

# Adi-pure® Adipic Acid

### HOOC(CH<sub>2</sub>)<sub>4</sub>COOH

### **Product Description**

Adi-*pure*<sup>®</sup> is a crystalline, white powder used to make a variety of polymer and nonpolymer products serving many end uses.

Adi-*pure*<sup>®</sup> Adipic Acid is **not** sold for use as a direct food ingredient.

### **Applications**

- Adhesives: urethane, polyester and polyamide
- Coatings: alkyd, urethane, gel coat, and polyester
- Nylon 6/6 fibers, engineering resins, films and monofilaments
- pH buffering in water soluble polymers and in flue gas desulfurization
- Ester plasticizers: monomeric and polymeric
- Synthetic ester lubricants and hydraulic fluids
- Textile treatments
- Urethane foams, elastomers and fibers
- Unsaturated polyester resins
- Wet strength paper resins: polyamideepichlorohydrin type
- Copolyamide adhesives, resins, films and binders
- Intermediate in the production of adiponitrile, cyclopentanone, dimethyl sebacate and adipic polyanhydride
- Personal care emollients

### **Specifications**

Assay, wt%, min.	99.7
Water, wt%, max.	0.20
Ash, ppm, max.	2.0
Iron, as Fe, ppm, max.	0.5
Methanol Solution Color (APHA), max.	4
Total Nitrogen (TN)	
mpm (moles per million moles), max.	15

