Poly(vinyl alcohol)

sc-250741

Material Safety Data Sheet

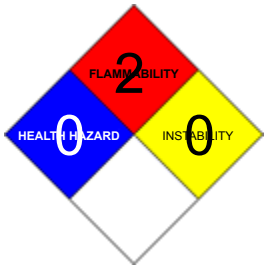
Hazard Alert Code Key:	EXTREME	HIGH	MODERATE	LOW

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
Poly(vinyl alcohol)

STATEMENT OF HAZARDOUS NATURE
CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

NFPA



SUPPLIER
Santa Cruz Biotechnology, Inc.
2145 Delaware Avenue
Santa Cruz, California 95060
800.457.3801 or 831.457.3800

EMERGENCY
ChemWatch
Within the US & Canada: 877-715-9305
Outside the US & Canada: +800 2436 2255
(1-800-CHEMCALL) or call +613 9573 3112

SYNONYMS
(C2-H4-O)n, "CAS RN 54626-91-4", PVA, PVAl, PVS, PVOH, "PVA alcohol", "vinyl alcohol polymer", "acetic acid, ethenyl ester, , polymer with ethanol", "ethanol homopolymer", "hydrolysed PVA", "Alcotex 88/05, ", 88/10, Gohsenol, Ivalon, "Alkotex Kuralon Vp", Resistoflex, PVAlcohol, Alvyl, "Aracet APV", "Kurare Poval 1700", 120, Rhodoviol, PVAlc., Poval, "Cipoviol W72", "Kurare Pva 205", Solvar, "Sumitex H 10", Covol, Elvanol, EP160, Lemol, "Vibatex S", "Vinacol Mh", "EP 160", "Galvatol 1-60", Mowiol, Vinalak, Vinarol, Vinarole, GL, GLO5, Polydesis, "Vinavilol 2-98", Vinnarol, "GH 20", GM14, "Polysizer 173", Polyvinol, Polyviol, Vinol, "Vinol Unisize", "Vinylon Film 2000", "Sigma Aldrich P8136"

Section 2 - HAZARDS IDENTIFICATION

CHEMWATCH HAZARD RATINGS

		Min	Max
Flammability	1		
Toxicity	2		
Body Contact	2		
Reactivity	1		
Chronic	2		

Min/Nil=0
Low=1
Moderate=2
High=3
Extreme=4

CANADIAN WHMIS SYMBOLS

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

■ Although ingestion is not thought to produce harmful effects (as classified under EC Directives), the material may still be damaging to the health of the individual, following ingestion, especially where pre-existing organ (e.
g.
■ High molecular weight material; on single acute exposure would be expected to pass through gastrointestinal tract with little change / absorption.
Occasionally accumulation of the solid material within the alimentary tract may result in formation of a bezoar (concretion), producing discomfort.

EYE

■ Although the material is not thought to be an irritant (as classified by EC Directives), direct contact with the eye may cause transient discomfort characterised by tearing or conjunctival redness (as with windburn).
Slight abrasive damage may also result.
■ Sixteen human volunteers using a topical opthalmic solution containing 1.
4% polyvinyl alcohol in saline three times daily on alternate days in a 6-day study of tear replacement solutions showed no ocular discomfort.

SKIN

■ Skin contact is not thought to have harmful health effects (as classified under EC Directives); the material may still produce health damage following entry through wounds, lesions or abrasions.
■ There is some evidence to suggest that this material can cause inflammation of the skin on contact in some persons.
■ Three-week dermal irritation tests using formulations containing 13% polyvinyl alcohol produced mild to moderate irritation.
■ Open cuts, abraded or irritated skin should not be exposed to this material.
■ Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects.
Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

INHALED

■ The material is not thought to produce respiratory irritation (as classified by EC Directives using animal models).
Nevertheless inhalation of dusts, or fumes, especially for prolonged periods, may produce respiratory discomfort and occasionally, distress.
■ Inhalation of vapours may cause drowsiness and dizziness.
This may be accompanied by sleepiness, reduced alertness, loss of reflexes, lack of co-ordination, and vertigo.
■ Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled.
If prior damage to the circulatory or nervous systems has occurred or if kidney damage has been sustained, proper screenings should be conducted on individuals who may be exposed to further risk if handling and use of the material result in excessive exposures.
■ Inhalation of vapours or aerosols (mists, fumes), generated by the material during the course of normal handling, may be damaging to the health of the individual.

