# Toxicological profile for

## Polyvinyl acetate

***This ingredient has been assessed to determine potential human health effects for the consumer. It was considered not to increase the inherent toxicity of the product and thus is acceptable under conditions of intended use.***

## *1. Name of substance and physico-chemical properties*

### *1.1. IUPAC systematic name*

No data available to us at this time.

### *1.2. Synonyms*

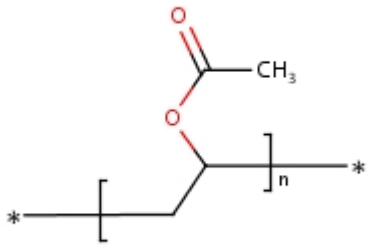
Acetic acid, ethenyl ester, homopolymer; Ethenyl acetate, homopolymer; Polyvinyl acetate; 76 Res; ASB 516; AYAA; AYAF; AYJV; Acetic acid vinyl ester, polymers; Asahisol 1527; Bakelite AYAA; Bakelite AYAF; Bakelite AYAT; Bakelite LP 90; Bond CH 1200; Bond CH 18; Bond CH 3; Booksaver; Borden 2123; Cascorez; Cemedine 196; Cevian 380; Cevian A 678; D 50; D 50 (Polymer); D 50 M; DCA 70; Danfirm; Daratak; Duvilax; Duvilax BD 20; Duvilax HN; Duvilax LM 52; EP 1208; EP 1436; EP 1437; EP 1463; Elmer's Glue All; Elvacet 81-900; Emultex F; En-cor; Esnil P 18; Ethenyl acetate homopolymer; Everflex B; Formvar 1285; Gelva; Gelva 25; Gelva CSV 16; Gelva GP 702; Gelva S 55H; Gelva TS 22; Gelva TS 23; Gelva TS 30; Gelva TS 85; Gelva V 100; Gelva V 15; Gelva V 25; Gelva V 800; Gohensil E 50Y; Gohsenyl E 50 Y; HSDB 1250; Kurare OM 100; Lemac; Lemac 1000; Meikatex 5000NG60; Merckogel OR; Merckogen 6000; Mokotex D 2602; Movinyl; Movinyl 114; Movinyl 50M; Movinyl 801; Mowilith 30; Mowilith 50; Mowilith 70; Mowilith 90; Mowilith D; Mowilith DV; Mowilith M70; NS 2842; National 120-1207; National starch 1014; OM 100; OR 1500; P-170; PS 3h; PVAE; Pioloform F; Plyamul 40-155; Plyamul 40-350; Polisol S-3; Poly(vinyl acetate); Poly(vinylacetate); Polyco 117FR; Polyco 2116; Polyco 2134; Polyco 953; Polyfox P 20; Polyfox PO; Polysol 1000; Polysol 1000AX; Polysol 1200; Polysol PS 10; Polysol S 5; Polysol S 6; Polyvinyl acetate; Polyvinyl acetate resin; Protex (polymer); R 10688; RV225-5B; Raviflex 43; Resyn 25-1014; Resyn 25-1025; Rhodopas; Rhodopas 010; Rhodopas 5000SMR; Rhodopas 5425; Rhodopas A 10; Rhodopas AM 041; Rhodopas B; Rhodopas BB; Rhodopas HV 2; Rhodopas M; S-Nyl-P 42; SP 60; SP 60 (Ester); Sakunol SN 08; Soloid; Soviol; TS2; Toabond 2; Toabond 40H; Toabond 6; UK 131; Ucar 130; Ucar 15; V 501; VA 0112; Vinac; Vinac ASB 10; Vinac B 7; Vinac RP251; Vinacet D; Vinalite D 50N; Vinalite DS 41/11; Vinamul 9300; Vinapol A 16; Vinipaint 555; Vinnapas B; Vinnapas B 100; Vinnapas B 17; Vinnapas UW 50; Vinyl acetate homopolymer; Vinyl acetate polymer (ChemIDplus)

### *1.3. Molecular formula*

$(C_4H_6O_2)x$- (ChemIDplus)

*1.4. Structural Formula*

(ChemIDplus)




*1.5. Molecular weight (g/mol)*

Polymer, so variable; 11,000 – 1,500,000 (HSDB, 2002)

*1.6. CAS registration number*

9003-20-7

*1.7. Properties*

*1.7.1. Melting point*

35-50ºC (with softening) (HSDB, 2002)

*1.7.2. Boiling point*

Degrades at 220-250ºC (IARC, 1979)

*1.7.3. Solubility*

Practically insoluble in water. Soluble in methanol, ethanol, propan-2-ol and a variety of other

organic solvents; insoluble in higher alcohols, aliphatic hydrocarbons, carbon disulfide and cyclohexane (CIR, 1992,1996; IARC, 1979)

*1.7.4. pKa*

No data available to us at this time.

*1.7.5. Flashpoint*

No data available to us at this time.

*1.7.6. Flammability limits (vol/vol%)*

No data available to us at this time.

*1.7.7. (Auto)ignition temperature*

: 550ºC (cloud)

*1.7.8. Decomposition temperature*

: 220-250ºC (HSDB, 2002)

*1.7.9. Stability*

Stable at normal temperatures and pressure; Softens at relatively low temperatures but is relatively stable in light and oxygen (HSDB, 2002)

*1.7.10. Vapor pressure*

Not found (as a polymer likely to be extremely low).

*1.7.11. log Kow*

Not applicable.

## *2. General information*

### *2.1. Exposure*

“The available results of occupational exposure to vinyl acetate have been well documented (NIOSH, 1978). Some minor skin and eye irritations to airborne vinyl acetate were noted.”

As taken from CIR (1996). Amended final safety assessment of polyvinyl acetate. Journal of the American College of Toxicology, 15, 166-176.

A recent US EPA risk assessment concluded that no mammalian toxicity would be anticipated from inhalation exposure to vinyl acetate polymers (EPA, 2001).

| | |
|---|---|
| Cosmetics | Yes (Cosing; Cosmetics Bench Ref, 1996). |
| Environment | No evidence |
| Food | Yes (Sheftel, 2000; US FDA, 2013, 2018) |
| Pharmaceuticals | No evidence |
| Tobacco: In the burned part | Yes |
| In tobacco naturally | No evidence |

Used in cosmetics in the EU as an antistatic, binding, emulsion stabilising and film forming agent. As taken from CosIng (Cosmetics Substances and Ingredients Database. Accessed February 2018. Available at http://ec.europa.eu/growth/tools-databases/cosing/).

Polyvinyl acetate (CAS RN 9003-20-7) is listed as an ingredient in home maintenance, auto, arts and crafts, landscape/yard and inside the home products (at concentrations of up to 60%) by the US Department of Health and Human Services (2017)

Polyvinyl acetate is reported used in water-based coatings (paints and lacquers), adhesives (paper, wood, glass, metals, and porcelain), sealants, textile finishes, fabric binders and inks.