### **General Information**

CAS Name         Hexanedioic acid           CAS Number         124-04-9           Formula         C <sub>6</sub> H <sub>10</sub> O <sub>4</sub> Other Names         1,4-Butanedicarboxylic acid           Molecular Weight         146.14           Melting Point, °C (°F)         152-153 (306-307)           Density, g/cc solid         1.360           liquid, 163°C (325°F)         1.093           Bulk Density, loose, lb/ft³         40-45           Melt Viscosity, cP         4.54           193°C (379°F)         2.64           Specific Heat         cal/g°C         kJ/kg°K           solid         0.38         1.59           liquid         0.54         2.26           Heats of         cal/g°C         kJ/kg°K           Formation         -1630         -6500           Fusion         57         239           Vaporization         134         560           Sublimation, 25°C (77°F)         211         882           Combustion         4580         19,200           Crystallization (water)         64         265           Solution (water)         64         265           Solution (sater)         -51         -214           90-100°C (50-	General 1	mormation
Formula         C₀H₁₀O₄           Other Names         1,4-Butanedicarboxylic acid           Molecular Weight         146.14           Melting Point, °C (°F)         152-153 (306-307)           Density, g/cc solid         1.360           liquid, 163°C (325°F)         1.093           Bulk Density, loose, lb/ft³         40-45           Melt Viscosity, cP         160°C (320°F)         4.54           193°C (379°F)         2.64           Specific Heat         cal/g°C         kJ/kg°K           solid         0.38         1.59           liquid         0.54         2.26           Heats of         cal/g         kJ/kg°K           Formation         -1630         -6500           Fusion         57         239           Vaporization         134         560           Sublimation, 25°C (77°F)         211         882           Combustion         4580         19,200           Crystallization (water)         64         265           Solution (water)         -51         -214           90-100°C (50-68°F)         -51         -214           90-100°C (194-212°F)         -58         -241           Nonhygroscopic at 27°C (81°F) and 85%	CAS Name	Hexanedioic acid
Formula         C₀H₁₀O₄           Other Names         1,4-Butanedicarboxylic acid           Molecular Weight         146.14           Melting Point, °C (°F)         152-153 (306-307)           Density, g/cc solid         1.360           liquid, 163°C (325°F)         1.093           Bulk Density, loose, lb/ft³         40-45           Melt Viscosity, cP         160°C (320°F)         4.54           193°C (379°F)         2.64           Specific Heat         cal/g°C         kJ/kg°K           solid         0.38         1.59           liquid         0.54         2.26           Heats of         cal/g         kJ/kg°K           Formation         -1630         -6500           Fusion         57         239           Vaporization         134         560           Sublimation, 25°C (77°F)         211         882           Combustion         4580         19,200           Crystallization (water)         64         265           Solution (water)         -51         -214           90-100°C (50-68°F)         -51         -214           90-100°C (194-212°F)         -58         -241           Nonhygroscopic at 27°C (81°F) and 85%	CAS Number	124-04-9
Other Names         1,4-Butanedicarboxylic acid           Molecular Weight         146.14           Melting Point, °C (°F)         152-153 (306-307)           Density, g/cc solid liquid, 163°C (325°F)         1.093           Bulk Density, loose, lb/ft³         40-45           Melt Viscosity, cP 160°C (320°F)         4.54           193°C (379°F)         2.64           Specific Heat solid 0.38 1.59         1.59           liquid 0.54 2.26         Last of cal/g kJ/kg           Formation -1630 -6500         -6500           Fusion 57 239         239           Vaporization 134 560         57 239           Vaporization 4580 19,200         19,200           Crystallization (water) 64 265         265           Solution (water) 10-20°C (50-68°F) -51 -214         -51 -214           90-100°C (194-212°F) -58 -241         -241           Nonhygroscopic at 27°C (81°F) and 85% relative humidity           Flash Point (TCC), °C (°F) 196 (385)           Crystal 107 -5 pKa1 4.43         4.23           K2 3.87 × 10-6 pKa2 5.41         4.43           K2 3.83 × 10-6 pKa2 5.41         4.43 <td></td> <td></td>		
