Date: January 14, 2004

I. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY

PRODUCT: VIRKON-S EPA REG # 62432-1
MSDS HSD/US41
IMPORTER: Pharmacal Research Laboratories
Naugatuck, CT 06770
Tel: 800-243-5350
Supplier: Antec International Limited
Sudbury Suffolk CO10 2XD
Tel: 44-(0)1787-377305

All information provided in this Material Safety Data Sheet refers specifically to the Virkon S powder, as supplied, & not the in-use solutions, unless otherwise stated.

II. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical	% Concentration	CAS	Exposure
Potassium peroxomonosulfate	40-60	70693-62-8	1mg/m^3, total dust, 8 & 12 hr. TWA – manufacturer's recommendation.
Sodium Dodecylbenzene-sulphonate	10-20	25155-30-0	None assigned.
Sulfamic Acid	1-10	5329-14-6	0.5mg/m^3, 8 & 12 hr. TWA – manufacturer's recommendation.

III. HAZARDS INFORMATION

Potential Health Effects
Danger: Powder is corrosive. Causes skin burns & irreversible eye damage. Harmful if swallowed, absorbed through skin or inhaled. Do not get into eyes, on skin, or on clothing.

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

IV. FIRST AID

INHALATION
Symptom: - Inhalation of this powder in sufficient quantities may cause irritation of the upper respiratory passages, nose & throat. Gross over exposure may cause ulceration of mucous membranes.
Treatment: - Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

SKIN CONTACT
Symptom: - If allowed to become moist the dry powder may cause severe irritation and in cases of prolonged contact may cause burns or ulceration. Contact with the dry powder may cause skin irritation with discomfort or rash, or allergic skin reactions in sensitive individuals.
Treatment: - Flush skin with plenty of water. Remove contaminated clothing & shoes after use. Call a physician. Wash contaminated clothing before reuse.

EYE CONTACT
Symptom: - Eye contact with the powder may cause eye corrosion or ulceration; eye irritation with discomfort, tearing or blurring of vision. Severe eye damage may result if not treated immediately.
Treatment: - In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

INGESTION
Symptom: - Ingestion of this product in sufficient quantities may cause gastritis, with stomach pain, nausea, vomiting, diarrhoea, headache or weakness; possibly progressing to necrosis or haemorrhage with gross overexposure.
Treatment: - If swallowed, do not induce vomiting. Give 2 glasses of water immediately. Never give anything by mouth to an unconscious person. Call a physician.

V. FIRE FIGHTING MEASURES

Flammable properties: Not applicable

Extinguishing media: Water, dry powder (sand or Met-L-X), CO_2

Fire Fighting instructions: Evacuate personnel to a safe area. Wear self-contained breathing apparatus (SCBA) & full protective equipment. When heated above 70°C, decomposes with evolution of corrosive gas (SO_2). Virkon S itself is not flammable or oxidizing, but may assist combustion of other materials under exceptional circumstances.

VI. ACCIDENTAL RELEASE PROCEDURES

Safeguards (Personnel).
Review FIRE FIGHTING MEASURES & HANDLING sections. Use appropriate Personal Protective Equipment during clean- up.
Environmental precautions: Do not allow the powder concentrate to enter drains. Infrequent disposal of small quantities (<0.5kg) may be diluted to waste with large quantities of water, subject to local waste disposal regulations. Do not allow entry to surface waters.
Methods for clean up: Sweep up carefully, preferable with the aid of a suitable dry anti-dusting agent if available. Place in suitable containers for disposal. Prevent powder from becoming moist while awaiting disposal, if possible. Moist product awaiting disposal must be kept away from combustible material & stored in a manner that allows suitable ventilation of the waste.

VII. HANDLING AND STORING

Handling Personnel: Avoid inhalation. Do not get in eyes and avoid contact with skin. Wear Personal Protective Equipment in accordance with section 8.

Handle with sufficient care to prevent dust generation.

Storage: Keep containers tightly sealed & avoid coming into contact with moisture during storage.
Keep containers tightly Keep away from combustible material. Avoid contamination of the product.
1% solution: Store in a clean, loosely capped plastic container at room temperatures, and away from direct sunlight. Do not allow solution to freeze. Discard any used or contaminated solution & dispose of any stock s solutions after 7 days from date of preparation.

