



MATERIAL SAFETY DATA SHEET

Glucose-6-Phosphate Dehydrogenase

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: Glucose-6-Phosphate Dehydrogenase

Product Number: 70-1201-01; 70-1201-60; GLPD-70-1201

Synonym(s): Glucose-6-phosphate dehydrogenase Ex. L. mesenteroides

Product Use: Enzyme reagent for laboratory use.

Description: Lyophilized powder containing enzyme (protein) and buffering salts.

Corporate Headquarters

Genzyme Corporation

500 Kendall Street
Cambridge, MA 02142
USA

Phone: 617-252-7500

Manufacturer/Distributor

Genzyme Diagnostics

50 Gibson Drive
Kings Hill, West Malling
Kent, ME19 4AF
UK

Phone: 44 (0) 1732 220022

Distributor

Genzyme Diagnostics

31 New York Avenue
Framingham, MA 01701-9322
USA

Phone: 800-332-1042

Emergency Telephone Numbers

Genzyme (U.S.): 617-562-4555

CHEMTREC (U.S.): 800-424-9300

CHEMTREC (Outside U.S.): 703-527-3887

2. HAZARDS IDENTIFICATION

Precautionary Statements:

CAUTION! The chemical, physical and toxicological properties of this preparation have not been thoroughly characterized. Avoid contact with eyes and skin. Do not ingest or inhale. Preparation appearance: white to off-white powder.

Routes of Exposure:

Occupational exposure routes may include eye contact, skin contact and inhalation.

Potential Health Effects:

Inhalation	No data available. Although there is no evidence that the enzyme(s) in this preparation induces specific respiratory hypersensitivity, all proteins are potential respiratory allergens and may result in respiratory sensitization in certain individuals after repeated and/or prolonged inhalation exposure, producing mild to severe symptoms similar to pollen allergy or asthma, including mucous membrane or eye irritation, itching of the skin or eyes, sneezing, nasal or sinus congestion, coughing, and tightness in the chest. These symptoms may develop as late as 12 hours after exposure.
Eye	No data available. Eye exposure may cause irritation, redness and itching.
Skin	No data available. Skin contact may cause irritation, dryness and redness.
Ingestion	No data available.
Chronic Effects	No data available. Repeated inhalation may result in respiratory sensitization.
Target Organs	Unknown.



MATERIAL SAFETY DATA SHEET

Glucose-6-Phosphate Dehydrogenase

Regulatory Status:

This preparation is classified as hazardous under U.S. OSHA 29 CFR 1910.1200; E.C. Directive 1999/45/EC; Canadian R.S. 1985, c. H-3; U.K. CHIP 2002 No. 1689; and/or U.N. GHS ST/SG/AC 10/30. Refer to Sec. 15, Regulatory Information, for details regarding hazard classification.

None of the components present in this preparation at concentrations equal to or greater than 0.1% are listed by IARC, NTP, OSHA or ACGIH as a carcinogen.

Potential Environmental Effects:

No data available.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Ingredient Name	CAS #	EC #	% (wt/wt)
Glucose-6-phosphate dehydrogenase EC R-Phrases: None	9001-40-5 EC Hazard Class: None	232-602-6	60 - 70
Disodium hydrogen phosphate, dodecahydrate EC R-Phrases: None	10039-32-4 EC Hazard Class: None	231-448-7	25 - 35
Citric acid EC R-Phrases: None	77-92-9 EC Hazard Class: None	201-069-1	1 - 5

NOTE - Glucose-6-phosphate dehydrogenase - Enzyme source: *Leuconostoc mesenteroides*, Enzyme Commission number: 1.1.1.49

4. FIRST AID MEASURES

Inhalation:

If inhaled, move from exposure area to fresh air. Seek medical attention if breathing becomes difficult or if cough or other symptoms develop.

Eye Contact:

Immediately flush eyes with plenty of tepid water for 15 minutes while separating eyelids with fingers. Remove contact lenses if worn. Obtain medical attention if needed or if symptoms, such as redness or irritation persist.

Skin Contact:

In case of contact, flush skin with cool water and remove contaminated clothing. Obtain medical attention if needed or if irritation or other symptoms develop.

Ingestion:

In case of ingestion, contact a poison control center or physician for instructions.

5. FIRE FIGHTING MEASURES

Flammable Properties:

Material may burn when exposed to sufficient heat.

Suitable Extinguishing Media:

Use extinguishing media suitable for surrounding fire, such as carbon dioxide, chemical foam, dry chemical or water spray.

Unsuitable Extinguishing Media:

Unknown.



MATERIAL SAFETY DATA SHEET

Glucose-6-Phosphate Dehydrogenase

Specific Hazards Arising from the Chemical:

Toxic gases may be generated by combustion, including carbon monoxide (CO), carbon dioxide (CO₂) and phosphorus oxides (PO_x).