Molecular Weight       146.14         Melting Point, °C (°F)       152-153 (306-307)         Density, g/cc solid liquid, 163°C (325°F)       1.093         Bulk Density, loose, lb/ft³       40-45         Melt Viscosity, cP 160°C (320°F)       4.54         193°C (379°F)       2.64         Specific Heat solid liquid       0.38 1.59         Specific Heat solid liquid       0.54 2.26         Heats of solid liquid       6.54 2.26         Heats of solid liquid       57 2.39         Vaporization solid liquid       57 2.39         Vaporization solid liquid       57 2.39         Vaporization solid liquid       134 560         Sublimation, 25°C (77°F) 211 882       82         Combustion solid liquid       4580 19,200         Crystallization (water) 64 265       50         Solution (water) 10-20°C (50-68°F) 51 -51 -214       -51 -214         90-100°C (194-212°F) 58 -241       -58 -241         Nonhygroscopic at 27°C (81°F) and 85% relative humidity         Flash Point (TCC), °C (°F) 196 (385)         Crystal Monoclinic needles         Ionization Constants, 25°C (77°F)         K1 3.71 × 10-5 pKa1 4.43         K2 3.87 × 10-6 pKa2 5.41         Acidity of aqueous solutions, 25°C (77°F)         wt% 0.	Other Names	
Melting Point, °C (°F)       152–153 (306–307)         Density, g/cc solid       1.360         liquid, 163°C (325°F)       1.093         Bulk Density, loose, lb/ft³       40–45         Melt Viscosity, cP       160°C (320°F)       4.54         193°C (379°F)       2.64         Specific Heat solid       0.38       1.59         Solid       0.54       2.26         Heats of cal/g kJ/kg       kJ/kg°K         Formation       -1630       -6500         Fusion       57       239         Vaporization       134       560         Sublimation, 25°C (77°F)       211       882         Combustion       4580       19,200         Crystallization (water)       64       265         Solution (water)       64       265         Solution (water)       -51       -214         90–100°C (50–68°F)       -51       -241         Nonhygroscopic at 27°C (81°F) and 85% relative humidity       Flash Point (TCC), °C (°F)       196 (385)         Crystal       Monoclinic needles         Ionization Constants, 25°C (77°F)       K1       3.71 × 10–5       pKa1       4.43         K2       3.87 × 10–6       pKa2		•
Density, g/cc         solid       1.360         liquid, 163°C (325°F)       1.093         Bulk Density, loose, lb/ft³       40–45         Melt Viscosity, cP       160°C (320°F)       4.54         193°C (379°F)       2.64         Specific Heat       cal/g°C       kJ/kg°K         solid       0.38       1.59         liquid       0.54       2.26         Heats of       cal/g       kJ/kg         Formation       -1630       -6500         Fusion       57       239         Vaporization       134       560         Sublimation, 25°C (77°F)       211       882         Combustion       4580       19,200         Crystallization (water)       64       265         Solution (water)       64       265         Solution (water)       -51       -214         90-100°C (50-68°F)       -51       -241         Nonhygroscopic at 27°C (81°F) and 85% relative humidity       Flash Point (TCC), °C (°F)       196 (385)         Crystal       Monoclinic needles         Ionization Constants, 25°C (77°F)       K1       3.71 × 10-5       pKa       4.43       4.43       4.43       4.43 <td< td=""><td></td><td></td></td<>		
Solid     1.360		,
Bulk Density, loose, lb/ft3		1.360
Melt Viscosity, cP       160°C (320°F)       4.54         193°C (379°F)       2.64         Specific Heat       cal/g°C       kJ/kg°K         solid       0.38       1.59         liquid       0.54       2.26         Heats of       cal/g       kJ/kg         Formation       -1630       -6500         Fusion       57       239         Vaporization       134       560         Sublimation, 25°C (77°F)       211       882         Combustion       4580       19,200         Crystallization (water)       64       265         Solution (water)       64       265         Solution (water)       -51       -214         90-100°C (50-68°F)       -51       -214         90-100°C (194-212°F)       -58       -241         Nonhygroscopic at 27°C (81°F) and 85% relative humidity         Flash Point (TCC), °C (°F)       196 (385)         Crystal       Monoclinic needles         Ionization Constants, 25°C (77°F)       K1       3.71 × 10-5       pKa1       4.43         K2       3.87 × 10-6       pKa2       5.41         Acidity of aqueous solutions, 25°C (77°F)       wt%       0.1       0.2	liquid, 163°C (325°F)	