As taken from Haz-Map, 2017

National Occupational Exposure Survey (1981 - 1983)

Estimated Numbers of Employees Potentially Exposed to Acetic Acid Vinyl Ester, Polymers (CAS RN 9003-20-7) by Occupation*

| Code | Occupation Description (1980) | Total # Employees (Male & Female) | Total # Female Employees |
|---|---|---|---|
| 019 | MANAGERS AND ADMINISTRATORS, N.E.C. | 101 | |
| 055 | ELECTRICAL AND ELECTRONIC ENGINEERS | 995 | 206 |
| 059 | ENGINEERS, N.E.C. | 91 | 12 |
| 073 | CHEMISTS, EXCEPT BIOCHEMISTS | 6 | |
| 078 | BIOLOGICAL AND LIFE SCIENTISTS | 209 | 188 |
| 084 | PHYSICIANS | 49 | 33 |
| 095 | REGISTERED NURSES | 451 | 407 |
| 099 | OCCUPATIONAL THERAPISTS | 711 | 694 |
| 103 | PHYSICAL THERAPISTS | 373 | 256 |
| 105 | THERAPISTS, N.E.C. | 493 | 473 |
| 188 | PAINTERS, SCULPTORS, CRAFT-ARTISTS, AND ARTIST PRINTMAKERS | 922 | 670 |
| 189 | PHOTOGRAPHERS | 309 | |
| 204 | DENTAL HYGIENISTS | 85 | 49 |
| 213 | ELECTRICAL AND ELECTRONIC TECHNICIANS | 16 | 7 |
| 216 | ENGINEERING TECHNICIANS, N.E.C. | 516 | 7 |
| 217 | DRAFTING OCCUPATIONS | 1,414 | |
| 224 | CHEMICAL TECHNICIANS | 6,055 | 2,579 |
| 235 | TECHNICIANS, N.E.C. | 1,347 | 203 |
| 259 | SALES REPRESENTATIVES, MINING, MANUFACTURING, AND WHOLESALE | 479 | 479 |

| | | | |
|---|---|---|---|
| 277 | STREET AND DOOR-TO-DOOR SALES WORKERS | 1,744 | 734 |
| 328 | PERSONNEL CLERKS, EXCEPT PAYROLL AND TIMEKEEPING | 57 | 57 |
| 356 | MAIL CLERKS, EXC. POSTAL SERVICE | 1,226 | 350 |
| 364 | TRAFFIC, SHIPPING, AND RECEIVING CLERKS | 1,657 | 70 |
| 365 | STOCK AND INVENTORY CLERKS | 115 | |
| 389 | ADMINISTRATIVE SUPPORT OCCUPATIONS, N.E.C. | 52 | |
| 445 | DENTAL ASSISTANTS | 49 | 29 |
| 447 | NURSING AIDES, ORDERLIES, AND ATTENDANTS | 558 | |
| 453 | JANITORS AND CLEANERS | 8,178 | 1,006 |
| 508 | AIRCRAFT ENGINE MECHANICS | 795 | |
| 515 | AIRCRAFT MECHANICS, EXC. ENGINE | 210 | 9 |
| 518 | INDUSTRIAL MACHINERY REPAIRERS | 803 | |
| 534 | HEATING, AIR CONDITIONING, AND REFRIGERATION MECHANICS | 8,809 | |
| 544 | MILLWRIGHTS | 45 | |
| 547 | SPECIFIED MECHANICS AND REPAIRERS, N.E.C. | 460 | |
| 549 | NOT SPECIFIED MECHANICS AND REPAIRERS | 3,346 | 334 |
| 565 | TILE SETTERS, HARD AND SOFT | 5,655 | |
| 567 | CARPENTERS | 36,366 | 250 |
| 573 | DRYWALL INSTALLERS | 5,682 | |
| 575 | ELECTRICIANS | 134 | |
| 579 | PAINTERS, CONSTRUCTION AND MAINTENANCE | 4,639 | 119 |

| | | | |
|---|---|---|---|
| 583 | PAPERHANGERS | 387 | |
| 585 | PLUMBERS, PIPEFITTERS, AND STEAMFITTERS | 1,507 | |
| 593 | INSULATION WORKERS | 78 | |
| 599 | CONSTRUCTION TRADES, N.E.C. | 3,816 | 254 |
| 617 | MINING OCCUPATIONS, N.E.C. | 7,885 | |
| 633 | SUPERVISORS, PRODUCTION OCCUPATIONS | 1,766 | 415 |
| 637 | MACHINISTS | 774 | |
| 643 | BOILERMAKERS | 48 | |
| 645 | PATTERNMAKERS AND MODEL MAKERS, METAL | 592 | |
| 646 | LAY-OUT WORKERS | 1,827 | 1,522 |
| 657 | CABINET MAKERS AND BENCH CARPENTERS | 727 | |
| 658 | FURNITURE AND WOOD FINISHERS | 2,297 | |
| 667 | TAILORS | 827 | 528 |
| 668 | UPHOLSTERERS | 5,365 | 1,606 |
| 675 | HAND MOLDERS AND SHAPERS, EXCEPT JEWELERS | 255 | 64 |
| 676 | PATTERNMAKERS, LAY-OUT WORKERS, AND CUTTERS | 751 | |
| 679 | BOOKBINDERS | 7,671 | 3,731 |
| 684 | MISCELLANEOUS PRECISION WORKERS, N.E.C. | 494 | |
| 689 | INSPECTORS, TESTERS, AND GRADERS | 19 | |
| 717 | FABRICATING MACHINE OPERATORS, N.E.C. | 118 | 59 |
| 719 | MOLDING AND CASTING MACHINE OPERATORS | 433 | |

| | | | |
|---|---|---|---|
| 726 | WOOD LATHE, ROUTING, AND PLANING MACHINE OPERATORS | 761 | 457 |
| 727 | SAWING MACHINE OPERATORS | 1,783 | |
| 733 | MISCELLANEOUS WOODWORKING MACHINE OPERATORS | 4,637 | |
| 734 | PRINTING MACHINE OPERATORS | 17,770 | 1,524 |
| 735 | PHOTOENGRAVERS AND LITHOGRAPHERS | 359 | 352 |
| 736 | TYPESETTERS AND COMPOSITORS | 2,340 | 513 |
| 737 | MISCELLANEOUS PRINTING MACHINE OPERATORS | 2,207 | 1,299 |
| 739 | KNITTING, LOOPING, TAPING, AND WEAVING MACHINE OPERATORS | 205 | |
| 744 | TEXTILE SEWING MACHINE OPERATORS | 18,672 | 15,794 |
| 747 | PRESSING MACHINE OPERATORS | 1,112 | 869 |
| 748 | LAUNDERING AND DRY CLEANING MACHINE OPERATORS | 659 | 439 |
| 749 | MISCELLANEOUS TEXTILE MACHINE OPERATORS | 1,742 | 57 |
| 753 | CEMENTING AND GLUING MACHINE OPERATORS | 1,774 | 1,055 |
| 754 | PACKAGING AND FILLING MACHINE OPERATORS | 1,497 | 639 |
| 756 | MIXING AND BLENDING MACHINE OPERATORS | 5,266 | 306 |
| 757 | SEPARATING, FILTERING, AND CLARIFYING MACHINE OPERATORS | 32 | |
| 758 | COMPRESSING AND COMPACTING MACHINE OPERATORS | 211 | 33 |
| 759 | PAINTING AND PAINT SPRAYING MACHINE OPERATORS | 2,968 | 729 |
| 765 | FOLDING MACHINE OPERATORS | 4,769 | 2,853 |
| 766 | FURNACE, KILN, AND OVEN OPERATORS, EXC. FOOD | 66 | 47 |
| 769 | SLICING AND CUTTING MACHINE OPERATORS | 3,648 | 933 |

