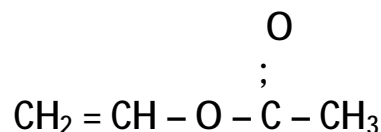


# Vinyl Acetate

## Acetic Acid Vinyl Ester

CAS no. 108-05-4

EC no. 203-545-4



### Product Description

Vinyl Acetate is a clear, colorless liquid with a faint ether-like odor. It is only sparingly soluble in water but readily soluble in many organic solvents such as ethyl acetate and ethanol. It is a highly flammable liquid. In the presence of water, it forms an azeotrope, which boils at 66 °C under atmospheric pressure, that contains 92.7 % Vinyl Acetate.

Vinyl Acetate is stabilized with 3 – 5 ppm of Hydroquinone to prevent uncontrolled polymerization during handling and storage. Vinyl Acetate with higher amount of hydroquinone is available upon request.

### Possible Applications

Vinyl acetate is an unsaturated ester that is capable of undergoing various addition and exchange reactions with other esters. This chemical property makes it a very versatile monomer; it readily forms homo-polymers and hetero-polymers with a wide range of other monomers such as ethylene, acrylates, vinyl chloride, fumarate esters, and maleate esters among others. It polymerizes under the influence of various activators such as light, heat or peroxides.

The vinyl acetate monomer can be polymerized in the mass as well as in the form of a solution, suspension (pearl form) or emulsion. The latter form is widely used for the production of synthetic resin dispersions, general and pressure sensitive adhesives and in the paint, textile and paper coating industries. Solution and suspension polymers are used in coatings and adhesives. Suspension polymers, in addition, are used in plastics.

Secondary products from vinyl acetate polymers are the polyvinyl alcohols, from which the polyvinyl acetals are produced. Fields of applications for polyvinyl acetate, polyvinyl acetate secondary products and their co- and terpolymers are:

**Polyvinyl acetate** is suitable as a binder and raw material for the production of paints, adhesives, paper coatings, finishing agents for textiles and non-wovens, and resin-bound plasters.

**Polyvinyl alcohol** is employed as a thickening agent and protective colloid and is also used in the form of a solution, for instance in the production of adhesives, paper, textiles and cosmetics.

**Polyvinyl acetals**, e.g. polyvinyl butyral, are used for instance in the manufacture of paints, primers, electrical resins, printing inks and films for laminated glass.

**Acrylonitrile / vinyl acetate copolymers** are employed in the production of acrylic fibers.

**Methacrylic acid / vinyl acetate copolymers** are suitable for the production of paints for interior and exterior use.

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*Vinyl acetate/ethylene/vinylchloride (VAEVC) terpolymers* are used in the form of dispersions for the production of abrasion-resistant interior paints, exterior wall paints, resin-bound plasters and cement additives.

*Vinyl acetate/ethylene (VAE) and vinyl acetate/vinyl versatate copolymers* with a predominance of Vinyl acetate are employed as dispersions e.g. for the production of adhesive films for textiles (non-wovens) and crosslinking agents.

*Ethylene/Vinyl acetate (EVA) copolymers* with a large proportion of ethylene are suitable for the modification of low-density polyethylene for engineering plastics (e.g. automotive industry) and for the production of shrink film and other films.

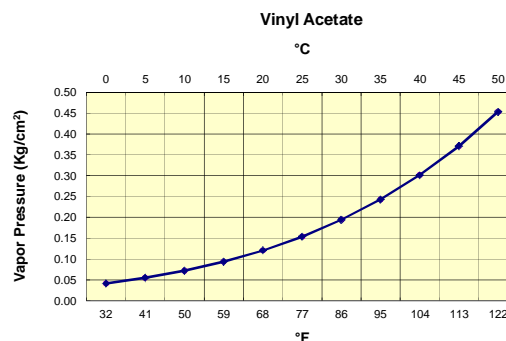
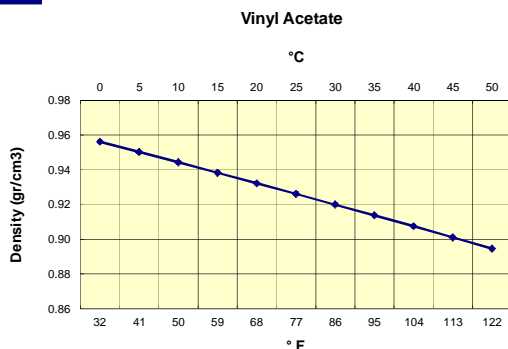
*Ethylene / vinyl alcohol (EVOH) copolymers* are used for the production of food packaging materials because of their excellent oxygen barrier properties.