CHRONIC HEALTH EFFECTS

■ There has been some concern that this material can cause cancer or mutations but there is not enough data to make an assessment.
Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure.
Long term exposure to high dust concentrations may cause changes in lung function i.e. pneumoconiosis; caused by particles less than 0.5 micron penetrating and remaining in the lung. Prime symptom is breathlessness; lung shadows show on X-ray.
Long-term exposure to methanol vapour, at concentrations exceeding 3000 ppm, may produce cumulative effects characterised by gastrointestinal disturbances (nausea, vomiting), headache, ringing in the ears, insomnia, trembling, unsteady gait, vertigo, conjunctivitis and clouded or double vision. Liver and/or kidney injury may also result. Some individuals show severe eye damage following prolonged exposure to 800 ppm of the vapour.
This material contains a substantial amount of polymer considered to be of low concern. These are classified under having MWs of between 1000 to 10000 with less than 25% of molecules with MWs under 1000 and less than 10% under 500; or having a molecular weight average of over 10000. Functional groups contained on the polymer are then classified into risk categories. Being classified as a polymer of "low concern" does not mean that there are no hazards associated with the chemical.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%

polyvinyl alcohol	9002-89-5	>95
residuals as		
sodium acetate, anhydrous	127-09-3	<3
volatiles as		
methanol	67-56-1	<1.8
methyl acetate	79-20-9	<1

Section 4 - FIRST AID MEASURES

SWALLOWED
- Immediately give a glass of water.
- First aid is not generally required. If in doubt, contact a Poisons Information Centre or a doctor.

EYE
If this product comes in contact with the eyes
- Wash out immediately with fresh running water.
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
- Seek medical attention without delay; if pain persists or recurs seek medical attention.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN
If skin contact occurs
- Immediately remove all contaminated clothing, including footwear.
- Flush skin and hair with running water (and soap if available).
- Seek medical attention in event of irritation.

INHALED
- If fumes or combustion products are inhaled remove from contaminated area.
- Lay patient down. Keep warm and rested.
- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.

NOTES TO PHYSICIAN
■ Treat symptomatically.
For acute and short term repeated exposures to methanol
- Toxicity results from accumulation of formaldehyde/formic acid.
- Clinical signs are usually limited to CNS, eyes and GI tract Severe metabolic acidosis may produce dyspnea and profound systemic effects which may become intractable. All symptomatic patients should have arterial pH measured. Evaluate airway, breathing and circulation.
- Stabilise obtunded patients by giving naloxone, glucose and thiamine.
- Decontaminate with Ipecac or lavage for patients presenting 2 hours post-ingestion. Charcoal does not absorb well; the usefulness of cathartic is not established.

Section 5 - FIRE FIGHTING MEASURES

Vapour Pressure (mmHG)	Not available.
Upper Explosive Limit (%)	Not limited
Specific Gravity (water=1)	1.26-1.31
Lower Explosive Limit (%)	0.87g/m3

EXTINGUISHING MEDIA
- Alcohol stable foam.
- Use extinguishing media suitable for surrounding area.

FIRE FIGHTING
- Alert Fire Brigade and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves for fire only.
- Prevent, by any means available, spillage from entering drains or water courses.
- Use fire fighting procedures suitable for surrounding area.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS
Polyvinyl alcohol powder is a ST-1 (strong) dust explosion hazard when tested to ASTM E-1226. The explosive hazard is highly

dependent on particle size, the finer the particles the greater the explosive strength
Typical maximum explosion pressure 540 kPa.
Dust Explosion Hazard Class 1
Dusts fall into one of three Kst* classes. Class 1 dusts; Kst 1-200 m3/sec; Class 2 dusts; 201-299 m3/sec.

- Combustible solid which burns but propagates flame with difficulty; it is estimated that most organic dusts are combustible (circa 70%) - according to the circumstances under which the combustion process occurs, such materials may cause fires and / or dust explosions.
- Avoid generating dust, particularly clouds of dust in a confined or unventilated space as dusts may form an explosive mixture with air, and any source of ignition, i.e. flame or spark, will cause fire or explosion. Dust clouds generated by the fine grinding of the solid are a particular hazard; accumulations of fine dust (420 micron or less) may burn rapidly and fiercely if ignited - particles exceeding this limit will generally not form flammable dust clouds.; once initiated, however, larger particles up to 1400 microns diameter will contribute to the propagation of an explosion.
- In the same way as gases and vapours, dusts in the form of a cloud are only ignitable over a range of concentrations; in principle, the concepts of lower explosive limit (LEL) and upper explosive limit (UEL).are applicable to dust clouds but only the LEL is of practical use; - this is because of the inherent difficulty of achieving homogeneous dust clouds at high temperatures (for dusts the LEL is often called the "Minimum Explosible Concentration", MEC)
- A dust explosion may release of large quantities of gaseous products; this in turn creates a subsequent pressure rise of explosive force capable of damaging plant and buildings and injuring people.

