GENERAL

MANUFACTURER/SUPPLIER: LTS RESEARCH LABORATORIES, INC.

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DATE MSDS PREPARED: 02/03/00
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1. PRODUCT IDENTIFICATION

PRODUCT NAME: ZINC OXIDE-PHOSPHORUS OXIDE
CHEMICAL NATURE: METAL OXIDE
FORMULA: ZnO (P DOPED)
CAS #: 1314-13-2/1314-56-3

2. PHYSICAL AND CHEMICAL CHARACTERISTICS

BOILING POINT: N/A
MELTING POINT: N/A
MOLECULAR WEIGHT: N/A
VAPOR DENSITY: N/A
VAPOR PRESSURE: N/A
SPECIFIC GRAVITY: N/A
% VOLATILES: N/A
SOLUBILITY IN H2O: INSOLUBLE
APPEARANCE AND ODOR: WHITE POWDER, ODORLESS

3. HAZARD IDENTIFICATION

HAZARDS DESCRIPTION:
ZINC OXIDE: N DANGEROUS FOR THE ENVIRONMENT
PHOSPHORUS OXIDE: C CORROSIVE
HMIS RATING:
ZINC OXIDE:
  HEALTH: 2
  FLAMMABILITY: 0
  REACTIVITY: 0
PHOSPHORUS OXIDE:
  HEALTH: 3
  FLAMMABILITY: 0
  REACTIVITY: 3

4. FIRE FIGHTING MEASURES

FLASH POINT: N/A
AUTOIGNITION TEMPERATURE: N/A
FLAMMABLE LIMITS:
  UPPER: N/A
  LOWER: N/A
EXTINGUISHING MEDIA: SPECIAL POWDER FOR METAL FIRES. DO NOT USE WATER.
SPECIAL FIRE FIGHTING
PROCEDURES: FIREFIGHTERS MUST WEAR FULL FACE, SELF-CONTAINED BREATHING APPARATUS WITH FULL PROTECTIVE CLOTHING TO PREVENT CONTACT WITH SKIN AND EYES. ISOLATE RUNOFF TO PREVENT ENVIRONMENTAL POLLUTION.

UNUSUAL FIRE AND EXPLOSION HAZARDS: WHEN HEATED TO DECOMPOSITION ZINC OXIDE MAY EMIT TOXIC FUMES OF ZnO. PHOSPHORUS OXIDE IS NON-COMBUSTIBLE BUT CAN CAUSE HIGH LOCAL TEMPERATURES WHEN IN CONTACT WITH WATER, GENERATING ENOUGH HEAT TO IGNITE OTHER MATERIALS.

5. HEALTH HAZARD INFORMATION

ACUTE EFFECTS:
- INHALATION: MAY CAUSE DAMAGE TO THE RESPIRATORY TRACT, NASOPHARYNGITIS AND LARYNGITIS.
- INGESTION: MAY BE CORROSIVE
- SKIN: IRRITANT, PHOSPHORUS OXIDE HAS A STRONG CORROSIVE EFFECT ON SKIN AND MUCOUS MEMBRANES. AVOID CONTACT WITH SKIN AND HANDLE WITH CARE
- EYE: IRRITANT, PHOSPHORUS OXIDE HAS A STRONG CORROSIVE EFFECT