Standard Protective Equipment and Precautions for Firefighters:

Firefighters should wear NIOSH-approved or equivalent Self-Contained Breathing Apparatus and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions:

Avoid physical contact with material and avoid generating or inhaling dust. Ensure adequate ventilation. Wear Personal Protective Equipment (PPE) as indicated in Section 8. Wash hands thoroughly after handling.

Environmental Precautions:

No information available.

Methods and Materials for Containment and Clean-Up:

Do not dry sweep powder. Use HEPA-filtered vacuum, if available, otherwise wet mop to clean up a powder spill. Decontaminate the spill site following standard procedures. Dispose of materials in accordance with all applicable federal, state, local and provincial environmental regulations, per Section 13.

7. HANDLING AND STORAGE

Handling:

Follow good laboratory hygiene practices. See Section 8, Engineering Controls. Minimize contact and contamination of personal clothing and skin. Wash hands thoroughly after handling.

Storage:

Store desiccated at -20°C (-4°F). Do not store with incompatible substances; see Section 10.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines:

There are no ACGIH, NIOSH, OSHA or country-specific occupational exposure limits currently established for components present in this preparation at concentrations equal to or greater than 1% (0.1% if carcinogen).

Engineering Controls:

Use in well ventilated areas. If handling large quantities or there is a potential for dust or aerosol generation, use local exhaust ventilation. Facilities storing or using this preparation should be equipped with an eyewash fountain.

Personal Protective Equipment (PPE):

Respiratory	A respirator is not required under normal conditions of use.
Eye/Face	Wear appropriate protective chemical safety glasses.
Skin	Wear lab coat or other protective garments. Remove contaminated clothing promptly.
Gloves	Wear chemical resistant protective gloves.
General	Follow company-specific safety procedures.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	White to off-white powder	pH:	Not applicable
Odor:	Not available	Solubility:	Water-soluble
Boiling Point:	Not applicable	Evaporation Rate:	Not applicable



MATERIAL SAFETY DATA SHEET

Glucose-6-Phosphate Dehydrogenase

Melting Point:	Not available	Density:	Not available
Freezing Point:	Not applicable	Vapor Pressure:	Not available
		Partition Coefficient (n-octanol/water):	Not available
Flammability/Explosivity Limits in Air, Lower:	Not applicable		
Flammability/Explosivity Limits in Air, Upper:	Not applicable		
Auto-Ignition Temperature:	Not available		
Flash Point:	Not applicable		

10. STABILITY AND REACTIVITY

Chemical Stability:

Stable under ordinary conditions of use and storage. See Section 7.

Conditions to Avoid:

Unknown.

Incompatible Materials:

Unknown.

Hazardous Decomposition Products:

Thermal decomposition may lead to release of irritating gases and vapors.

Possibility of Hazardous Reactions:

Hazardous polymerization will not occur.

11. TOXICOLOGICAL INFORMATION

Acute Effects:**Toxicology Data - Selected LD50s and LC50s**

Citric acid	77-92-9	Oral LD50 Rat: 3000 mg/kg
Disodium hydrogen phosphate, dodecahydrate	10039-32-4	Oral LD50 Rat: 17 gm/kg

Local Effects:

No data available.

Chronic Effects:

No data available.

Carcinogenicity:

No data available.

Mutagenicity:

No data available.

Teratogenicity:

No data available.

Reproductive Effects:

No data available.

Sensitization:

No data available.

12. ECOLOGICAL INFORMATION



MATERIAL SAFETY DATA SHEET

Glucose-6-Phosphate Dehydrogenase

Ecotoxicity:

Ecotoxicity - Freshwater Fish Species Data

Citric acid	77-92-9	96 Hr LC50 <i>Lepomis macrochirus</i> : 1516 mg/L [static]; 96 Hr LC50 <i>Leuciscus idus</i> : 440 mg/L [static]
-------------	---------	--

Ecotoxicity - Microtox Data

Citric acid	77-92-9	15 min EC50 <i>Photobacterium phosphoreum</i> : 14 mg/L
-------------	---------	---

Ecotoxicity - Water Flea Data

Citric acid	77-92-9	72 Hr EC50 <i>Daphnia magna</i> : 120 mg/L
-------------	---------	--

Persistence and Degradability:

No data available.

Bioaccumulative Potential:

No data available.

Mobility in Environmental Media:

No data available.

13. DISPOSAL CONSIDERATIONS

Methods of Disposal:

Dispose of unused product, spilled material and waste in accordance with all applicable federal, state, local and provincial environmental and hazardous waste regulations.

14. TRANSPORT INFORMATION

Basic Shipping Description:

Not classified as dangerous goods. Not regulated per IATA and DOT regulations.