Melt Viscosity, cP       160°C (320°F)       4.54         193°C (379°F)       2.64         Specific Heat solid       cal/g°C 0.38 1.59       kJ/kg°K 1.59         liquid       0.54 2.26       Lose         Heats of cal/g Formation       cal/g kJ/kg       kJ/kg         Formation       -1630 -6500       -6500         Fusion       57 239       239         Vaporization       134 560       560         Sublimation, 25°C (77°F) 211 882       882         Combustion       4580 19,200         Crystallization (water)       64 265         Solution (water)       57 -21       -214         90-100°C (50-68°F) -51 -214       -51 -214       -214         90-100°C (194-212°F) -58 -241       -241         Nonhygroscopic at 27°C (81°F) and 85% relative humidity       Flash Point (TCC), °C (°F)       196 (385)         Crystal       Monoclinic needles         Ionization Constants, 25°C (77°F)       K1 3.71 × 10-5 pKa1 4.43       4.43         K2 3.87 × 10-6 pKa2 5.41       4.43         Acidity of aqueous solutions, 25°C (77°F)       wt% 0.1 0.2 0.4 0.6 1.2 2.5         pH 3.2 3.1 3.0 2.9 2.8 2.7         Vapor Pressure       Temperature, °C (°F) mmHg       kPa         159.5 (319.1)	Bulk Density, loose, lb/ft <sup>3</sup>	40–45
160°C (320°F)	Melt Viscosity, cP	
Specific Heat         cal/g°C         kJ/kg°K           solid         0.38         1.59           liquid         0.54         2.26           Heats of         cal/g         kJ/kg           Formation         -1630         -6500           Fusion         57         239           Vaporization         134         560           Sublimation, 25°C (77°F)         211         882           Combustion         4580         19,200           Crystallization (water)         64         265           Solution (water)         64         265           Solution (water)         -51         -214           90-100°C (194-212°F)         -58         -241           Nonhygroscopic at 27°C (81°F) and 85% relative humidity           Flash Point (TCC), °C (°F)         196 (385)           Crystal         Monoclinic needles           Ionization Constants, 25°C (77°F)         K1         3.71 × 10-5         pKa1         4.43           K2         3.87 × 10-6         pKa2         5.41           Acidity of aqueous solutions, 25°C (77°F)         wt%         0.1         0.2         0.4         0.6         1.2         2.5           pH         3.2         3		4.54
Solid	193°C (379°F)	
Iiquid   0.54   2.26     Heats of   cal/g   kJ/kg     Formation   -1630   -6500     Fusion   57   239     Vaporization   134   560     Sublimation, 25°C (77°F)   211   882     Combustion   4580   19,200     Crystallization (water)   64   265     Solution (water)   10-20°C (50-68°F)   -51   -214     90-100°C (194-212°F)   -58   -241     Nonhygroscopic at 27°C (81°F) and 85% relative humidity     Flash Point (TCC), °C (°F)   196 (385)     Crystal   Monoclinic needles     Ionization Constants, 25°C (77°F)     K1   3.71 × 10-5   pKa1   4.43     K2   3.87 × 10-6   pKa2   5.41     Acidity of aqueous solutions, 25°C (77°F)     wt%   0.1   0.2   0.4   0.6   1.2   2.5     pH   3.2   3.1   3.0   2.9   2.8   2.7     Vapor Pressure   Temperature, °C (°F)   mmHg   kPa     159.5 (319.1)   1   0.13     205.5 (401.9)   10   1.3     240.5 (464.9)   40   5.3	Specific Heat	cal/g°C kJ/kg°K