| | | | |
|---|---|---|---|
| 774 | PHOTOGRAPHIC PROCESS MACHINE OPERATORS | 405 | 82 |
| 777 | MISCELLANEOUS MACHINE OPERATORS, N.E.C. | 28,884 | 14,037 |
| 779 | MACHINE OPERATORS, NOT SPECIFIED | 10,614 | 2,247 |
| 785 | ASSEMBLERS | 31,940 | 10,662 |
| 786 | HAND CUTTING AND TRIMMING OCCUPATIONS | 234 | 117 |
| 787 | HAND MOLDING, CASTING, AND FORMING OCCUPATIONS | 360 | 360 |
| 789 | HAND PAINTING, COATING, AND DECORATING OCCUPATIONS | 608 | |
| 793 | HAND ENGRAVING AND PRINTING OCCUPATIONS | 526 | 33 |
| 795 | MISCELLANEOUS HAND WORKING OCCUPATIONS | 652 | 186 |
| 796 | PRODUCTION INSPECTORS, CHECKERS, AND EXAMINERS | 1,670 | 1,662 |
| 798 | PRODUCTION SAMPLERS AND WEIGHERS | 85 | |
| 799 | GRADERS AND SORTERS, EXCEPT AGRICULTURAL | 57 | 57 |
| 844 | OPERATING ENGINEERS | 213 | |
| 856 | INDUSTRIAL TRUCK AND TRACTOR EQUIPMENT OPERATORS | 360 | |
| 859 | MISCELLANEOUS MATERIAL MOVING EQUIPMENT OPERATORS | 364 | 91 |
| 865 | HELPERS, CONSTRUCTION TRADES | 922 | |
| 869 | CONSTRUCTION LABORERS | 13,999 | |
| 873 | PRODUCTION HELPERS | 1,588 | |
| 877 | STOCK HANDLERS AND BAGGERS | 202 | |
| 878 | MACHINE FEEDERS AND OFFBEARERS | 3,390 | 275 |
| 887 | VEHICLE WASHERS AND EQUIPMENT CLEANERS | 103 | |

| | | | |
|---|---|---|---|
| 888 | HAND PACKERS AND PACKAGERS | 5,962 | 2,739 |
| 889 | LABORERS, EXCEPT CONSTRUCTION | 3,346 | 1,396 |
| TOTAL | | 311,807 | 79,243 |

*(1) The estimates for each occupation apply across the surveyed industries in which the agent was observed. Not all industries were surveyed, and not all agents were observed in all surveyed industries. (2) When using the estimates, standard errors associated with estimates should be considered. (3) Potential exposures to a chemical agent are categorized as actual (i.e., the surveyor observed the use of the specific agent) or tradename (i.e., the surveyor observed the use of a tradename product known to contain the specific agent). The estimates presented in the table combine both categories.

As taken from NIOSH, available at https://web.archive.org/web/20111028103818/http://www.cdc.gov/noes/noes2/x6603occ.html

A Cosmetic Ingredient Rereview confirmed that polyvinyl acetate is “safe in the present practices of use and concentration” (ranging from 0.4-47% in certain cosmetic products).

As taken from Burnett CL. 2017. Int. J. Toxicol. 36(Suppl. 2), 48S-49S. Available at https://online.personalcarecouncil.org/ctfa-static/online/lists/cir-pdfs/PR758.pdf

*2.2. Combustion products*

No data available to us at this time.

*2.3. Ingredient(s) from which it originates*

No data available to us at this time.

***3. Status in legislation and other official guidance***

| | | | | |
|---|---|---|---|---|
| States approving use in tobacco | Approved in Belgium, France, Germany and UK. | | | |
| Food | EU | No | USA | Yes |
| ADI | None identified. | | | |
| Codex Alim. | Not listed. | | | |
| C of E no. | Not listed. | | FEMA no. | None identified. |
| TLV (ACGIH) | Not listed. | | | |
| Cosmetics (UK) | Not listed in Schedule 1. | | | |

**FDA Requirements:**

“US fda permits use of polyvinyl acetate homopolymers & copolymers as components of adhesives, resinous & polymeric coatings, & paper & paperboard (for aq, fatty or dry food) when they are intended for use in contact with food (US FDA, 1977). [IARC (1979). Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man. Geneva: World Health Organization, International Agency for Research on Cancer, 1972-PRESENT. (Multivolume work). Available at: http://monographs.iarc.fr/index.php p. V19 350] **PEER REVIEWED**”

“8.390; limitations: diluent in ink for marking gum, confectionery, & food supplements in tablet form; minimum molecular wt of 2000. [Furia, T.E. (ed.). CRC Handbook of Food Additives. 2nd ed. Cleveland: The Chemical Rubber Co., 1972., p. 922] **PEER REVIEWED**”

As taken from HSDB, 2002

Polyvinyl acetate is included on the FDA list of substances added to food in the US under 21 CFR sections:

172.615 (chewing gum base),

175.105 (adhesives),

175.300 (resinous and polymeric coatings),

175.320 (resinous and polymeric coatings for polyolefin films),

176.170 (components of paper and paperboard in contact with aqueous and fatty foods),

176.180 (components of paper and paperboard in contact with dry food),

177.1200 (cellophane),

177.2260 (filters, resin-bonded),

177.2800 (textiles and textile fibers),

181.30 (substances used in the manufacture of paper and paperboard products used in food packaging) and

73.1 (diluents in color additive mixtures for food use exempt from certification)

As taken from US FDA, 2013, 2018.

Acetic acid ethenyl ester, homopolymer (CAS RN 9003-20-7) is listed in the US EPA Inert Finder Database (2018) as approved for food and non-food use pesticide products. For food use, it is listed under 40 CFR Part 180.960 (TOLERANCES AND EXEMPTIONS FOR PESTICIDE CHEMICAL RESIDUES IN FOOD: Polymers exemptions from the requirement of a tolerance) (US EPA, 2018).

Polyvinyl acetate homo-polymer appears on the list of “Permitted Additives to Tobacco Products in the United Kingdom" (Department of Health, 2003) at a maximum level permitted for inclusion in cigarettes/RYO and cigars of 1.0% w/w tobacco.

Acetic acid ethenyl ester, homopolymer (CAS RN 9003-20-7) is pre-registered under REACH (“envisaged registration deadline 31 May 2013”) (ECHA, 2018a).

Acetic acid ethenyl ester, homopolymer (CAS RN 9003-20-7) is not classified for packaging and labelling under Regulation (EC) No. 1272/2008 (ECHA, 2018b).

Polyvinyl acetate is listed in the US EPA Toxic Substances Control Act (TSCA) inventory and is fully exempt from reporting under the US EPA Chemical Data Reporting (CDR) rule. The CDR regulation requires companies that manufacture (including import) certain chemicals at certain volumes in the U.S. to report to EPA every four years through its CDR.

The TSCA inventory and 2016 CDR Exempt List are available at: https://iaspub.epa.gov/sor_internet/registry/substreg/searchandretrieve/searchbylist/search.do

Acetic acid ethenyl ester, homopolymer (CAS RN 9003-20-7) is included on the New Zealand Inventory of Chemicals and may be used as a single component chemical under an appropriate

group standard (NZ EPA, 2006).