15. REGULATORY INFORMATION

US Federal Regulations:

Inventory - United States - Section 8(b) Inventory (TSCA)

Citric acid	77-92-9	Present
Disodium hydrogen phosphate, dodecahydrate	10039-32-4	XU
Glucose-6-phosphate dehydrogenase	9001-40-5	XU

U.S. - CERCLA/SARA - Hazardous Substances and their Reportable Quantities

Disodium hydrogen phosphate, dodecahydrate	10039-32-4	5000 lb final RQ (listed under Sulfuric acid dithallium (1+) salt); 2270 kg final RQ (listed under Sulfuric acid dithallium (1+) salt)
--	------------	---

US State Regulations:

U.S. - California - 8 CCR Section 339 - Director's List of Hazardous Substances

Disodium hydrogen phosphate, dodecahydrate	10039-32-4	Present (listed under Sodium phosphate, dibasic)
--	------------	--



MATERIAL SAFETY DATA SHEET

Glucose-6-Phosphate Dehydrogenase

International Regulations:

Canada - WHMIS - Classifications of Substances

Citric acid	77-92-9	E (including 40%)
Disodium hydrogen phosphate, dodecahydrate	10039-32-4	Uncontrolled product according to WHMIS classification criteria

Canada - WHMIS - Ingredient Disclosure List

Citric acid	77-92-9	1 %
-------------	---------	-----

Germany - Water Classification (VwVwS) - Annex 2 - Water Hazard Classes

Citric acid	77-92-9	ID Number 57, hazard class 1 - low hazard to waters
Disodium hydrogen phosphate, dodecahydrate	10039-32-4	1

Inventory - Australia - Inventory of Chemical Substances (AICS)

Citric acid	77-92-9	Present
Disodium hydrogen phosphate, dodecahydrate	10039-32-4	Present
Glucose-6-phosphate dehydrogenase	9001-40-5	Present

Inventory - Canada - Domestic Substances List (DSL)

Citric acid	77-92-9	Present
Disodium hydrogen phosphate, dodecahydrate	10039-32-4	H3O4P.2Na

Inventory - Canada - Organisms on the Domestic Substances List (DSL)

Glucose-6-phosphate dehydrogenase	9001-40-5	IUB #1.1.1.49
-----------------------------------	-----------	---------------

Inventory - China

Citric acid	77-92-9	Present
Disodium hydrogen phosphate, dodecahydrate	10039-32-4	Present
Glucose-6-phosphate dehydrogenase	9001-40-5	Present

Inventory - European Union - European Inventory of Existing Commercial Chemical Substances (EINECS)

Citric acid	77-92-9	201-069-1
Disodium hydrogen phosphate, dodecahydrate	10039-32-4	231-448-7; H3O4P.2Na
Glucose-6-phosphate dehydrogenase	9001-40-5	232-602-6

Inventory - Japan Existing and New Chemical Substances (ENCS)

Citric acid	77-92-9	2-1318
Disodium hydrogen phosphate, dodecahydrate	10039-32-4	1-497

Inventory - Korea - Existing and Evaluated Chemical Substances

Citric acid	77-92-9	KE-20831
Disodium hydrogen phosphate, dodecahydrate	10039-32-4	KE-12344
Glucose-6-phosphate dehydrogenase	9001-40-5	KE-09578

Canadian Hazardous Products:

WHMIS Status	Non-controlled
--------------	----------------

European Communities Dangerous Substances/Preparations:

EC Hazard Class None

Risk Phrases None

Safety Phrases None

16. OTHER INFORMATION

Further Information:

This MSDS has been prepared in accordance with the ANSI Z400.1 format. Every effort has been made to adhere to the hazard criteria and content requirements of the U.S. OSHA Hazard Communication Standard, Canadian Controlled Products Regulation (CPR), UK Chemical Hazard Information and Packaging Regulations, European Communities REACH Regulation, and UN Globally Harmonized System of Classification and Labelling of Chemicals.



MATERIAL SAFETY DATA SHEET

Glucose-6-Phosphate Dehydrogenase

MSDS Origination Date: May 31, 2006

Version #: 3

Revision Date: October 30, 2008

Disclaimer:

The information above is provided in good faith. It is believed to be accurate and represents the best information currently available to us. HOWEVER, WE MAKE NO WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OF ANY OTHER TYPE, EXPRESSED OR IMPLIED, WITH RESPECT TO PRODUCTS DESCRIBED OR DATA OR INFORMATION PROVIDED, AND WE ASSUME NO LIABILITY RESULTING FROM THE USE OF SUCH PRODUCTS, DATA OR INFORMATION. Users should make their own investigations to determine the suitability of the information for their particular purposes, and the user assumes all risk arising from their use of the material. The user is required to comply with all laws and regulations relating to the purchase, use, storage and disposal of the material, and must be familiar with and follow generally accepted safe handling procedures. In no event shall Genzyme be liable for any claims, losses, or damages of any individual or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Genzyme has been advised of the possibility of such damages.