Combustion products include carbon monoxide (CO), carbon dioxide (CO2), other pyrolysis products typical of burning organic material.
May emit poisonous fumes.
May emit corrosive fumes.

FIRE INCOMPATIBILITY

- Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS

- Remove all ignition sources.
- Clean up all spills immediately.
- Avoid contact with skin and eyes.
- Control personal contact by using protective equipment.

MAJOR SPILLS

Moderate hazard.

- CAUTION Advise personnel in area.
- Alert Emergency Services and tell them location and nature of hazard.
- Control personal contact by wearing protective clothing.
- Prevent, by any means available, spillage from entering drains or water courses.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

DANGER Care should be exercised when opening bins, tanks or silo hatches. Emptying bags of PVOH powder directly into vessels where flammable vapours exist should be strictly prohibited because static discharges can be generated of sufficient strength to produce an explosion.

- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- Prevent concentration in hollows and sumps.

Empty containers may contain residual dust which has the potential to accumulate following settling. Such dusts may explode in the presence of an appropriate ignition source.

- Do NOT cut, drill, grind or weld such containers.
- In addition ensure such activity is not performed near full, partially empty or empty containers without appropriate workplace safety authorisation or permit.

RECOMMENDED STORAGE METHODS

- Polyethylene or polypropylene container.
- Check all containers are clearly labelled and free from leaks.

STORAGE REQUIREMENTS

- Store in original containers.
- Keep containers securely sealed.
- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials and foodstuff containers.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m³	STEL ppm	STEL mg/m³	Peak ppm	Peak mg/m³	TWA F/CC	Notes
Canada - Alberta Occupational Exposure Limits	polyvinyl alcohol (Methanol (Methyl alcohol))	200	262	250	328				
Canada - British Columbia Occupational Exposure Limits	polyvinyl alcohol (Methanol)	200		250					Skin
US - Minnesota Permissible Exposure Limits (PELs)	polyvinyl alcohol (Methyl alcohol)	200	260	250	325				
US ACGIH Threshold Limit Values (TLV)	polyvinyl alcohol (Methanol)	200		250					TLV® Basis Headache; eye dam ; BEI
US NIOSH Recommended Exposure Limits (RELs)	polyvinyl alcohol ()	200	260	250	325				[skin]
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	polyvinyl alcohol (Methyl alcohol)	200	260	250	325				
US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	polyvinyl alcohol (Methyl alcohol)	200	260						
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	polyvinyl alcohol (Methyl alcohol)	200	260	250	310				
US - California Permissible Exposure Limits for Chemical Contaminants	polyvinyl alcohol (Methyl alcohol; methanol)	200	260	250	325	1000			
US - Idaho - Limits for Air Contaminants	polyvinyl alcohol (Methyl alcohol)	200	260						
US OSHA Permissible Exposure Levels	polyvinyl alcohol (Methyl alcohol)	200	260						

(PELs) - Table Z1						
US - Hawaii Air Contaminant Limits	polyvinyl alcohol (Methyl alcohol (methanol))	200	260	250	325	
US - Alaska Limits for Air Contaminants	polyvinyl alcohol (Methyl alcohol (Methanol))	200	260	250	310	
US - Michigan Exposure Limits for Air Contaminants	polyvinyl alcohol (Methyl alcohol)	200	260	250	325	
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	polyvinyl alcohol (Methyl alcohol (methanol) - Skin)	200	260	250	310	
US - Washington Permissible exposure limits of air contaminants	polyvinyl alcohol (Methanol (Methyl alcohol))	200		250		
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	polyvinyl alcohol (Methyl alcohol (methanol))	200		250		Skin
US - Oregon Permissible Exposure Limits (Z-1)	polyvinyl alcohol (Methyl alcohol (methanol))	200	260			
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	polyvinyl alcohol (Methyl alcohol)	200	260			
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	polyvinyl alcohol (Methyl alcohol)	200	262	250	328	
Canada - Northwest Territories Occupational Exposure Limits (English)	polyvinyl alcohol (Methyl alcohol (Methanol) - Skin)	200	262	250	328	
Canada - Nova Scotia Occupational Exposure Limits	polyvinyl alcohol (Methanol)	200		250		TLV Basis headache; eye damage. BEI