## *4. Metabolism/Pharmacokinetics*

### *4.1. Metabolism/metabolites*

No data available to us at this time

### *4.2. Absorption, distribution and excretion*

“An aqueous emulsion of PVAc was administered to rabbits by the following routes: subcutaneous (s.c.) in 2 rabbits, intratracheally in 3 rabbits, and intravenously (i.v.) in 131 rabbits (Miyasaki, 1975). In the s.c. study, 2 rabbits were injected with 0.3 ml of 30% PVAc. The PVAc remained localized at the site of injection with little absorption. When 1 mllkg of a 3% solution of PVAc was injected intratracheally in 3 rabbits every fourth day for a total of four injections, the PVAc was phagocytized by alveolar phagocytes. Six groups of rabbits received i.v. injections. The first group of 41 rabbits received 1 ml/kg injections of 5% PVAc daily for 1, 2, 4, 8, 12, 16, or 24 weeks; a second group of 60 rabbits reccived daily injections of 2 ml/kg of 5% PVAc for 3 days, or 1, 2, 3, 6, 12, or 24 weeks; a third group of 5 rabbits received daily injections of 3 ml/kg of 5% PVAc for 26 weeks; a fourth group of 2 rabbits received injections for 26 weeks as did the third group, followed by a 12-week nontreatment period; a fifth group of 18 rabbits received daily injections of 4 ml/kg of 5% PVAc for 1,2,4, or 6 weeks; and a sixth group of 5 pregnant rabbits each received a 5 rnllkg-injection of 5% PVAc. A small amount of the i.v. injected PVAc was excreted in the urine; the remainder was retained in the body.” As taken from CIR (1996). Amended final safety assessment of polyvinyl acetate. Journal of the American College of Toxicology, 15, 166-176

### *4.3. Interactions*

"This study investigated the non-sink in vitro dissolution behavior and in vivo performance in rats of celecoxib (CCX) amorphous solid dispersions with polyvinyl acetate (PVA), polyvinylpyrrolidone (PVP) and hydroxypropyl methylcellulose (HPMC) at different drug doses. Both in vitro and in vivo, the amorphous solid dispersions with the hydrophilic polymers PVP and HPMC led to higher areas under both, the in vitro dissolution and the plasma concentration-time curves (AUC) compared to crystalline and amorphous CCX for all doses. In contrast, the amorphous solid dispersion with the hydrophobic polymer PVA showed a lower AUC both in vitro and in vivo than crystalline CCX. For crystalline CCX and CCX:PVA, the in vitro AUC was limited by the low solubility of the drug and the slow release of the drug from the hydrophobic polymer, respectively. For the supersaturating formulations, amorphous CCX, CCX:PVP and CCX:HPMC, the in vitro performance was mainly dependent on the dissolution rate and precipitation/crystallization inhibition of the polymer. As expected, the crystallization tendency increased with increasing dose, and therefore the in vitro AUCs did not increase proportionally with dose. Even though the in vivo AUC for all formulations increased with increasing dose, the relative bioavailability decreased significantly, indicating that the supersaturating formulations also crystallized in vivo and that the absorption of CCX was solubility-limited. These findings underline the importance of evaluating relevant in vitro doses, in order to rationally assess the performance of amorphous solid dispersions and avoid confusion in early in vivo studies. " As taken from Knopp MM et al. 2016. Eur. J. Pharm. Biopharm. 105, 106-14.

PubMed, 2017 available at: https://www.ncbi.nlm.nih.gov/pubmed/27212472

## *5. Toxicity*

### *5.1. Single dose toxicity*

"PVAc, 25 g/kg as a single dose, was administered orally to rats and mice (strain unspecified) (IARC, 1979). Effects due to oral administration of PVAc included lymphoid infiltration of the liver, depigmented epithelial cells of the renal tubules, and a slight increase in the number of polynucleated cells in the spleen." As taken from CIR (1996). Amended final safety assessment of polyvinyl acetate. Journal of the American College of Toxicology, 15, 166-176.

| Type of Test | Route of Exposure or Administration | Species / Test System | Dose Data | Reference |
|---|---|---|---|---|
| LD - Lethal dose | Oral | Rodent - rat | >25 gm/kg | JACTDZ Journal of the American College of Toxicology. (Mary Ann Liebert, Inc., 1651 Third Ave., New York, NY 10128) V.1-12, 1982-1993. Discontinued. Volume(issue)/page/year: 11,465,1992 |
| LD - Lethal dose | Oral | Rodent - mouse | >25 gm/kg | JACTDZ Journal of the American College of Toxicology. (Mary Ann Liebert, Inc., 1651 Third Ave., New York, NY 10128) V.1-12, 1982-1993. Discontinued. Volume(issue)/page/year: 11,465,1992 |
| LD50 - Lethal dose, 50 percent kill | Oral | Rodent - rat | >25 gm/kg | ENTOX* Encyclopedia of Toxicology: Reference Book, Elsevier, 2005 Volume(issue)/page/year: -,516,2005 |

As taken from RTECS, 2007.

### *5.2. Repeated dose toxicity*

"The PVAc injected daily over a long period of time caused enlargement of the spleen, lymph nodes, and liver. The monocyte-macrophage system of the liver, spleen, bone marrow, lymph nodes, adrenal glands, and lungs phagocytosed the injected PVAc, forming foam cells. The cellular storage of PVAc remained unchanged 3 months after treatment."

"Extracts of a commercial hair spray containing polyvinyl pyrrolidine (PVP)/polyvinyl acetate (PVAc) were dissolved in isotonic saline and injected s.c. in the scapular area of adult mice, rats, and guinea pigs (Gebbers et al., 1979); polymer concentrates were not stated. PVP and PVAc alone in saline were also injected s.c. in the scapular area of mice, rats, and guinea pigs. Control animals received injections of saline. The animals were killed 4, 10, or 30 days after injection and the injection site was biopsied; samples from the liver, spleen, and kidneys were obtained for electron microscopic evaluation. A strong s.c. foreign body reaction with granulomas was seen in the animals injected with hair spray extracts and with PVP/PVAc 4 and 10 days postinjection. No

reaction was noted at 30 days. The foreign body reaction consisted of many monocytes, large macrophagcs, multi-nucleated giant cells with periodic acid-Schiff (PAS)-positive inclusions, and many foam cells. Lamellar lysosomal inclusions were observed in the macro-phages and giant cells. The Kupffer's cells of the liver and macrophages of the spleen contained PAS-positive cytoplasmic inclusiuns 4 weeks after injection of hair spray extract and PVP/PVAc."

"When PVAc, 250 mg/kg, was administered orally for 12 months to rats and mice, fluctuations in weight, changes in blood composition, changes in liver-to-body weight ratios, and changes in cholinesterase and catalase activities were observed (IARC, 1979). No other details were given."

As taken from CIR (1996). Amended final safety assessment of polyvinyl acetate. Journal of the American College of Toxicology, 15, 166-176

*5.3. Reproduction toxicity*

"No studies have reported effects of PVAc on reproduction, leratology, or other developmental toxicity. However, data from pregnant rabbits (Miyasaki, 1975) indicate that PVAc was not transferred to the fetus in appreciable amounts, even when administered by the i.v. route, thus suggesting that no developmental effects could be produced by the usual dermal application of cosmetic ingredients." As taken from CIR (1996). Amended final safety assessment of polyvinyl acetate. Journal of the American College of Toxicology, 15, 166-176.

"Male rats were given 250 mg/kg unplasticized polyvinyl acetate (pvad) & pvad plasticized with 15% aq soln dibutylphthalate in food (dry residue equivalent to 125 mg/kg= 0.5% of diet) & paired with females at end of 11 mo. only male progeny revealed disturbances in orientation response."

As taken from HSDB, 2002

"A brief abstract reported a study where male rats received unplasticised polyvinyl acetate, dispersed in the feed (apparently at a concentration that gave a dose level of 125 mg/kg bw), probably for 11 months before mating with untreated females. Duration of pregnancy was not affected, and the pups showed no external defects or abnormalities in body weight or length. However the males (but not the females) were reported to have an altered "orientation response" (Shcherbak, 1977).

"A review cited that polyvinyl acetate is not transferred to foetuses in "appreciable amounts" following applications (not further specified, but including intravenous administration) in [presumably pregnant] rabbits. This was said to suggest that no developmental effects could be produced by the dermal application of cosmetics containing this ingredient. Polyvinyl acetate as used in cosmetic products was said to be an emulsion "containing 55-60% resin" (CIR, 1992).