VIII. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls:
Appropriate Local Exhaust Ventilation may be necessary for handling the product where dust formation is a problem, i.e. product in bulk quantities, or operations in small and/or poorly ventilated areas. Not normally necessary for preparation of solutions from small pack sizes (10lb or less).

Personal Protection Equipment:
Respiratory: Where a Health and Safety assessment shows the dusting levels to be sufficiently high when handling the powder product, wear a NIOSH approved respiratory mask against fine particles. Respiratory protection is not normally considered necessary when handling solutions of diluted product. However, when working with spray mists of Virkon S, respiratory protection in the form of a NIOSH approved respirator unit in conjunction with an organic vapor – fine particle filter cartridge.

Protective clothing:
Eye: Chemical splash goggles.
Skin: Overalls.
Hand: Rubber gloves.

Exposure Guidelines & Applicable Exposure Limits:

Potassium peroxomonosulfate
PEL (OSHA): None Established
TLV (ACGIH): None Established
AEL* (DuPont): 1 mg/m3, total dust, 8 & 12 hr. TWA
Sulfamic Acid
PEL (OSHA): None Established
TLV (ACGIH): None Established
AEL* (DuPont): 0.5 mg/m3, 8 & 12 Hr. TWA
1 5 mg/m3, 15 minute TWA
*AEL is DuPont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

IX. PHYSICAL AND CHEMICAL PROPERTIES

Boiling point: Decomposes on heating
Solubility in water: Approximately 8.3oz/gal
Form: Free flowing powder
Color: Yellow
Specific gravity: ~1.07

X. STABILITY AND REACTIVITY

Chemical stability: Stable at normal temperatures & storage conditions.
Incompatibility with other materials: Incompatible with strong alkalis. In contact with halogen salts (e.g. KCl, KBr, KI, NaCl), Virkon S may react to release toxic halogen gases, such as chlorine, bromine & iodine. In exceptional cases Virkon S may support combustion; avoid contact with combustible materials.
Decomposition: Under certain extreme conditions sulphur dioxide & chlorine may be generated if the powder is allowed to become moist.
Polymerisation: Polymerisation will not occur.

XI. TOXICOLOGICAL INFORMATION

Animal Data-Virkon S powder
Acute Dermal Toxicity: LD_{50} >2.0g/kg (rabbit)
Acute Oral Toxicity: LD_{50} = 1.70g/kg (male rats) & 1.16g/kg (female rats)
Acute Inhalation Toxicity: 4 hour LC_{50} > 6.147mg/l (male & female rats).
Guinea Pig Dermal Sensitisation: Virkon S displayed no fatiguing or sensitising effects.
Primary Skin Irritation: The powder is corrosive to the skin of rabbits with an irritation index of 7.00. A dilution of 5% results in an irritation index of 0.08 in rabbits.
Primary Eye Irritation: The powder is corrosive to rabbit's eyes. A dilution of 5% produces conjunctival irritation.
Effects of Overexposure: Inhalation of dust may cause choking, coughing or wheezing. A 1% solution is normally non-irritating.

XII. ECOLOGICAL INFORMATION

Aquatic Toxicity:
Oxone Monopersulphate:
96 hour LC_{50} – rainbow trout: 53 mg/L
48 hour EC_{50} – daphnia magna: 3.5 mg/L
Sodium Dodecylbenzenesulfate:
96 hour LC_{50} – rainbow trout: 1.7 mg/L
Sulphamic Acid:
96 hour LC_{50} – fathead minnows: 7.650 mg/L

XII. WASTE DISPOSAL CONSIDERATIONS

Treatment, storage, transportation, & disposal must be in accordance with applicable Federal, State/Provincial, and Local Regulations.

XIV. TRANSPORT INFORMATION

Shipping Information:
Not Regulated as a hazardous material by DOT, IMO, or IATA.

XV. U.S. REGULATORY INFORMATION

TSCA Inventory Status: Listed
The following components are TSCA listed:

Oxone
Sodium Dodecylbenzenesulfonate
Sulphamic Acid

Those not stated are proprietory & non-hazardous. However, all components over 0.1% inclusion are TSCA listed.
This information is based upon technical information believed to be reliable. It is subject to revision as additional knowledge & experience is gained.