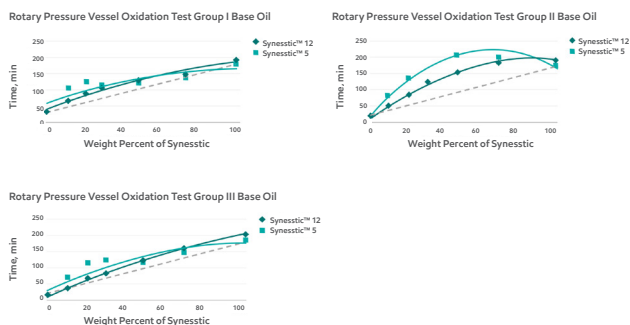
- Long-lasting, clean performance and deposit control in formulations
- High performance in wear protection
- Excellent thermal-oxidation resistance
- Controlled seal swell and additive solubility performance
- Excellent hydrolytic and thermal stability
- Improved performance under severe conditions
- Low volatility
- Improved additive response

#### Application flexibility

Synesstic alkylated naphthalene can be used in a broad range of automotive and industrial applications:

- Compressor
- Industrial gear
- Greases
- Turbine
- Food process machinery
- Chain

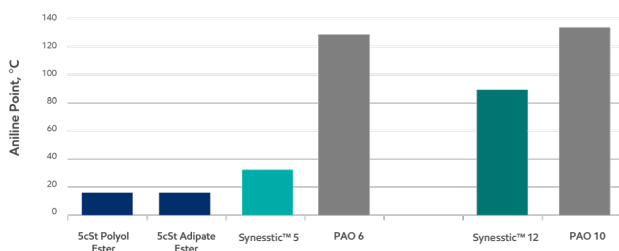
## Oxidative stability in Group I - III Mineral oils



Synesstic™ AN can improve mineral oil oxidative stability across the board.

Test method: ASTM D2272B

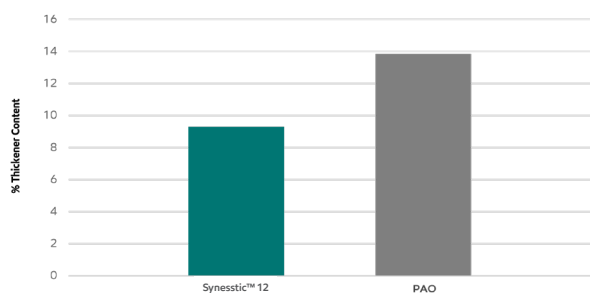
## Synesstic™ AN solvency



Synesstic™ AN has excellent additive solvency for polar compounds due to its' aromatic structures.

Test method: ASTM D611

## Grease - thickener efficiency



NLGI No. 2 grease  
Lithium complex thickener and commercial additive package

The solvency of Synesstic™ AN allows improved thickener efficiency during grease manufacture.

Data from tests performed by or on behalf of ExxonMobil

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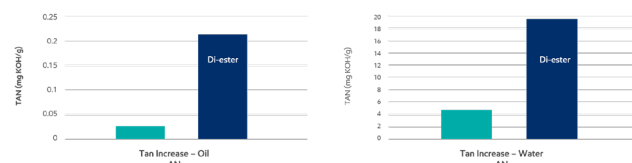


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## Synesstic™ AN improves hydrolytic stability

### Formulation:

- 73 % PAO
- 25 % Di-ester or Synesstic™ 5
- 2 % Additive



Synesstic™ AN exhibits a lower TAN increase compared to a similar di-ester based formulation.

Test method: ASTM D2619

## Synesstic™ AN improved anti-wear additive response

Sequence IIIIG Wear Performance of Experimental Low Phosphorus 0W-30 Engine Oils



Synthetic engine oils blended with PAO and Synesstic™ AN demonstrate improved wear performance to PAO/ester formulations.

## Regulatory compliance

- Synesstic™ 5 and Synesstic™ 12 have been approved for use as lubricant base stock fluids with incidental food contact
  - HX-1 National Sanitation Foundation (NSF) registered
  - Kosher, Halal
- REACH-registered globally
- MOSH classification (Mineral Oil Saturated Hydrocarbons): European Food Safety Authority (EFSA) defines MOSH as a subset of Mineral Oil Hydrocarbons (MOH), containing linear, branched and cyclic alkanes.
- MOAH classification (Mineral Oil Aromatic Hydrocarbons): EFSA defines MOAH to be a subset of MOH containing four distinct structural types; non-alkylated aromatic hydrocarbons (including naphthalene and polyaromatic hydrocarbons), alkylated aromatic hydrocarbons, partially hydrogenated hydrocarbons and sulfur-containing aromatic compounds.

Synesstic™ AN base stocks are distinct from the chemical constituents of concern in MOSH and MOAH fractions of mineral oil hydrocarbons.