Acetic acid ethenyl ester, homopolymer (CAS RN 9003-20-7) is suspected to be toxic for reproduction. The CAESAR developmental toxicity model in VEGA (Q)SAR platform predicts that the chemical is a toxicant (good reliability).

As taken from ECHA, 2016

The reliability and applicability of this QSAR prediction as standalone source of toxicological information is limited and inappropriate for some complex endpoints like reprotoxicity or carcinogenicity. Nevertheless, for the toxicological assessment of this ingredient, this result was still taken into consideration and used within the WoE approach as a supportive tool, in combination with other sources of information when available, like experimental data or appropriate read-across

*5.4. Mutagenicity*

“PVAc was tested for mutagenic potential in the Ames test using Salmonella Typhimurium strains TA92, TA1535, TA100, TA1537, TA94, and TA98, with metabolic activation (Ishidate et al., 1984). PVAc, 98.6% pure and dissolved in acetone, at a maximum dose of 5.0 mg/plate, was not mutagenic under the conditions of the study.”

“PVAc was also tested for mutagenic potential in the chromosomal aberration test using a Chinese hamster fibroblast cell line (Ishidate et al., 1984). No metabolic activation system was used. The test cells were exposed to three concentrations of the test substance; the maximum concentration was 200 mg/ml. Polyploid cells, as well as cells with chromosomal structural aberrations, were recorded. A result was considered positive if >10% aberrations were found, equivocal if 5.0 to 9.9% aberrations were detected, and negative if there were <4.9% aberrations. The negative controls, consisting of untreated and solvent-treated cells, contained <3.0% aberrations. The maximum incidence of polyploid cells in the treated groups was 2.0%; no chromosomal aberrations were observed at 24 and 48 h. PVAc was negative for mutagenicity under the conditions of the study.”

As taken from CIR (1996). Amended final safety assessment of polyvinyl acetate. Journal of the American College of Toxicology, 15, 166-176.

“Polyvinyl acetate was nonmutagenic in the Ames assay, with and without activation and in the Chinese hamster fibroblast cell assay. Several carcinogenic implantation studies using mice gave negative results”. As taken from CIR (1996). Amended final safety assessment of polyvinyl acetate. Journal of the American College of Toxicology, 15, 166-176

| **In vivo** | | | | |
|---|---|---|---|---|
| **Species** | **Test conditions** | **Endpoint** | **Result** | **Reference** |
| According to a short English abstract, a small group of workers involved in the production of polyvinyl acetate production had higher levels of chromosome damage (aberrations) in the white blood cells (lymphocytes) than workers not involved in production (Shirinian & Arutyunyan, 1980). It is not clear how closely matched the two groups were, or what other exposures the production workers had. Therefore, the results are not interpretable. However, it seems unlikely that a high-molecular weight polymer would have any significant genotoxicity potential. | | | | |

| **In vitro** | | | | | |
|---|---|---|---|---|---|
| **Test system** | **Test conditions** | **Endpoint** | **Activation** | **Result** | **References** |
| Chinese hamster lung fibroblast cells | Incubated for 48 hr at up to 200 mg/ml. Cells examined for chromosome aberrations and polyploidy. | Chromosome damage and changes in chromosome number | Without | -ve<br>Limited assay as not tested in the presence of metabolic activation. | Ishidate, 1987; Ishidate et al. 1984 |
| *Salmonella typhimurium*, strains TA92, TA94, TA98, TA100, TA1535, TA1537 (and possibly TA2637) | Ames assay. Tested up to 5 mg/plate. | Mutation | With and without S9 | -ve<br>Good quality study. | Ishidate et al. 1984 |
| +ve, positive; ve, negative; ?, equivocal; with, with metabolic activation; without, without metabolic activation | | | | | |
| | | | | | |

*5.5. Cytotoxicity*

No data available to us at this time.

*5.6. Carcinogenicity*

**Evidence for Carcinogenicity:**

"No data are available in humans. Inadequate evidence of carcinogenicity in animals. OVERALL EVALUATION: Group 3: The agent is not classifiable as to its carcinogenicity to humans. [IARC. Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man. Geneva: World Health Organization, International Agency for Research on Cancer, 1972-PRESENT. (Multivolume work). Available at: http://monographs.iarc.fr/index.php p. S7 70 (1987)] **QC REVIEWED**"

As taken from HSDB, 2002

"In a single inhalation study, 96 rats were exposed 6 h/day, 5 dayslweek, to vinyl acetate at a concentration of 8,750 mg/ml for 1 year and observed until death. There was no evidence that vinyl acetate influenced the incidence of neoplasms (Maltoni, 1976)."

"Vinyl chloride-vinyl acetate (VC/VA) polymer was tested for strain response differences to s.c. implantation of the polymer in 18 strains of mice (Brand et al., 1977). There was a 90 to 100% incidence of neoplasms in female mice of the CBA/H, CBA/H-T6, BALB/cJ, BALB/cWAT, 657BL/10ScSn strains, in males of the AKR/J strain, and in both sexes of the (C57BL/10ScSnxCBA/H)FI strain mice. All other strains had intermediate responses, with incidence of neoplasms in males lower than that in females, with the exception aP male AKR mice."

"VC/VA powder, equivalent to two films 15 x 22 x 0.2 mrn (as in the previous study), was injected s.c. in 30 male and 46 female 6-week-old CBA mice; the mice were observed until death (Brand et al., 1975). One female mouse developed a sarcoma possibly due to the clumping of the powder after administration. No other treatment-related neoplasms were observed. Clayssn (1962) concluded that the induction of local sarcomas after the sc, injection of a substance cannot be regarded as sufficient to state that the substance is a chemical carcinogen."

As taken from CIR (1996). Amended final safety assessment of polyvinyl acetate. Journal of the American College of Toxicology, 15, 166-176.

| Species | Test conditions | Evidence of carcinogenicity | Reference |
|---|---|---|---|
| Rat (100) and mouse (100) | Polyvinyl acetate powder was implanted [presumably subcutaneously], animals were examined [presumably regularly] for local tumours appearing within 16-20 months.<br><br>No further details provided in the citing source, but it was noted that these results were presented, without details, as a footnote to another study. | No local tumours within 16-20 months of implantation.<br><br>This early study is very limited. Modern carcinogenicity study guidelines recommend that groups of 50 animals/sex be exposed, at several dose levels, on 5-7 days/week, for 2 yr, followed by microscopic examination of a comprehensive range of tissues and organs. | Nothdurft, 1956 |
| One publication reported that polyvinyl actetate has demonstrated equivocal ("?") carcinogenic activity (Ishidate et al. 1988). No further details were given and no studies supporting this statement were identified. | | | |

Acetic acid ethenyl ester, homopolymer (CAS RN 9003-20-7) is a suspected carcinogen. The CAESAR Carcinogenicity model in VEGA (Q)SAR platform predicts that the chemical is a carcinogen (moderate reliability). As taken from ECHA, 2016

The reliability and applicability of this QSAR prediction as standalone source of toxicological information is limited and inappropriate for some complex endpoints like reprotoxicity or carcinogenicity. Nevertheless, for the toxicological assessment of this ingredient, this result was still

taken into consideration and used within the WoE approach as a supportive tool, in combination with other sources of information when available, like experimental data or appropriate read-across.