Heats of Formation         cal/g         kJ/kg           Formation         -1630         -6500           Fusion         57         239           Vaporization         134         560           Sublimation, 25°C (77°F)         211         882           Combustion         4580         19,200           Crystallization (water)         64         265           Solution (water)         -51         -214           90-100°C (50-68°F)         -51         -214           90-100°C (194-212°F)         -58         -241           Nonhygroscopic at 27°C (81°F) and 85% relative humidity         Flash Point (TCC), °C (°F)         196 (385)           Crystal         Monoclinic needles           Ionization Constants, 25°C (77°F)         K1         3.71 × 10-5         pKa1         4.43           K2         3.87 × 10-6         pKa2         5.41           Acidity of aqueous solutions, 25°C (77°F)         wt%         0.1         0.2         0.4         0.6         1.2         2.5           pH         3.2         3.1         3.0         2.9         2.8         2.7           Vapor Pressure         Temperature, °C (°F)         mmHg         kPa           159.5 (401.9)		
Formation	liquid	
Fusion 57 239  Vaporization 134 560  Sublimation, 25°C (77°F) 211 882  Combustion 4580 19,200  Crystallization (water) 64 265  Solution (water) −51 −214  90−100°C (194−212°F) −58 −241  Nonhygroscopic at 27°C (81°F) and 85% relative humidity  Flash Point (TCC), °C (°F) 196 (385)  Crystal Monoclinic needles  Ionization Constants, 25°C (77°F)  K1 3.71 × 10−5 pKa1 4.43  K2 3.87 × 10−6 pKa2 5.41  Acidity of aqueous solutions, 25°C (77°F)  wt% 0.1 0.2 0.4 0.6 1.2 2.5  pH 3.2 3.1 3.0 2.9 2.8 2.7  Vapor Pressure  Temperature, °C (°F) mmHg kPa  159.5 (319.1) 1 0.13  205.5 (401.9) 10 1.3  240.5 (464.9) 40 5.3		
Vaporization       134       560         Sublimation, 25°C (77°F)       211       882         Combustion       4580       19,200         Crystallization (water)       64       265         Solution (water)       10–20°C (50–68°F)       −51       −214         90–100°C (194–212°F)       −58       −241         Nonhygroscopic at 27°C (81°F) and 85% relative humidity         Flash Point (TCC), °C (°F)       196 (385)         Crystal       Monoclinic needles         Ionization Constants, 25°C (77°F)       K1       3.71 × 10–5       pKa1       4.43         K2       3.87 × 10–6       pKa2       5.41         Acidity of aqueous solutions, 25°C (77°F)       wt%       0.1       0.2       0.4       0.6       1.2       2.5         pH       3.2       3.1       3.0       2.9       2.8       2.7         Vapor Pressure       Temperature, °C (°F)       mmHg       kPa         159.5 (319.1)       1       0.13         205.5 (401.9)       10       1.3         240.5 (464.9)       40       5.3		
Sublimation, 25°C (77°F)       211       882         Combustion       4580       19,200         Crystallization (water)       64       265         Solution (water)       10-20°C (50-68°F)       -51       -214         90-100°C (194-212°F)       -58       -241         Nonhygroscopic at 27°C (81°F) and 85% relative humidity         Flash Point (TCC), °C (°F)       196 (385)         Crystal       Monoclinic needles         Ionization Constants, 25°C (77°F)       K1       3.71 × 10-5       pKa1       4.43         K2       3.87 × 10-6       pKa2       5.41         Acidity of aqueous solutions, 25°C (77°F)       wt%       0.1       0.2       0.4       0.6       1.2       2.5         pH       3.2       3.1       3.0       2.9       2.8       2.7         Vapor Pressure       Temperature, °C (°F)       mmHg       kPa         159.5 (319.1)       1       0.13         205.5 (401.9)       10       1.3         240.5 (464.9)       40       5.3		
Combustion Crystallization (water)       4580       19,200         Crystallization (water)       64       265         Solution (water)       10−20°C (50−68°F)       −51       −214         90−100°C (194−212°F)       −58       −241         Nonhygroscopic at 27°C (81°F) and 85% relative humidity         Flash Point (TCC), °C (°F)       196 (385)         Crystal       Monoclinic needles         Ionization Constants, 25°C (77°F)       pKa1       4.43         K2       3.87 × 10−6       pKa2       5.41         Acidity of aqueous solutions, 25°C (77°F)       wt%       0.1       0.2       0.4       0.6       1.2       2.5         pH       3.2       3.1       3.0       2.9       2.8       2.7         Vapor Pressure       Temperature, °C (°F)       mmHg       kPa         159.5 (319.1)       1       0.13         205.5 (401.9)       10       1.3         240.5 (464.9)       40       5.3		
Crystallization (water)  10-20°C (50-68°F)	, , ,	
Solution (water)  10-20°C (50-68°F)		•
10-20°C (50-68°F)		64 265