CHRONIC EFFECTS:
- ZINC COMPOUNDS HAVE VARIABLE LOW TOXICITY. ZINC IS NOT INHERENTLY A TOXIC ELEMENT. HOWEVER, WHEN HEATED IT EVOLVES A FUME OF ZINC OXIDE WHICH MAY CAUSE METAL FUME FEVER. EFFECTS INCLUDE DRY THROAT, METALLIC TASTE, CHEST PAIN, DYSPNEA, RALES, AND DRY COUGH. CHILLS MAY OCCUR WITH LASSITUDE, MALAISE, FATIGUE, HEADACHE, BACK PAIN, MUSCLE CRAMPS, BLURRED VISION, NAUSEA, FEVER, PERSPIRATION, VOMITING, AND LEUKOCYTOSIS.
- CORROSIVE MATERIALS ARE ACUTELY DESTRUCTIVE TO THE RESPIRATORY TRACT, EYES, SKIN AND DIGESTIVE TRACT. EYE CONTACT MAY RESULT IN PERMANENT DAMAGE AND COMPLETE VISION LOSS. INHALATION MAY RESULT IN RESPIRATORY EFFECTS SUCH AS INFLAMMATION, EDEMA, AND CHEMICAL PNEUMONITIS. MAY CAUSE COUGHING, WHEEZING, LARYNGITIS, SHORTNESS OF BREATH, HEADACHE, NAUSEA, AND VOMITING. INGESTION MAY CAUSE DAMAGE TO THE MOUTH, THROAT AND ESOPHAGUS. MAY CAUSE SKIN BURNS OR IRRITATION DEPENDING ON THE SEVERITY OF THE EXPOSURE. CHRONIC INGESTION OR INHALATION OF PHOSPHORUS OXIDE MAY RESULT IN SYSTEMIC PHOSPHORUS POISONING. LIVER DAMAGE, KIDNEY DAMAGE, JAW/TOOTH ABNORMALITIES, BLOOD DISORDERS, AND CARDIOVASCULAR EFFECTS CAN RESULT.

6. STABILITY

STABILITY: STABLE
- CONDITION TO AVOID: MOISTURE
- MATERIAL TO AVOID: ALUMINUM, HEXACHLOROETHANE, CHLORINATED RUBBER, LINSEED OIL, MAGNESIUM, WATER, OXIDIZING AGENTS
- HAZARDOUS DECOMPOSITION PRODUCTS: ZINC OXIDE, PHOSPHORUS OXIDE

7. EMERGENCY AND FIRST AID PROCEDURES:
INHALATION: REMOVE TO FRESH AIR; KEEP WARM AND QUIET; GIVE OXYGEN IF BREATHING IS DIFFICULT AND SEEK MEDICAL ATTENTION.

INGESTION: SEEK IMMEDIATE MEDICAL ATTENTION.

SKIN: REMOVE CONTAMINATED CLOTHING, BRUSH MATERIAL OFF SKIN, WASH AFFECTED AREA WITH MILD SOAP AND WATER SEEK MEDICAL ATTENTION.

EYE: RINSE EYE FOR SEVERAL MINUTES UNDER RUNNING WATER. SEEK MEDICAL ATTENTION.

8. HANDLING AND STORAGE

HANDLING AND STORAGE STORE IN COOL, DRY PLACE IN TIGHTLY SEALED CONTAINERS. KEEP AWAY FROM WATER AND FLAMMABLE MATERIALS.

OTHER PRECAUTIONS: NORMAL LAB COAT.

9. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: WEAR APPROPRIATE RESPIRATORY AND PROTECTIVE EQUIPMENT. ISOLATE SPILLED AREA AND PROVIDE VENTILATION. VACUUM UP SPILL AREA WITH HIGH EFFICIENCY PARTICULATE ABSOLUTE AIR FILTER AND PROVIDE VENTILATION TAKE CARE NOT RAISE DUST.

WASTE DISPOSAL METHOD: IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS.

SPECIAL PROTECTION INFORMATION:

RESPIRATORY PROTECTION: NIOSH/MSHA APPROVED DUSR RESPIRATOR.
VENTILATION: LOCAL EXHAUST VENTILATION MAY BE NECESSARY TO CONTROL ANY AIR CONTAMINANTS TO WITHIN THEIR PELs OR TLVs DURING THE USE OF THIS PRODUCT. GOOD GENERAL EXHAUST IS RECOMMENDED.

PROTECTIVE GLOVES: RUBBER GLOVES
EYE PROTECTION: SAFETY GLASSES

OTHER PROTECTIVE EQUIPMENT OR CLOTHING: PROTECTIVE GEAR SUITABLE TO PREVENT CONTAMINATION.