*5.7. Irritation/immunotoxicity*

“Polyvinyl acetate caused moderate inflammatory reaction when injected sc in rats and peaked at day 7 and minimal at day 42. Histological appearance of hamster cheek pouch was not significantly altered from topical application to pouche. [CARPENTER WM ET AL; ORAL SURG; ORAL MED ORAL PATHOL 42(4) 461 (1976)] **PEER REVIEWED** “

As taken from HSDB, 2002

“A dose of 0.1 ml of a solution of 1.25% PVAc in ethanol saline was injected s.c. into the shaved posterior dorsal skin of 24 adult albino rats to determine the irritation potential of the PVAc (Carpenter et al., 1976). Twelve negative vehicle controls and 24 positive controls (carrageenan) were included in the study program. Two rats from the negative control group and four rats from the positive control group and four from the test group were killed on days 3,7, 14, 21, 28, and 42. The injection sites were removed and preserved for microscopic examination. Tissue samples obtained from the test rats killed on day 3 had a moderate subacute inflammatory infiltrate of lymphocytes and plasma cells. Ulceration, accompanied by edema and tissue destruction, was frequently observed. Tissue samples from the rats killed on day 7 had retained PVAc surrounded by a severe inflammatory response. Ulceration, accompanied by abscesses and necrosis, was present in almost all the rats. In addition to lymphocytes and plasma cells, neutrophils were also present in abundance. The inflammatory response had reduced in severity by day 14, although many plasma cells and lymphocytes were still present. Many areas of granulation tissue were evident, as well as foci of necrosis with ulceration and an accompanying acute response. The tissue samples from the rats killed on day 21 had a moderate inflammatory response, with inflammatory cells and granulation tissue in abundance. By day 28, a minimal inflammatory response was evident, with cicatrization and early maturation of collagen fibrils. By day 42, inflammatory response was minimal, with the epithelium intact and cicatrization of the dermis. The PVAc response was similar to that of the positive control through day 14, at which time the PVAc response was much reduced compared to the positive control. PVAc was considered very irritating when injected s.c., with an initial response similar to that of the positive control except for granuloma formation, which did not occur in the PVAc-treated animals. The adverse irritation reactions to the i.v. injection of PVAc cited in this section are similar to that previously reported as a foreign body reaction by Gebbers et al. (1979) in their short-term toxicity i.v. studies of PVAc using mice, rats, and guinea pigs.”

“An occlusive skin irritation test (CTFA, 1994) was conducted using 54 female volunteers and an aqueous PVAc solution (50% concentration). Approximately 0.05 ml was placed on a patch test plaster that was applied to the intact forearm area for 24 h. On removal of the plaster, the skin response was immediately scored on a six-point scale: 0 (-), no reaction; 1 (+/-), faint or minimal erythema; 2(+), distinct erythema; 3(+ +), distinct erythema with infiltration, edema, or papules; 4 (+ + + ), edema or papules, with vesicles; and 5 ( + + + + ), crust or necrosis. All 54 subjects had no reaction.”

“A repeat insult patch test (CTFA, 1994) was conducted using 159 volunteers (26 males and 133 females; aged 16-65 years). Aqueous PVAc emulsions at 50% concentration were used for induction and challenge. Induction was done using 0.2 ml of the PVAc solution placed onto an occlusive patch and then applied to the back of each subject. Patches were left on for 24 h, removed for 24 h, and a new patch applied after examination of the induction site. This sequence was continued through nine applications and varied only by allowing 48 h between applications of the patch on weekends. Two weeks after the last patch was removed, a challenge patch was applied to a previously unexposed site. All challenge sites were evaluated at 24 and 72 h after application, and subjects were instructed to report any delayed skin reactivity occurring at a later

time. Thirteen subjects discontinued the study for reasons unrelated to the conduct of the study. Of the 146 subjects completing the study, none had any skin irritation or allergic contact sensitization at any time."

"No significant skin or eye irritation due to occupational exposure has been reported. Polyvinyl acetate at concentration of 50% in a cosmetic product showed no irritation reaction ain 54 female volunteers tested with occlusive patches and no irritation or allergic contact sensitisation in 146 volunteers in a repeat insult patch".

"No sensitization potential was observed in a repeat insult protocol, involving nine 24-hr applications (on alternate days) of a 50% aqueous solution to the skin of 159 volunteers, followed 2 weeks later by a similar challenge application".

As taken from CIR (1996). Amended final safety assessment of polyvinyl acetate. Journal of the American College of Toxicology, 15, 166-176.

Acetic acid ethenyl ester, homopolymer (CAS RN 9003-20-7) ois a suspected skin sensitizer. The CAESAR skin sensitization model in VEGA (Q)SAR platform predicts that the chemical is a sensitizer (good reliability).

As taken from ECHA, 2016

The reliability and applicability of this QSAR prediction as standalone source of toxicological information is limited and inappropriate for some complex endpoints like reprotoxicity or carcinogenicity. Nevertheless, for the toxicological assessment of this ingredient, this result was still taken into consideration and used within the WoE approach as a supportive tool, in combination with other sources of information when available, like experimental data or appropriate read-across.

### *5.8. All other relevant types of toxicity*

"Other in vitro test"

Sustained release capsules of nifedipine containing an initial rapidly available loading dose in a solid dispersion and sustained action polyvinyl acetate coated microparticles were prepared and evaluated for in vitro release and stability. The capsules provided release of the initial therapeutic dose in less than 45 min and sustained release for over 11-12 h. In addition, they were stable over 3.23 yr.

As taken from Ali A ; Sharma SN . Indian Drugs; VOL 33 ISS Jan 1996, P30-35.

## ***6. Functional effects on***

### *6.1. Broncho/pulmonary system*

"Chemical factors operating in the manufacture of vinyl acetate and its derivatives cause pathologic changes in the bronchopulmonary system reflected in ventilatory disturbances (overt or latent) with or without clinical manifestations of chronic bronchitis. The boundary zone of normality and latent or overt ventilatory disturbances, which represent different stages of changes in pulmonary function, were encountered more frequently than clinical manifestations of bronchitis in workers."

As taken from Amatuni VG et al., GIG TR PROF ZABOL; 0 (2). 1980. 14-16.

*6.2. Cardiovascular system*

“To assess blood compatibility of artificial materials, the blood of human donors was passed through columns containing various materials, including PVAc beads (Lindon et al., 1978). The PVAc was observed for signs of platelet retention and release of platelet constituents due to lysis. Platelet aggregation and adhesion to the PVAc resulted in retention of platelets in the test column. When various blood sample parameters of the donors were examined to assess the causes of donor-to-donor variability, it was reported that the amount of platelet retention by PVAc increased as the sedimentation rate increased. The use of birth control pills by female blood donors increased platelet retention by PVAc. PVAc did not adsorb serotonin from platelet-free plasma, and did not cause lysis of erythrocytes.”

As taken from CIR (1996). Amended final safety assessment of polyvinyl acetate. Journal of the American College of Toxicology, 15, 166-176

*6.3. Nervous system*

Abstracts cited in Toxline have reported nervous system, lung and liver enzyme effects in workers involved in polyvinyl acetate production. It is likely that the workers were exposed to a number of chemicals, including the monomer vinyl acetate. Further details of these publications could be provided if required.

*6.4. Other organ systems, dependent on the properties of the substance*

The PVAc injected daily over a long period of time caused enlargement of the spleen, lymph nodes, and liver. The monocyte-macrophage system of the liver, spleen, bone marrow, lymph nodes, adrenal glands, and lungs phagocytosed the injected PVAc, forming foam cells. The cellular storage of PVAc remained unchanged 3 months after treatment.”

As taken from CIR (1996). Amended final safety assessment of polyvinyl acetate. Journal of the American College of Toxicology, 15, 166-176.

## *7. Addiction*

JTI is not aware of any information that demonstrates that this ingredient has any addictive effect.