### Physical Properties

<i>Typical Properties</i>	<i>Unit</i>	
Boiling point at 1013 hPa (760 mm Hg)	°C (°F)	72.7 (162.9)
Density at 20 °C	g/cm <sup>3</sup>	0.93
Freezing Point	°C (°F)	-92.8°C (-135°F)
Heat of Vaporization		
at 20 °C	BTU/lb	174.3
at 30 °C		171.3
at 50 °C		165.2
Liquid Heat Capacity		
at 20 °C	BTU/lb/°F	0.471
at 30 °C		0.481
at 50 °C		0.501
Liquid Thermal Conductivity		
at 20 °C	BTU/ft/sec/°F	2.44 x 10 <sup>-5</sup>
at 30 °C		2.39 x 10 <sup>-5</sup>
at 50 °C		2.27 x 10 <sup>-5</sup>
Molar mass	g/mol	86.09
Refractive index n <sub>D</sub> at 20 °C		1.395
Solubility at 20 °C – Vinyl Acetate in Water	wt %	2.3
Solubility at 20 °C – Water in Vinyl Acetate	wt %	1
Surface Tension		
at 20°C	dynes/cm	23.6
at 30°C		22.3
at 50 °C		19.8
Vapor density (Air = 1)		3.0
Viscosity		
at 20 °C	mPa · s	0.43
at 30 °C		0.38
at 50 °C		0.32

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° F	° C	Liquid Density (g/cm <sup>3</sup> )
32	0	0.9562
41	5	0.9503
50	10	0.9444
59	15	0.9384
68	20	0.9323
77	25	0.9262
86	30	0.9200
95	35	0.9138
104	40	0.9075
113	45	0.9011
122	50	0.8947

° F	° C	Vapor Pressure (Kg/cm <sup>2</sup> )	hPa
32	0	0.041	40.7
41	5	0.055	54.0
50	10	0.072	71.0
59	15	0.094	92.3
68	20	0.121	118.7
77	25	0.154	151.2
86	30	0.195	190.8
95	35	0.243	238.6
104	40	0.302	296.0
113	45	0.371	364.3
122	50	0.454	444.9

The above characteristic data are intended for the purpose of product description and are not the subject of continuous monitoring. Further physical properties and characteristic data as well as information on safety and handling are listed in the material safety data sheet and the sales specifications. Please consult [www.celanese.com](http://www.celanese.com)

### Shelf life

Bulk Storage	2 months
Drums 3-5 ppm HQ	6 months
Drums 14-17 ppm HQ	12 months

The shelf life dates from the day of packaging (drums); for bulk product, it is the date of delivery. This period is in general applicable to material stored under the recommended conditions (see Storage section).

Shelf life for Vinyl Acetate Monomer (VAM) is not determined by quality reasons, but rather by safety reasons (monomer stability). The stability of VAM is finite. The rate at which the polymerization inhibitor HQ is consumed is dependent on storage conditions with temperature, oxygen concentration and presence of reactive contaminants being the key factors.

Under laboratory conditions, experimental data indicates that VAM stored at a temperature of 38°C (100°F) with a dry air blanket and containing 3-5 ppm HQ in a carbon steel container is stable for at least 7-8 months. Stable storage times using a nitrogen blanket were even longer. Despite evidence for stability over 6 months without polymerization, the 2-month turnover time for bulk VAM is recommended to provide conservatism when accounting for varying transit times and storage conditions.

