MATERIAL SAFETY DATA SHEET

Glucose-6-Phosphate Dehydrogenase

Section 1: Product and Company Identification

Material name	**Glucose-6-Phosphate Dehydrogenase**
Synonyms	Glucose-6-phosphate dehydrogenase Ex. L. mesenteroides
Product No.	70-1201-01; 70-1201-60; GLPD-70-1201
Product description	Lyophilized powder containing enzyme (protein) and buffering salts.
Product use	Enzyme reagent for laboratory use.

Emergency Telephone Numbers
Americas: +1-760-476-3962
Europe, Middle East
& Africa: +1-760-476-3961
Asia Pacific: +1-760-476-3960
Access code: 333512

Manufacturer/Distributor
Sekisui Diagnostics (UK) Ltd
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Kings Hill, West Malling
Kent ME19 4AF UK
Phone: 44 (0) 1732 220022

Corporate Headquarters/Distributor
Sekisui Diagnostics LLC
31 New York Avenue
Framingham, MA 01701
USA
Phone: 508-661-1835

Section 2: Hazards Identification

OSHA 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.

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.

Potential health effects:

Routes of exposure	Occupational exposure routes may include eye contact, skin contact and inhalation.
Eyes	No data available. Eye exposure may cause irritation, redness and itching.
Skin	No data available. Skin contact may cause irritation, dryness and redness.
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.
Ingestion	No data available.
Chronic effects	No data available. Repeated inhalation may result in respiratory sensitization.
Target organs	Unknown.

Potential environmental effects No data available.

Section 3: Composition / Information on Ingredients

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

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

Section 4: First Aid Measures

First aid procedures:

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.
Inhalation	If inhaled, move from exposure area to fresh air. Seek medical attention if breathing becomes difficult or if cough or other symptoms develop.
Ingestion	In case of ingestion, contact a poison control center or physician for instructions.

Section 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.
Specific hazards arising from the chemical	Toxic gases may be generated by combustion, including. carbon monoxide (CO), carbon dioxide (CO_2) and phosphorus oxides (POx).
Standard protective equipment and precautions for firefighters	Firefighters should wear NIOSH-approved or equivalent Self-Contained Breathing Apparatus and full protective gear.

Section 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.

Section 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.

Section 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:

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

Section 9: Physical and Chemical Properties

Appearance	White to off-white powder
Odor	Not available
pH	Not applicable
Melting point/Freezing point	Not available / Not applicable
Boiling point	Not applicable
Flash point	Not available
Evaporation rate	Not applicable
Flammability/explosivity limits in air, upper	Not applicable
Flammability/explosivity limits in air, lower	Not applicable
Vapor pressure	Not available
Density	Not available
Solubility	Water-soluble
Partition coefficient (n-octanol/water)	Not available
Auto-ignition temperature	Not applicable

Section 10: Chemical Stability and Reactivity Information

Possibility of hazardous reactions	Hazardous polymerization will not occur.
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.

Section 11: Toxicological Information

Acute effects:

Toxicological 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.
Sensitization	No data available.
Carcinogenicity	No data available.
Mutagenicity	No data available.
Reproductive effects	No data available.
Teratogenicity	No data available.

Section 12: Ecological Information

Ecotoxicity:

Ecotoxicity - Freshwater Fish Species Data

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

Ecotoxicity - Microtox Data

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

Ecotoxicity - Water Flea Data

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

Persistence and degradability	No data available.
Bioaccumulation potential	No data available.
Mobility in environmental media	No data available.

Section 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.

Section 14: Transport Information

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

Section 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

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)

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	

Section 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.

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