## *8. Burnt ingredient toxicity*

| Endpoint | Tested level (ppm) | Reference |
|---|---|---|
| | | |

| | | |
|---|---|---|
| Smoke chemistry | -<br>- | JTI Internal Report<br>Coggins (2013) |
| *In vitro* genotoxicity | -<br>- | JTI Internal Report<br>Coggins (2013) |
| *In vitro* cytotoxicity | - | Coggins (2013) |
| 90 days inhalation | - | Coggins (2013) |

In comparison with a CSC of a reference cigarette with sideseam adhesives/cigarette paper corresponding to representative specifications for the majority of commercial cigarettes no differences were observed either in the bacterial mutagenicity, cytotoxicity or mammalian cell genotoxicity of the smoke condensate prepared from cigarettes with sideseam adhesives/cigarette paper containing Polyvinyl acetate at 1.62 mg/cig. The smoke chemistry data between test and reference cigarette revealed small changes towards both higher and lower yields per cigarette over all analytical groups. These differences were well within the variability of the analytical methods (JTI NTM Study Report(s)).

“CONTEXT: Adhesives are used in several different manufacturing operations in the production of cigarettes. The use of new, "high-speed-manufacture" adhesives (e.g. vinyl acetate based) could affect the smoke chemistry and toxicology of cigarettes, compared with older "low-speed-manufacture" adhesives (e.g. starch based). OBJECTIVE: This study was conducted to determine whether the inclusion of different levels of three adhesives (ethylene vinyl acetate, polyvinyl acetate and starch) in experimental cigarettes results in different smoke chemistry and toxicological responses in in vitro and in vivo assays. MATERIALS AND METHODS: A battery of tests (analytical chemistry, in vitro and in vivo assays) was used to compare the chemistry and toxicology of smoke from experimental cigarettes made with different combinations of the three adhesives. Varying levels of the different side-seam adhesives, as well as the transfer of adhesives from packaging materials, were tested. RESULTS: There were differences in some mainstream cigarette smoke constituents as a function of the level of adhesive added to experimental cigarettes and between the tested adhesives. None of these differences translated into statistically significant differences in the in vitro or in vivo assays. CONCLUSION: The use of newer "high-speed-manufacture" vinyl acetate-based adhesives in cigarettes does not produce toxicological profiles that prevent the adhesives from replacing the older "low-speed-manufacture" adhesives (such as starch).” As taken from Coggins CR et al. 2013. Inhal. Toxicol. 25(Suppl. 2), 6-18. PubMed, 2014 available at http://www.ncbi.nlm.nih.gov/pubmed/24341843

***9. Heated/vapor emissions toxicity***

No data available to us at this time.

## *10. Ecotoxicity*

### *10.1. Environmental fate*

The Ecological Categorization Results from the Canadian Domestic Substances List simply state that acetic acid ethenyl ester, homopolymer (CAS RN 9003-20-7) is persistent in the environment.

Data accessed June 2017 on the OECD website: http://webnet.oecd.org/CCRWeb/Search.aspx

### *10.2. Aquatic toxicity*

The Ecological Categorization Results from the Canadian Domestic Substances List simply state that acetic acid ethenyl ester, homopolymer (CAS RN 9003-20-7) is not inherently toxic to aquatic organisms and give a pivotal value for inherent toxicity of 14 mg/l.

Data accessed June 2017 on the OECD website: http://webnet.oecd.org/CCRWeb/Search.aspx

### *10.3. Sediment toxicity*

No data available to us at this time.

### *10.4. Terrestrial toxicity*

No data available to us at this time.

### *10.5. All other relevant types of ecotoxicity*

The Ecological Categorization Results from the Canadian Domestic Substances List simply state that acetic acid ethenyl ester, homopolymer (CAS RN 9003-20-7) is not bioaccumulative in the environment.

Data accessed June 2017 on the OECD website: http://webnet.oecd.org/CCRWeb/Search.aspx

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### *12. Other information*

No data available to us at this time.

### *13. Last audited*

April 2018

# VINYL ACETATE, POLYVINYL ACETATE AND POLYVINYL ALCOHOL

**VOL.**: 19 (1979) (p. 341)

**Vinyl acetate**
**CAS No.**: 108-05-4
**Chem. Abstr. Name**: Acetic acid ethenyl ester

**Polyvinyl acetate**
**CAS No.**: 9003-20-7
**Chem. Abstr. Name**: Acetic acid ethenyl ester homopolymer

**Polyvinyl alcohol**
**CAS No.**: 9002-89-5
**Chem. Abstr. Name**: Ethenol homopolymer

## 5. Summary of Data Reported and Evaluation

### 5.1 Experimental data

In the only study available, vinyl acetate was tested in rats by inhalation exposure; it produced no evidence of carcinogenicity.

Vinyl acetate was non-mutagenic in the only test system used.

Subcutaneous or intraperitoneal implantation of polyvinyl acetate powder in mice and rats did not result in local sarcomas. Subcutaneous implantation of polyvinyl alcohol sponges in rats produced local sarcomas, whereas negative results were obtained with polyvinyl alcohol powder.

### 5.2 Human data

No case reports or epidemiological studies relating to the carcinogenicity of either vinyl acetate or polyvinyl acetate were available to the Working Group. One case of haemangiopericytoma was reported in a man exposed to polyvinyl alcohol.

The high levels of production of vinyl acetate, polyvinyl acetate and polyvinyl alcohol indicate that occupationally exposed groups could be identified for epidemiological investigation. The widespread use of polyvinyl acetate and polyvinyl alcohol in diverse applications indicates that the general population is also exposed.

### 5.3 Evaluation

No case reports or epidemiological studies concerning vinyl acetate were available to the Working Group. Animal studies involving implantation of polyvinyl acetate and

polyvinyl alcohol powder in rats did not result in local sarcomas, whereas in similar experiments with polyvinyl alcohol sponges, local sarcomas were produced. Both polyvinyl acetate and polyvinyl alcohol have substantial commercial applications. Further studies are required before an evaluation can be made of the carcinogenicity of these compounds.

**Subsequent evaluation**: Suppl. 7 (1987) (Polyvinyl acetate, p. 70: **Group 3**) (Polyvinyl alcohol, p. 70: **Group 3**); Vol. 63 (1995) (Vinyl acetate)

For definition of Groups, see Preamble Evaluation.

**Synonyms for Vinyl acetate**

- Acetic acid vinyl ester
- 1-Acetoxyethylene
- 2,4-Diisocyanatotoluene
- Vinyl A monomer
- VAc
- VyAc

**Synonyms for Polyvinyl acetate**

- Acetic acid vinyl ester polymers
- Asahisol 1527
- ASB 516
- AYAA
- AYAF
- AYJV
- Bakelite AYAA
- Bond CH 3
- Borden 2123
- Cemedine 196
- Cevian 380
- D 50
- D 50(polymer)
- DCA 70
- Duvilax
- Elvacet 81-900
- Emultex F
- En-Cor
- EP 1208
- Esnil P 18
- Everflex B
- Formvar 1285
- Gelva
- Gohensil E 50Y

- Kurare OM 100
- Lemac
- Meikatex 5000NG60
- Merckogel OR
- Merckogen 6000
- Mokotex D 2602
- Movinyl
- Movinyl 801
- Movinyl 50M
- Mowilith 30
- National 120-1207
- National Starch 1014
- NS 2842
- OM 100
- OR 1500
- P-170
- Pioloform F
- Plyamul 40-155
- Plyamul 40-350
- Polisol S-3
- Polyco 953
- Polyfox P 20
- Poly(vinylacetate)
- Protex
- PS 3h
- PVAE
- R 10688
- Resyn 25-1025
- Rhodopas
- RV 225-5B
- S-nyl-p 42
- Soloid
- Soviol
- SP 60
- SP 60 (ester)
- Toabond 2
- TS2
- Ucar 15
- UK 131
- V 501
- VA-0112
- Vinac ASB 10
- Vinalite D 50N
- Vinamul 9300
- Vinapol A 16
- Vinnapas B