Canada - Prince Edward Island Occupational Exposure Limits	polyvinyl alcohol (Methanol)	200		250	TLV® Basis Headache; eye dam ; BEI
Canada - Ontario Occupational Exposure Limits	polyvinyl alcohol (Specified (PNOS) / Particules (insolubles ou peu solubles) non précisées par ailleurs)		3 (R)		
Canada - Ontario Occupational Exposure Limits	polyvinyl alcohol (Particles (Insoluble or Poorly Soluble) Not Otherwise)		10 (I)		
Canada - British Columbia Occupational Exposure Limits	sodium acetate, anhydrous (Particles (Insoluble or Poorly Soluble) Not Otherwise Classified (PNOC))		10 (N)		
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	sodium acetate, anhydrous (Particulates not otherwise regulated Respirable fraction)		5		
US - California Permissible Exposure Limits for Chemical Contaminants	sodium acetate, anhydrous (Particulates not otherwise regulated Respirable fraction)		5		(n)
US - Oregon Permissible Exposure Limits (Z-1)	sodium acetate, anhydrous (Particulates not otherwise regulated (PNOR) (f) Total Dust)	-	10		Bold print identifies substances for which the Oregon Permissible Exposure Limits (PELs) are different than the federal Limits. PNOR means “particles not otherwise regulated.”
US - Michigan Exposure Limits for Air Contaminants	sodium acetate, anhydrous (Particulates not otherwise regulated, Respirable dust)		5		

US - Oregon Permissible Exposure Limits (Z-1)	sodium acetate, anhydrous (Particulates not otherwise regulated (PNOR) (f) Respirable Fraction)	-	5				Bold print identifies substances for which the Oregon Permissible Exposure Limits (PELs) are different than the federal Limits. PNOR means “particles not otherwise regulated.”
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	sodium acetate, anhydrous (Particulates not otherwise regulated (PNOR)(f)-Respirable fraction)		5				
Canada - Alberta Occupational Exposure Limits	methyl acetate (Methyl acetate)	200	606	250	757		
Canada - British Columbia Occupational Exposure Limits	methyl acetate (Methyl acetate)	200		250			
US NIOSH Recommended Exposure Limits (RELs)	methyl acetate ()	200	610	250	760		
US OSHA Permissible Exposure Levels (PELs) - Table Z1	methyl acetate (Methyl acetate)	200	610				
US ACGIH Threshold Limit Values (TLV)	methyl acetate (Methyl acetate)	200		250			TLV® Basis Headache; eye & URT irr; ocular nerve dam
US - Minnesota Permissible Exposure Limits (PELs)	methyl acetate (Methyl acetate)	200	610	250	760		
US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	methyl acetate (Methyl acetate)	200	610				
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	methyl acetate (Methyl acetate)	200	610	250	760		

US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	methyl acetate (Methyl acetate)	200	610	250	760	
US - California Permissible Exposure Limits for Chemical Contaminants	methyl acetate (Methyl acetate)	200	610	250	760	
US - Idaho - Limits for Air Contaminants	methyl acetate (Methyl acetate)	200	610			
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	methyl acetate (Methyl acetate)	200	606	250	757	
US - Hawaii Air Contaminant Limits	methyl acetate (Methyl acetate)	200	610	250	760	
US - Alaska Limits for Air Contaminants	methyl acetate (Methyl acetate)	200	610	250	760	
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	methyl acetate (Methyl acetate)	200		250		
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	methyl acetate (Methyl acetate)	200	610	250	760	
US - Michigan Exposure Limits for Air Contaminants	methyl acetate (Methyl acetate)	200	610	250	760	
Canada - Prince Edward Island Occupational Exposure Limits	methyl acetate (Methyl acetate)	200		250		TLV® Basis Headache; eye & URT irr; ocular nerve dam
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	methyl acetate (Methyl acetate)	200	610			
Canada - Nova Scotia Occupational Exposure Limits	methyl acetate (Methyl acetate)	200		250		TLV Basis headache; eye & upper respiratory tract

						irritation; ocular nerve damage
US - Oregon Permissible Exposure Limits (Z-1)	methyl acetate (Methyl acetate)	200	610			
Canada - Northwest Territories Occupational Exposure Limits (English)	methyl acetate (Methyl acetate)	200	605	250	760	

PERSONAL PROTECTION

RESPIRATOR

- Type AX-P Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 1432000 & 1492001, ANSI Z88 or national equivalent)

EYE

- Safety glasses with side shields.
- Chemical goggles.
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59], [AS/NZS 1336 or national equivalent]

HANDS/FEET

Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include

- frequency and duration of contact,
- chemical resistance of glove material,
- glove thickness and
- dexterity

Experience indicates that the following polymers are suitable as glove materials for protection against undissolved, dry solids, where abrasive particles are not present.

- polychloroprene
- nitrile rubber
- butyl rubber
- fluorocaoutchouc

OTHER

- Overalls.
- P.V.C. apron.
- Barrier cream.
- Skin cleansing cream.