# Product Description and Handling Guide

## Vinyl Acetate

### Storage

Recommended Blanketing <sup>1,2,3</sup>	Air or Dry Nitrogen
Recommended Maximum Temperature	86 °F (30 °C)
Recommended Pressure	Atmospheric
Bulk Quantities <sup>4</sup>	Outside, detached tanks
Inhibitor Content (HQ)	3 ppm minimum.
Turnover of tank contents <sup>5</sup>	Every 60 days or less.

1. Refer to NFPA #77 “Static Electricity” for proper electrical grounding procedures.
2. See the National Fire Protection Agency (NFPA) #30 “Flammable and Combustible Liquids Code” and consult with qualified fire protection specialists to determine specific storage tank design requirements.
3. Blanketing with dry gas is important because the presence of water initiates a hydrolysis reaction of the VAM to acetic acid and acetaldehyde. The blanketing gas should be nitrogen (preferred) or air. Nitrogen is preferred as the blanket gas for two reasons. First, it minimizes flammability concerns. Second, the presence of oxygen promotes formation of organic peroxides, which are polymerization initiators. This leads to more rapid depletion of HQ and more rapid onset of polymerization. However, storage under dry air is acceptable with a 60-day or shorter turnover.
4. The product must be maintained in a rust free storage environment, and in the absence of reactive contaminants.
5. Turnover of the tank involves the addition of fresh, inhibited VAM with sufficient mixing in the tank to maintain a uniform HQ concentration of at least 3 ppm throughout the tank.

Under conditions that deviate from the above-recommended storage and use conditions, periodic analysis of the HQ concentration and tank temperature monitoring may be needed to ensure that polymerization is not occurring. The HQ concentration should be measured at least once every 30 days until sufficient historical data is available to define a HQ sampling schedule based on actual storage conditions.

Please refer to the [“Vinyl Acetate – A Guide to Safety and Handling”](#) and [MSDS](#) for further information.

# Product Description and Handling Guide

## Vinyl Acetate

### *Handling*

- Thoroughly review Material Safety Data Sheet before handling product.
- Protect small containers from physical damage. Keep containers closed when not in use. Open containers slowly to allow any excess pressure to vent.
- Keep away from heat, sparks, flame or other sources of ignition. Use spark-resistant tools.
- See the National Fire Protection Agency (NFPA) #30 “Flammable and Combustible Liquids Code” and consult with qualified fire protection specialists to determine specific storage tank design requirements.
- Use proper electrical grounding and bonding procedures when loading, unloading and transferring. Refer to the National Fire Protection Agency (NFPA) #77 “Recommended Practice for Static Electricity” for proper electrical grounding procedures.
- Electrical equipment and circuits in all storage and handling areas must conform to requirements of national electrical code (Articles 500 and 501) for hazardous location.

### *Packaging*

The following containers are suitable for handling and transportation of Vinyl Acetate:

- DOT 111A100W1 Tank Cars
- DOT MC 307 or DOT 407 Tank Trucks
- UN 1A1/X1.2/300 55-Gallon Carbon Steel Drums
- IMO 1 ISO Tank
- Ship Tank and Barge

# Product Description and Handling Guide

## Vinyl Acetate

### *Materials of Construction for Storage and Transportation.*

Unit / element	Acceptable Material	Alternate Material
Tank	Stainless Steel <sup>1</sup>	Aluminum <sup>2</sup> Lined Carbon Steel <sup>3</sup> Carbon Steel <sup>4</sup>
Piping	Stainless Steel <sup>1</sup>	Carbon Steel, Aluminum <sup>2</sup>
Valves	Stainless Steel <sup>1</sup>	Carbon Steel
Pumps	Stainless Steel <sup>1</sup>	Carbon Steel
Relief Valves	Stainless Steel <sup>1</sup>	Carbon Steel
Gaskets	Glass Filled PTFE <sup>5</sup>	Compressed Graphite
Pump Seals	Single mechanical seal: Stainless steel/Hastelloy C-276 metallic components, Kalrez O- rings	-
Valve Packing	PTFE <sup>5</sup>	Graphite
Pipe End Connections	Welded and flanged system	Threaded with PTFE <sup>5</sup> tape thread lubricant
Heat Exchanger	Product Side: Carbon Steel	Product Side: Stainless Steel <sup>1</sup>
Hoses	Stainless Steel <sup>1</sup>	Aluminum <sup>2</sup>
Tank Truck	Stainless Steel <sup>1</sup>	Aluminum <sup>2</sup>
Tank Car	Stainless Steel <sup>1</sup>	Aluminum <sup>2</sup> Carbon Steel <sup>4</sup>
ISO Tank	Stainless Steel <sup>1</sup>	Aluminum <sup>2</sup> Carbon Steel <sup>4</sup>
Barge	Stainless Steel <sup>1</sup>	Carbon Steel <sup>4</sup>
Ship Tank	Stainless Steel <sup>1</sup>	-