90–100°C (194–212°F) −58 −241  Nonhygroscopic at 27°C (81°F) and 85% relative humidity  Flash Point (TCC), °C (°F) 196 (385)  Crystal Monoclinic needles  Ionization Constants, 25°C (77°F)  K1 3.71 × 10−5 pKa1 4.43  K2 3.87 × 10−6 pKa2 5.41  Acidity of aqueous solutions, 25°C (77°F)  wt% 0.1 0.2 0.4 0.6 1.2 2.5  pH 3.2 3.1 3.0 2.9 2.8 2.7  Vapor Pressure  Temperature, °C (°F) mmHg kPa  159.5 (319.1) 1 0.13  205.5 (401.9) 10 1.3  240.5 (464.9) 40 5.3		F1 214
Nonhygroscopic at 27°C (81°F) and 85% relative humidity Flash Point (TCC), °C (°F) 196 (385)  Crystal Monoclinic needles  Ionization Constants, 25°C (77°F)  K1 3.71 × 10−5 pKa1 4.43  K2 3.87 × 10−6 pKa2 5.41  Acidity of aqueous solutions, 25°C (77°F)  wt% 0.1 0.2 0.4 0.6 1.2 2.5  pH 3.2 3.1 3.0 2.9 2.8 2.7  Vapor Pressure  Temperature, °C (°F) mmHg kPa  159.5 (319.1) 1 0.13  205.5 (401.9) 10 1.3  240.5 (464.9) 40 5.3		
Flash Point (TCC), °C (°F) 196 (385)  Crystal Monoclinic needles  Ionization Constants, $25$ °C ( $77$ °F)  K1 $3.71 \times 10-5$ pKa1 4.43  K2 $3.87 \times 10-6$ pKa2 5.41  Acidity of aqueous solutions, $25$ °C ( $77$ °F)  wt% 0.1 0.2 0.4 0.6 1.2 2.5  pH 3.2 3.1 3.0 2.9 2.8 2.7  Vapor Pressure  Temperature, °C (°F) mmHg kPa  159.5 (319.1) 1 0.13  205.5 (401.9) 10 1.3  240.5 (464.9) 40 5.3		
Crystal         Monoclinic needles           Ionization Constants, 25°C (77°F)         K1         3.71 × 10–5 pKa1 4.43 K2 3.87 × 10–6 pKa2 5.41           Acidity of aqueous solutions, 25°C (77°F)         wt% 0.1 0.2 0.4 0.6 1.2 2.5 pH 3.2 3.1 3.0 2.9 2.8 2.7           Vapor Pressure         Temperature, °C (°F) mmHg kPa 159.5 (319.1) 1 0.13 205.5 (401.9) 10 1.3 240.5 (464.9) 40 5.3		•
Ionization Constants, 25°C (77°F)  K1		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		
K2 $3.87 \times 10-6$ pKa2 $5.41$ Acidity of aqueous solutions, $25^{\circ}$ C ( $77^{\circ}$ F)wt% $0.1$ $0.2$ $0.4$ $0.6$ $1.2$ $2.5$ pH $3.2$ $3.1$ $3.0$ $2.9$ $2.8$ $2.7$ Vapor PressureTemperature, °C (°F)mmHgkPa $159.5$ ( $319.1$ ) $1$ $0.13$ $205.5$ ( $401.9$ ) $10$ $1.3$ $240.5$ ( $464.9$ ) $40$ $5.3$		
Acidity of aqueous solutions, 25°C (77°F)  wt% 0.1 0.2 0.4 0.6 1.2 2.5  pH 3.2 3.1 3.0 2.9 2.8 2.7  Vapor Pressure  Temperature, °C (°F) mmHg kPa  159.5 (319.1) 1 0.13  205.5 (401.9) 10 1.3  240.5 (464.9) 40 5.3		•
wt%         0.1         0.2         0.4         0.6         1.2         2.5           pH         3.2         3.1         3.0         2.9         2.8         2.7           Vapor Pressure           Temperature, °C (°F)         mmHg         kPa           159.5 (319.1)         1         0.13           205.5 (401.9)         10         1.3           240.5 (464.9)         40         5.3		
pH 3.2 3.1 3.0 2.9 2.8 2.7  Vapor Pressure  Temperature, °C (°F) mmHg kPa 159.5 (319.1) 1 0.13 205.5 (401.9) 10 1.3 240.5 (464.9) 40 5.3		
Vapor Pressure         Temperature, °C (°F)         mmHg         kPa           159.5 (319.1)         1         0.13           205.5 (401.9)         10         1.3           240.5 (464.9)         40         5.3		
Temperature, °C (°F)     mmHg     kPa       159.5 (319.1)     1     0.13       205.5 (401.9)     10     1.3       240.5 (464.9)     40     5.3		3.0 2.3 2.0 2.7
159.5 (319.1) 1 0.13 205.5 (401.9) 10 1.3 240.5 (464.9) 40 5.3		°F) mmHg kPa
205.5 (401.9) 10 1.3 240.5 (464.9) 40 5.3		-
240.5 (464.9) 40 5.3		
		40 5.3
265.0 (509.0) 100 13.3	265.0 (509.0)	100 13.3
312.5 (594.5) 400 53.3		400 53.3
*337.5 (639.5)* 760 101	*337.5 (639.5)*	760 101

<sup>\*</sup> With decomposition

# **Shipping Information**

Bulk **Net Weight** 

Pressure Differential (PD) Trailer: 47,000 lb Elizabeth, NJ Shipping Points:

Carnegie, PA

Highlands, TX

### **Packages**

Bulk Bags: 2,000 lb

500, 900, 1,000 kg

Paper Bags: 50 lb

25 Kg

**Shipping Point:** Highlands, TX

Pointe Claire, Quebec, Canada Scarborough, Ontario, Canada

### **Pallet Dimensions/Weight**

L x W x H (in) Gross/Net (lb)

50 bags 48 x 42 x 60 2,580/2,500 **Bulk Bags** 38 x 40 x 47 2,090/2,000

If packages contain less than 5,000 lb, shipping description is not regulated by DOT/IMO. If package contains 5,000 lb or more:

### **Proper Shipping Name**

Environmentally Hazardous Substance, Solid,

N.O.S. (Adipic Acid)

**UN Number:** 3077 DOT Hazard Class: Freight Classification: Adipic Acid Packaging Group: Harmonized Schedule No.: 2917.12.10002

# **For Samples and Information:**

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