ENGINEERING CONTROLS

■ Assess operations based upon available dust explosion information to determine the suitability of preventative or protective systems as precautionary measures against possible dust explosions. If prevention is not possible, consider protection by use of containment, venting or suppression of dust handling equipment.

Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.

The basic types of engineering controls are

Process controls which involve changing the way a job activity or process is done to reduce the risk.

Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

Does not mix with water.
Sinks in water.

State	Divided Solid	Molecular Weight	57,000-66,000 (Average)
Melting Range (°F)	392 (decomposes)	Viscosity	Not Applicable
Boiling Range (°F)	Not available.	Solubility in water (g/L)	Immiscible
Flash Point (°F)	174O.C.	pH (1% solution)	5-7 (4%)
Decomposition Temp (°F)	392	pH (as supplied)	Not applicable
Autoignition Temp (°F)	842 (dust cloud)	Vapour Pressure (mmHG)	Not available.
Upper Explosive Limit (%)	Not limited	Specific Gravity (water=1)	1.26-1.31
Lower Explosive Limit (%)	0.87g/m3	Relative Vapour Density (air=1)	Not Available
Volatile Component (%vol)	<5%	Evaporation Rate	Non Volatile

Material	Value
METHYL ACETATE	
log Kow (Sangster 1997)	0.18

APPEARANCE

Powder, no odour. Insoluble in many organic solvents. However, soluble in water, phenol, acetic acid. High impermeability to gases. Forms films by evaporation from water solution. Grades available with different degree of polymerisation and percent hydrolysis. Molecular weights vary from low viscosity (MW25000-35000) to super high viscosity (MW250000-300000); and percentage of hydrolysis varies. As molecular weight decreases, solubility in water increases at any degree of hydrolysis. Fully, Super or moderately hydrolysed grades are covered by CAS RN 9002-89-5 and intermediate or partially hydrolysed by CAS RN 25213-24-5. Most Denka Poval grades normally have less than 5% of volatiles (including free methanol and methyl acetate residuals, both of which are highly flammable with LEL's of 6% and 3.1% respectively). Being produced by hydrolysis of polyvinyl acetate polymer, a vinyl alcohol monomer does not exist.

Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY

- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerisation will not occur.

STORAGE INCOMPATIBILITY

■ Polyvinyl alcohol may contain minor amounts of methanol and methyl acetate which diffuse from the powder over time. Under certain conditions of heat and confinement, vapour head spaces of trucks, rail cars, bins or silos could exceed the lower explosive limits of those diffused vapours and produce an explosion given an ignition source.
Energy of decomposition (in the range 125-430 deg C) was measured as 0.59 kJ/g.
The relationships between energy of decomposition and processing hazards have been investigated.It is suggested that in "open vessel" process (with man-hole sized openings), substances with exothermic decomposition energies below 500 J/g (0.5 kJ/g) are not likely to be hazardous (though there appear to be exceptions for certain classes of compound). In "closed vessel" process (opening is a safety valve or bursting disk), an upper limit of 150 J/g (0.15 kJ/g) is appropriate
It was suggested that "adiabatic holding temperature which gives a time to exothermic decomposition of 24 hours, Tair24" can be calculated from isothermal DTA diagrams.

- Avoid reaction with oxidising agents

For incompatible materials - refer to Section 7 - Handling and Storage.

Section 11 - TOXICOLOGICAL INFORMATION

polyvinyl alcohol

TOXICITY AND IRRITATION

■ Subcutaneous injection of polyvinyl alcohol (PVA) (molecular weights 37000-185000, 1 ml of 5% PVA in physiological saline) into female rats for 28 days produced elevated blood pressure in some rats from each treatment group. The polymer with a molecular weight of 133000 was associated with widespread cardiovascular lesions, severe polydipsia, severe glomerulonephritis, and enlargement of the heart, kidney, liver and spleen.

The substance is classified by IARC as Group 3

NOT classifiable as to its carcinogenicity to humans.

Evidence of carcinogenicity may be inadequate or limited in animal testing.

CARCINOGEN

Polyvinyl alcohol	International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs	Group	3
methanol	US - Rhode Island Hazardous Substance List	IARC	
methanol	US - Maine Chemicals of High Concern List	Carcinogen	
methyl acetate	US - Rhode Island Hazardous Substance List	IARC	