- Vinyl acetate homopolymer
- Vinyl acetate polymer
- Vinyl acetate resin
- Vinylite AYAF
- Vinyl Products R 10688
- Winacet D

**Synonyms for Polyvinyl Alcohol**

- Poly(vinyl alcohol)
- PVA
- vinyl alcohol polymer
- Alcotex 88/05
- Alkotex
- Alvyl
- Aracet A-PV
- Cipoviol W 72
- Covol
- Elvanol
- EP 160
- Gelvatol
- GH 20
- GL 02
- GL 03
- GLO 5
- GM 14
- Gohsenol AH 22
- Kuralon VP
- Kurare Poval 120
- Lemol
- M 13/20
- Mowiol
- NH 18
- Polydesis
- Polysizer 173
- Polyvinol
- Polyviol
- Polyviol M 13/140
- Poval 117
- PVA 008
- PVS 4
- Resistoflex
- Rhodoviol
- Solvar
- Sumitex H 10
- Vibatex S

- Vinacol MH
- Vinalak
- Vinarol
- Vinavilol 2-98
- Vinnarol
- Vinol
- Vinylon Film 2000

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Last updated: 30 March 1998

# SAFETY DATA SHEET

Version 5.2
Revision Date 06/19/2017
Print Date 10/24/2017

## 1. PRODUCT AND COMPANY IDENTIFICATION

### 1.1 Product identifiers

| | | |
|---|---|---|
| Product name | : | Poly(vinyl acetate) |
| Product Number | : | 182508 |
| Brand | : | Sigma-Aldrich |
| CAS-No. | : | 9003-20-7 |

### 1.2 Relevant identified uses of the substance or mixture and uses advised against

| | | |
|---|---|---|
| Identified uses | : | Laboratory chemicals, Synthesis of substances |

### 1.3 Details of the supplier of the safety data sheet

| | | |
|---|---|---|
| Company | : | Sigma-Aldrich Canada Co.<br>2149 Winston Park Drive<br>OAKVILLE ON L6H 6J8<br>CANADA |
| Telephone | : | +1 9058299500 |
| Fax | : | +1 9058299292 |

### 1.4 Emergency telephone number

| | | |
|---|---|---|
| Emergency Phone # | : | +1-703-527-3887 (CHEMTREC) |

## 2. HAZARDS IDENTIFICATION

### 2.1 Classification of the substance or mixture

### 2.2 GHS Label elements, including precautionary statements

### 2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1 Substances

| | | |
|---|---|---|
| Formula | : | C4H6O2 |
| CAS-No. | : | 9003-20-7 |

No components need to be disclosed according to the applicable regulations.

## 4. FIRST AID MEASURES

### 4.1 Description of first aid measures

**If inhaled**
If breathed in, move person into fresh air. If not breathing, give artificial respiration.

**In case of skin contact**
Wash off with soap and plenty of water.

**In case of eye contact**
Flush eyes with water as a precaution.

**If swallowed**
Never give anything by mouth to an unconscious person. Rinse mouth with water.

**4.2 Most important symptoms and effects, both acute and delayed**
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

**4.3 Indication of any immediate medical attention and special treatment needed**
No data available

## 5. FIREFIGHTING MEASURES

**5.1 Extinguishing media**

**Suitable extinguishing media**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**5.2 Special hazards arising from the substance or mixture**
No data available

**5.3 Advice for firefighters**
Wear self-contained breathing apparatus for firefighting if necessary.

**5.4 Further information**
No data available

## 6. ACCIDENTAL RELEASE MEASURES

**6.1 Personal precautions, protective equipment and emergency procedures**
Avoid dust formation. Avoid breathing vapours, mist or gas.
For personal protection see section 8.

**6.2 Environmental precautions**
No special environmental precautions required.

**6.3 Methods and materials for containment and cleaning up**
Sweep up and shovel. Keep in suitable, closed containers for disposal.

**6.4 Reference to other sections**
For disposal see section 13.

## 7. HANDLING AND STORAGE

**7.1 Precautions for safe handling**
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

**7.2 Conditions for safe storage, including any incompatibilities**
Keep container tightly closed in a dry and well-ventilated place.

Recommended storage temperature 2 - 8 °C

**7.3 Specific end use(s)**
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**8.1 Control parameters**

**8.2 Exposure controls**

**Appropriate engineering controls**
General industrial hygiene practice.

**Personal protective equipment**

**Eye/face protection**
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin protection**
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Body Protection**
Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Respiratory protection**
Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Control of environmental exposure**
No special environmental precautions required.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

| | | |
|---|---|---|
| a) | Appearance | Form: solid |
| b) | Odour | No data available |
| c) | Odour Threshold | No data available |
| d) | pH | No data available |
| e) | Melting point/freezing point | No data available |
| f) | Initial boiling point and boiling range | No data available |
| g) | Flash point | No data available |
| h) | Evaporation rate | No data available |
| i) | Flammability (solid, gas) | No data available |
| j) | Upper/lower flammability or explosive limits | No data available |
| k) | Vapour pressure | No data available |
| l) | Vapour density | No data available |
| m) | Relative density | 1.191 g/cm3 |
| n) | Water solubility | No data available |

| | | |
|---|---|---|
| o) | Partition coefficient: n-octanol/water | No data available |
| p) | Auto-ignition temperature | 427 °C (801 °F) |
| q) | Decomposition temperature | No data available |
| r) | Viscosity | No data available |
| s) | Explosive properties | No data available |
| t) | Oxidizing properties | No data available |

**9.2 Other safety information**
No data available

## 10. STABILITY AND REACTIVITY

**10.1 Reactivity**
No data available

**10.2 Chemical stability**
Stable under recommended storage conditions.

**10.3 Possibility of hazardous reactions**
No data available

**10.4 Conditions to avoid**
No data available

**10.5 Incompatible materials**
Strong oxidizing agents, Strong bases

**10.6 Hazardous decomposition products**
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - No data available
In the event of fire: see section 5

## 11. TOXICOLOGICAL INFORMATION

**11.1 Information on toxicological effects**

**Acute toxicity**
No data available

Inhalation: No data available

Dermal: No data available

No data available

**Skin corrosion/irritation**
No data available

**Serious eye damage/eye irritation**
No data available

**Respiratory or skin sensitisation**
No data available

**Germ cell mutagenicity**
No data available

**Carcinogenicity**

IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (Acetic acid ethenyl ester, homopolymer)

**Reproductive toxicity**
No data available

No data available

**Specific target organ toxicity - single exposure**
No data available

**Specific target organ toxicity - repeated exposure**
No data available

**Aspiration hazard**
No data available

**Additional Information**
RTECS: Not available

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

## 12. ECOLOGICAL INFORMATION

### 12.1 Toxicity
No data available

### 12.2 Persistence and degradability
No data available

### 12.3 Bioaccumulative potential
No data available

### 12.4 Mobility in soil
No data available

### 12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

### 12.6 Other adverse effects

No data available

## 13. DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

**Product**
Offer surplus and non-recyclable solutions to a licensed disposal company.

**Contaminated packaging**
Dispose of as unused product.

## 14. TRANSPORT INFORMATION

**TDG (Canada)**
Not dangerous goods

**IMDG**
Not dangerous goods

**IATA**
Not dangerous goods

## 15. REGULATORY INFORMATION

This product has been classified in accordance with the hazard criteria of the Hazardous Products Regulations (HPR) and the SDS contains all the information required by the HPR.

## 16. OTHER INFORMATION

### Further information

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