1. Type 304 or 316 Stainless Steel
2. Use 3000, 5000, 6000 series Aluminum when temperature does not exceed 120 °F (49 °C).
3. Lining refers to high baked phenolic resin.
4. Rust Free
5. Polytetrafluoroethylene

For further information on safety and handling, please use the following link: <http://www.celanese.com/msds/>

### Guidelines

#### Chemical Inventory Status

The substance is listed in the following chemical inventories:

<i>Chemical Inventory Status</i>	<i>Listed</i>	<i>Comment</i>
AICS (Australia)	X	
DSL (Canada)	X	
NDSL (Canada)		
IECSC (China)	X	
EINECS (Europe)	X	EC-No.: 203-545-4
ELINCS (Europe)		
ENCS (Japan)	X	Japanese ENCS Number (2)-728
ISHL (Japan)	X	Japanese ISHL Number (2)-728
KECI (Korea)	X	Korean ID Number: KE-35324
NZIoC (New Zealand)	X	
PICCS (Philippines)	X	
TSCA (USA)	X	

#### § REACH

Celanese is aware of the obligations imposed by the European Union legislation REACH (“Registration, Evaluation, Authorization and Restriction of Chemicals”) on EU manufacturers and importers as well as on downstream users. We are obliged to comply with the requirements of the REACH legislation relating to our European manufacturing facilities, our own imports as well as our obligations as a downstream user in the European chemical industry. Should you require additional information, please contact Celanese at [REACH@celanese.com](mailto:REACH@celanese.com)

#### § BSE/TSE Statement

Vinyl Acetate is produced via a totally synthetic process, and no materials of animal origin are used in its manufacture. Therefore, Celanese does not expect this product to pose any risk for the transmission of Bovine Spongiform Encephalopathy (BSE) and Transmissible Spongiform Encephalopathies (TSE).

#### § Genetically Modified Organisms (GMO)

Celanese does not use any ingredients of animal or plant origin in the manufacture of Vinyl Acetate. Therefore, we can certify that the supplied Vinyl Acetate contains no genetically modified organisms (GMOs) and no GMOs were used in its production.

- **Allergens Guide**

Based on the knowledge of our raw materials and manufacturing process, Celanese Acetyl Intermediates does not expect any of the following allergens and/or intolerance factors to be present in Vinyl Acetate: Egg and egg products, milk and milk products, peanuts or peanut derivatives, tree nuts, fish and fish products, shellfish (crustaceans), molluscs, crabs, sesame seeds and products thereof, celery and products thereof, mustard and products thereof, wheat and wheat derivatives, soya and soy products, cereals containing gluten (i.e. wheat, rye, barley, oats, spelt, kamut or their hybridised strains) and products thereof, buckwheat, lupin, sulphur dioxide and sulphites (at > 10 mg/kg or 10 mg/liter, as SO<sub>2</sub>). No nutritional data is available for Vinyl Acetate.

- § **TSCA**

Vinyl Acetate (CAS 108-05-4) manufactured by Celanese complies with all applicable rules or orders under the Toxic Substances Control Act (TSCA).

- **Others**

Celanese Vinyl Acetate contains no melamine, cyanuric acid, or irradiated products, and neither of these materials is included in or produced in the manufacturing process.

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