SKIN

methanol	US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants - Skin	Skin Designation	X
methanol	US - Washington Permissible exposure limits of air contaminants - Skin	Skin	X
methanol	US ACGIH Threshold Limit Values (TLV) - Skin	Skin Designation	X
methanol	US ACGIH Threshold Limit Values (TLV) - Skin	Skin Designation	Yes
methanol	US AIHA Workplace Environmental Exposure Levels (WEELs) - Skin	Notes	TLV® Basis Headache; eye dam ; BEI
methanol	US - California OEHHA/ARB - Acute Reference Exposure Levels and Target Organs (RELs) - Skin	Skin	X
methanol	US - California OEHHA/ARB - Chronic Reference Exposure Levels and Target Organs (CRELs) - Skin	Skin	X
methanol	US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants - Skin	Skin Designation	X
methanol	US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants - Skin	Skin Designation	Yes
methanol	Canada - British Columbia Occupational Exposure Limits - Skin	Notation	Skin
methanol	US - Minnesota Permissible Exposure Limits (PELs) - Skin	Skin Designation	X
methanol	US - Minnesota Permissible Exposure Limits (PELs) - Skin	Skin Designation	Yes
methanol	US - Hawaii Air Contaminant Limits - Skin Designation	Skin Designation	X
methanol	US OSHA Permissible Exposure Levels (PELs) - Skin	Skin Designation	X
methanol	US OSHA Permissible Exposure Levels (PELs) - Skin	Skin Designation	Yes
methanol	US - Oregon Permissible Exposure Limits (Z2) - Skin	Skin	X
methanol	US - California Permissible Exposure Limits for Chemical Contaminants - Skin	Skin	X
methanol	US - California Permissible Exposure Limits for Chemical Contaminants - Skin	Skin	S

methanol	Canada - Alberta Occupational Exposure Limits - Skin	Substance Interaction	1
methanol	US NIOSH Recommended Exposure Limits (RELs) - Skin	Notes	[skin]

Section 12 - ECOLOGICAL INFORMATION

No data

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
sodium acetate, anhydrous	LOW	No Data Available	HIGH	HIGH
methanol	LOW	No Data Available	LOW	HIGH
methyl acetate	LOW	No Data Available	LOW	HIGH

Section 13 - DISPOSAL CONSIDERATIONS

US EPA Waste Number & Descriptions

B. Component Waste Numbers
When methanol is present as a solid waste as a discarded commercial chemical product, off-specification species, as a container residue, or a spill residue, use EPA waste number U154 (waste code I).

Disposal Instructions

All waste must be handled in accordance with local, state and federal regulations.
Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.
A Hierarchy of Controls seems to be common - the user should investigate:

- Reduction
- Reuse
- Recycling
- Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate. In most instances the supplier of the material should be consulted.

- DO NOT allow wash water from cleaning or process equipment to enter drains.
- It may be necessary to collect all wash water for treatment before disposal.
- In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.
- Where in doubt contact the responsible authority.
- Recycle wherever possible.
- Consult manufacturer for recycling options or consult local or regional waste management authority for disposal if no suitable treatment or disposal facility can be identified.
- Dispose of by: burial in a land-fill specifically licenced to accept chemical and / or pharmaceutical wastes or Incineration in a licenced apparatus (after admixture with suitable combustible material)
- Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.

Section 14 - TRANSPORTATION INFORMATION

NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS: DOT, IATA, IMDG

Section 15 - REGULATORY INFORMATION

polyvinyl alcohol (CAS: 9002-89-5,25213-24-5,54626-91-4) is found on the following regulatory lists;
"Canada Domestic Substances List (DSL)","International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs","OECD List of High Production Volume (HPV) Chemicals","OSPAR National List of Candidates for Substitution – United Kingdom","US Cosmetic Ingredient Review (CIR) Cosmetic ingredients found safe as used","US DOE Temporary Emergency Exposure Limits (TEELs)","US FDA Everything Added to Food in the United States (EAFUS)","US Inventory of Effective Food Contact Substance Notifications","US NFPA 499 Combustible Dusts","US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory","WHO Food Additives Series - Food additives evaluated toxicologically Acceptable daily intake"

Regulations for ingredients

sodium acetate, anhydrous (CAS: 127-09-3) is found on the following regulatory lists;

"Canada Domestic Substances List (DSL)","Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)","CODEX General Standard for Food Additives (GSFA) - Additives Permitted for Use in Food in General, Unless Otherwise Specified, in Accordance with GMP","GESAMP/EHS Composite List - GESAMP Hazard Profiles","International Council of Chemical Associations (ICCA) - High Production Volume List","International Fragrance Association (IFRA) Survey: Transparency List","OECD List of High Production Volume (HPV) Chemicals","US DOE Temporary Emergency Exposure Limits (TEELs)","US DOT Coast Guard Bulk Hazardous Materials - List of Flammable and Combustible Bulk Liquid Cargoes","US EPA High Production Volume Program Chemical List","US FDA CFSAN GRAS Substances evaluated by the Select Committee on GRAS Substances (SCOGS)","US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory","US Toxic Substances Control Act (TSCA) - Premanufacture Notice (PMN) Chemicals"

methanol (CAS: 67-56-1) is found on the following regulatory lists;