10. TOXICITY DATA

LD/LC50 VALUES:

ZINC OXIDE:
ORAL (LD50) 7950 MG/KG (MOUSE)
ORAL (LDLO) >8437 MG/KG (RAT)
INHALATION (LC50) 500 MG/M3 (MOUSE)
IRRITATION OF SKIN 2500 MG/24H (RABBIT)
IRRITATION OF EYES 500 MG/24H (RABBIT)

PHOSPHORUS OXIDE:
INHALATION (LC50) 1217 MG/M3 (RAT)

CARCINOGENICITY: NO CLASSIFICATION DATA FOR THE CARCINOGENICITY OF THIS MATERIAL IS AVAILABLE

ADDITIONAL INFORMATION: TO THE BEST OF OUR KNOWLEDGE THE ACUTE AND CHRONIC TOXICITY OF THIS MATERIAL IS NOT FULLY KNOWN.

11. TRANSPORTATION DATA

DOT REGULATIONS: NOT A HAZARDOUS MATERIAL FOR TRANSPORTATION
HAZARD CLASS: N/A
ADR/RID CLASS: N/A
IMDG CLASS: N/A
AIR TRAN. ICAO/IATA CLASS: N/A
MARITIME TRAN. IMDG CLASS: N/A

12. REGULATIONS

HAZARD SYMBOLS:
- ZINC OXIDE: N DANGEROUS FOR THE ENVIRONMENT
- PHOSPHORUS OXIDE: C CORROSIVE

RISK PHRASES:
- ZINC OXIDE: 50/53 VERY TOXIC THE AQUATIC ORGANISMS, MAY CAUSE LONG-TERM ADVERSE EFFECTS IN THE AQUATIC ENVIRONMENT
- PHOSPHORUS OXIDE: 35 CAUSES SEVERE BURNS

SAFETY PHRASES:
- ZINC OXIDE: 60 THIS MATERIAL AND ITS CONTAINER MUST BE DISPOSED OF AS HAZARDOUS WASTE
- 61 AVOID RELEASE TO THE ENVIRONMENT.
- PHOSPHORUS OXIDE: 22 DO NOT BREATHE DUST
- 26 IN CASE OF CONTACT WITH EYES, RINSE IMMEDIATELY WITH PLENTY OF WATER
- 45 IN CASE OF ACCIDENT OR IF YOU FEEL UNWELL, SEEK MEDICAL ADVICE IMMEDIATELY

NATIONAL REGULATIONS: ALL COMPONENTS OF THIS PRODUCT ARE LISTED IN THE U.S. ENVIRONMENTAL PROTECTION AGENCY TOXIC SUBSTANCES CONTROL ACT CHEMICAL SUBSTANCE INVENTORY.

13. OTHER INFORMATION

THIS SAFETY DATA SHEET SHOULD BE USED IN CONJUNCTION WITH TECHNICAL SHEETS. IT DOES NOT REPLACE THEM. THE INFORMATION GIVEN IS BASED ON OUR KNOWLEDGE OF THIS PRODUCT, AT THE TIME OF PUBLICATION, IT IS GIVEN IN GOOD FAITH. THE ATTENTION OF THE USER IS DRAWN TO THE POSSIBLE RISKS INCURRED BY USING THE PRODUCT FOR ANY OTHER PURPOSE OTHER THAN THAT FOR WHICH IT WAS INTENDED. THIS DOES NOT IN ANY WAY EXCUSE THE USER FROM KNOWING AND APPLYING ALL THE REGULATIONS GOVERNING HIS ACTIVITY. IT IS THE SOLE RESPONSIBILITY OF THE USER TO TAKE ALL PRECAUTIONS REQUIRED IN HANDLING THE PRODUCT. THE AIM OF THE MANDATORY REGULATIONS MENTIONED IS TO HELP THE USER TO FULFILL HIS OBLIGATIONS REGARDING THE USE OF HAZARDOUS PRODUCTS.