"Canada - Alberta Ambient Air Quality Objectives","Canada - Alberta Occupational Exposure Limits","Canada - British Columbia Occupational Exposure Limits","Canada - Northwest Territories Occupational Exposure Limits (English)","Canada - Nova Scotia Occupational Exposure Limits","Canada - Prince Edward Island Occupational Exposure Limits","Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)","Canada - Saskatchewan Industrial Hazardous Substances","Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits","Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances","Canada CEPA Environmental Registry Substance Lists - List of substances on the DSL that meet the human health criteria for categorization (English)","Canada Domestic Substances List (DSL)","Canada Ingredient Disclosure List (SOR/88-64)","Canada List of Prohibited and Restricted Cosmetic Ingredients (The Cosmetic Ingredient ""Hotlist"")","Canada National Pollutant Release Inventory (NPRI)","Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)","GESAMP/EHS Composite List - GESAMP Hazard Profiles","IMO IBC Code Chapter 17: Summary of minimum requirements","IMO MARPOL 73/78 (Annex II) - List of Other Liquid Substances","International Council of Chemical Associations (ICCA) - High Production Volume List","OECD List of High Production Volume (HPV) Chemicals","US - Alaska Limits for Air Contaminants","US - California Air Toxics ""Hot Spots"" List (Assembly Bill 2588) Substances for Which Emissions Must Be Quantified","US - California Occupational Safety and Health Regulations (CAL/OSHA) - Hazardous Substances List","US - California OEHHA/ARB - Acute Reference Exposure Levels and Target Organs (RELs)","US - California OEHHA/ARB - Chronic Reference Exposure Levels and Target Organs (CRELs)","US - California Permissible Exposure Limits for Chemical Contaminants","US - California Toxic Air Contaminant List Category II","US - Connecticut - Regulations Concerning the Designation of Controlled Drugs - Volatile substances","US - Connecticut Hazardous Air Pollutants","US - Delaware Pollutant Discharge Requirements - Reportable Quantities","US - Hawaii Air Contaminant Limits","US - Idaho - Limits for Air Contaminants","US - Louisiana Minimum Emission Rates Toxic Air Pollutants","US - Louisiana Toxic Air Pollutant Ambient Air Standards","US - Maine Chemicals of High Concern List","US - Massachusetts Oil & Hazardous Material List","US - Michigan Exposure Limits for Air Contaminants","US - Minnesota Hazardous Substance List","US - Minnesota Permissible Exposure Limits (PELs)","US - New Jersey Right to Know Hazardous Substances (English)","US - North Dakota Air Pollutants - Guideline Concentrations","US - Oregon Permissible Exposure Limits (Z-1)","US - Rhode Island Hazardous Substance List","US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants","US - Vermont Hazardous wastes which are Discarded Commercial Chemical Products or Off-Specification Batches of Commercial Chemical Products or Spill Residues of Either","US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants","US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants","US - Washington Discarded Chemical Products List - ""U"" Chemical Products","US - Washington Permissible exposure limits of air contaminants","US - Washington Toxic air pollutants and their ASIL, SQER and de minimis emission values","US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants","US ACGIH Threshold Limit Values (TLV)","US CAA (Clean Air Act) - HON Rule - Organic HAPs (Hazardous Air Pollutants)","US Clean Air Act - Hazardous Air Pollutants","US Cosmetic Ingredient Review (CIR) Cosmetic ingredients found safe, with qualifications","US Department of Transportation (DOT) List of Hazardous Substances and Reportable Quantities - Hazardous Substances Other Than Radionuclides","US DOE Temporary Emergency Exposure Limits (TEELs)","US DOT Coast Guard Bulk Hazardous Materials - List of Flammable and Combustible Bulk Liquid Cargoes","US EPA Acute Exposure Guideline Levels (AEGLs) - Interim","US EPA High Production Volume Program Chemical List","US EPCRA Section 313 Chemical List","US FDA Everything Added to Food in the United States (EAFUS)","US FDA Indirect Food Additives: Adhesives and Components of Coatings - Substances for Use Only as Components of Adhesives - Adhesives","US List of Lists - Consolidated List of Chemicals Subject to EPCRA, CERCLA and Section 112(r) of the Clean Air Act","US NFPA 30A Typical Flammable and Combustible Liquids Found at Motor Fuel Dispensing Facilities","US NFPA 30B Manufacture and Storage of Aerosol Products - Chemical Heat of Combustion","US NIOSH Recommended Exposure Limits (RELs)","US OSHA Permissible Exposure Levels (PELs) - Table Z1","US Postal Service (USPS) Hazardous Materials Table: Postal Service Mailability Guide","US RCRA (Resource Conservation & Recovery Act) - List of Hazardous Wastes","US RCRA (Resource Conservation & Recovery Act) - Phase 4 LDR Rule - Universal Treatment Standards","US Spacecraft Maximum Allowable Concentrations (SMACs) for Airborne Contaminants","US Spacecraft Water Exposure Guidelines for Selected Waterborne Contaminants SWEGs","US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory"

methyl acetate (CAS: 79-20-9) is found on the following regulatory lists;

"Canada - Alberta Occupational Exposure Limits","Canada - British Columbia Occupational Exposure Limits","Canada - Northwest Territories Occupational Exposure Limits (English)","Canada - Nova Scotia Occupational Exposure Limits","Canada - Prince Edward Island Occupational Exposure Limits","Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)","Canada - Saskatchewan Industrial Hazardous Substances","Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits","Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances","Canada CEPA Environmental Registry Substance Lists - Other DSL substances that are priorities for human health (English)","Canada Domestic Substances List (DSL)","Canada Ingredient Disclosure List (SOR/88-64)","Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)","GESAMP/EHS Composite List - GESAMP Hazard Profiles","IMO IBC Code Chapter 17: Summary of minimum requirements","IMO MARPOL 73/78 (Annex II) - List of Other Liquid Substances","International Fragrance Association (IFRA) Survey: Transparency List","OECD List of High Production Volume (HPV) Chemicals","US - Alaska Limits for Air Contaminants","US - California Occupational Safety and Health Regulations (CAL/OSHA) - Hazardous Substances List","US - California Permissible Exposure Limits for Chemical Contaminants","US - Connecticut Hazardous Air Pollutants","US - Hawaii Air Contaminant Limits","US - Idaho - Limits for Air Contaminants","US - Massachusetts Oil & Hazardous Material List","US - Michigan Exposure Limits for Air Contaminants","US - Minnesota Hazardous Substance List","US - Minnesota Permissible Exposure Limits (PELs)","US - New Jersey Right to Know Hazardous Substances (English)","US - North Dakota Air Pollutants - Guideline Concentrations","US - Oregon

Permissible Exposure Limits (Z-1)","US - Pennsylvania - Hazardous Substance List","US - Rhode Island Hazardous Substance List","US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants","US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants","US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants","US - Washington Permissible exposure limits of air contaminants","US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants","US ACGIH Threshold Limit Values (TLV)","US CAA (Clean Air Act) - HON Rule - Organic HAPs (Hazardous Air Pollutants)","US DOE Temporary Emergency Exposure Limits (TEELs)","US DOT Coast Guard Bulk Hazardous Materials - List of Flammable and Combustible Bulk Liquid Cargoes","US EPA High Production Volume Program Chemical List","US EPA Master Testing List - Index I Chemicals Listed","US FDA Everything Added to Food in the United States (EAFUS)","US FDA Indirect Food Additives: Adhesives and Components of Coatings - Substances for Use Only as Components of Adhesives - Adhesives","US FMA Air Freshener Fragrance Ingredient Survey Results","US NIOSH Recommended Exposure Limits (RELs)","US OSHA Permissible Exposure Levels (PELs) - Table Z1","US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory","US TSCA Section 12(b) - List of Chemical Substances Subject to Export Notification Requirements","US TSCA Section 4/12 (b) - Sunset Date/Status","US TSCA Section 8 (a) - Preliminary Assessment Information Rules (PAIR) - Reporting List","US TSCA Section 8 (d) - Health and Safety Data Reporting"

Section 16 - OTHER INFORMATION

LIMITED EVIDENCE

■ Inhalation may produce health damage*.
■ Cumulative effects may result following exposure*.
■ May produce skin discomfort*.
■ Limited evidence of a carcinogenic effect*.
■ Vapours potentially cause drowsiness and dizziness*.
* (limited evidence).

Ingredients with multiple CAS Nos

Ingredient Name	CAS
polyvinyl alcohol	9002-89-5, 25213-24-5, 54626-91-4

■ Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.
A list of reference resources used to assist the committee may be found at:
www.chemwatch.net/references.

■ The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings.

■ For detailed advice on Personal Protective Equipment, refer to the following U.S. Regulations and Standards:
OSHA Standards - 29 CFR:
1910.132 - Personal Protective Equipment - General requirements
1910.133 - Eye and face protection
1910.134 - Respiratory Protection
1910.136 - Occupational foot protection
1910.138 - Hand Protection
Eye and face protection - ANSI Z87.1
Foot protection - ANSI Z41
Respirators must be NIOSH approved.

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