Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
Clomiphene Citrate

STATEMENT OF HAZARDOUS NATURE

NFPA

SUPPLIER
Company: Santa Cruz Biotechnology, Inc.
Address:
2145 Delaware Ave
Santa Cruz, CA 95060
Telephone: 800.457.3801 or 831.457.3800
Emergency Tel: CHEMWATCH: From within the US and Canada: 877-715-9305
Emergency Tel: From outside the US and Canada: +800 2436 2255 (1-800-CHEMCALL) or call +613 9573 3112

PRODUCT USE
Synthetic non-steroidal oestrogen for stimulation of ovulation. Used in the treatment anovulatory infertility and in in-vitro fertilisation programs. Also used in the treatment of male infertility. Stimulates the secretion of pituitary gonadotrophic hormones probably by blocking the effects of oestrogens at receptor sites in the hypothalamus and pituitary. Related chemically to chlorotrianisene. Intermediate

SYNONYMS

Section 2 - HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW
RISK
May cause SENSITIZATION by skin contact.
May impair fertility.
Possible risk of harm to the unborn child.
Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

**POTENTIAL HEALTH EFFECTS**

**ACUTE HEALTH EFFECTS**

**SWALLOWED**
- Accidental ingestion of the material may be damaging to the health of the individual.
- The estrogens may produce dose-related nausea and vomiting, undesirable uterine growth, proliferation and withdrawal bleeding or loss of periods. It causes enlargement of the breasts in males. Other side effects include weight gain, swelling, breast tenderness, liver dysfunction, jaundice, depression, headache, and dizziness. Growth may be stunted due to premature closing of the growth plates. Skin reactions can include excess pigmentation of the face, rashes, and hives. Redness, itching and blistering has also been reported.

**EYE**
- Although the material is not thought to be an irritant, direct contact with the eye may cause transient discomfort characterized by tearing or conjunctival redness (as with windburn). Slight abrasive damage may also result. The material may produce foreign body irritation in certain individuals.

**SKIN**
- The material is not thought to be a skin irritant (as classified using animal models). Abrasive damage however, may result from prolonged exposures. Good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting.
- Skin contact with the material may damage the health of the individual; systemic effects may result following absorption.
- Open cuts, abraded or irritated skin should not be exposed to this material.
- Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

**INHALED**
- The material is not thought to produce either adverse health effects or irritation of the respiratory tract following inhalation (as classified using animal models). Nevertheless, adverse effects have been produced following exposure of animals by at least one other route and good hygiene practice requires that exposure be kept to a minimum and that suitable control measures be used in an occupational setting.
- Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled.

**CHRONIC HEALTH EFFECTS**
- Skin contact with the material is more likely to cause a sensitization reaction in some persons compared to the general population.
- Ample evidence exists from experimentation that reduced human fertility is directly caused by exposure to the material.
- Results in experiments suggest that this material may cause disorders in the development of the embryo or fetus, even when no signs of poisoning show in the mother.
- There has been some concern that this material can cause cancer or mutations but there is not enough data to make an assessment.
- Long term administration of estrogens can greatly increase the risk of endometrial cancer, especially after menopause. Males exposed can develop enlarged breasts and other feminizing effects, nipple pigmentation, withering of testicles, sterility, impotence and altered distribution of hair. Females exposed can develop breast enlargement and menstrual disorders and other effects on the reproductive system. Children born to exposed mothers can show breast enlargement in boys and early puberty in girls. Children who are themselves exposed may develop increased rate of bone maturation (leading to reduced final stature), strong pigmentation of the sexual organs and feminizing syndrome. Exposure before birth may be associated with limb defects and congenital heart deformities. Repeated swallowing can cause nausea, vomiting, abdominal cramps, loss of appetite, bowel inflammation, headache, dizziness, irritability, depression, general unwellness, involuntary jerky movements and convulsions. Swelling, weight change, increased blood pressure and risk of clotting, liver abnormalities, uremia have all been reported. Long-term users may also show an increased risk of developing gallstones, increased blood fats, acute pancreas inflammation and aggravation of porphyria. The eye may develop damage, increased corneal curvature with contact lens intolerance. Skin effects include itching, hives, inflammation, increased pigmentation, sensitivity to light, loss of scalp hair and hairiness. Allergic reactions include a red rash and jaundice. Susceptibility to Candida infections and changes to sex drive may occur. Application of estrogen-containing cream had produced breast enlargement. Long-term users may also show an increased risk of developing gallstones, increased blood fats, acute pancreas inflammation and aggravation of porphyria. The eye may develop damage, increased corneal curvature with contact lens intolerance. Skin effects include itching, hives, inflammation, increased pigmentation, sensitivity to light, loss of scalp hair and hairiness. Allergic reactions include a red rash and jaundice. Susceptibility to Candida infections and changes to sex drive may occur. Application of estrogen-containing cream had produced breast enlargement.

**Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS**

**HAZARD RATINGS**

<table>
<thead>
<tr>
<th>Body Contact</th>
<th>Toxicity:</th>
<th>Flammability:</th>
<th>Reactivity:</th>
<th>Chronic:</th>
<th>CAS RN</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NAME**

<table>
<thead>
<tr>
<th>Name</th>
<th>CAS RN</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>clomiphene citrate</td>
<td>50-41-9</td>
<td>&gt;98</td>
</tr>
<tr>
<td>as mixture of isomers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>cis-clomiphene citrate</td>
<td>7619-53-6</td>
<td></td>
</tr>
</tbody>
</table>
Section 4 - FIRST AID MEASURES

SWALLOWED
- If swallowed do NOT induce vomiting.
- If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.
- Observe the patient carefully.
- Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.
- Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.
- Seek medical advice.

EYE
- If this product comes in contact with the eyes:
  - Wash out immediately with fresh running water.
  - Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
  - If pain persists or recurs seek medical attention.

SKIN
- If skin contact occurs:
  - Immediately remove all contaminated clothing, including footwear
  - Flush skin and hair with running water (and soap if available).
  - Seek medical attention in event of irritation.

INHALED
- If dust is inhaled, remove from contaminated area.
- Encourage patient to blow nose to ensure clear passage of breathing.
- If irritation or discomfort persists seek medical attention.

NOTES TO PHYSICIAN
- Treat symptomatically.

Section 5 - FIRE FIGHTING MEASURES

Vapour Pressure (mmHG): Negligible
Upper Explosive Limit (%): Not available
Specific Gravity (water=1): Not available
Lower Explosive Limit (%): Not available

EXTINGUISHING MEDIA
- Foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.
- Water spray or fog - Large fires only.

FIRE FIGHTING
- Alert Emergency Responders and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water course.
- Use water delivered as a fine spray to control fire and cool adjacent area.
- DO NOT approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.
- Equipment should be thoroughly decontaminated after use.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS
- Combustible solid which burns but propagates flame with difficulty.
- Avoid generating dust, particularly clouds of dust in a confined or unventilated space as dusts may form an explosive mixture with air, and any source of ignition, i.e. flame or spark, will cause fire or explosion. Dust clouds generated by the fine grinding of the solid are a particular hazard; accumulations of fine dust may burn rapidly and fiercely if ignited.
- Dry dust can be charged electrostatically by turbulence, pneumatic transport, pouring, in exhaust ducts and during transport.
- Build-up of electrostatic charge may be prevented by bonding and grounding.
- Powder handling equipment such as dust collectors, dryers and mills may require additional protection measures such as explosion venting.

Combustion products include: carbon monoxide (CO), carbon dioxide (CO₂), hydrogen chloride, phosgene, nitrogen oxides (NOₓ), other pyrolysis products typical of burning organic material.

FIRE INCOMPATIBILITY
- Avoid contamination with oxidizing agents i.e. nitrates, oxidizing acids, chlorine bleaches, pool chlorine etc. as ignition may result.
## Section 6 - ACCIDENTAL RELEASE MEASURES

**MINOR SPILLS**
- Environmental hazard - contain spillage.
  - Clean up waste regularly and abnormal spills immediately.
  - Avoid breathing dust and contact with skin and eyes.
  - Wear protective clothing, gloves, safety glasses and dust respirator.
  - Use dry clean up procedures and avoid generating dust.
  - Vacuum up or sweep up. NOTE: Vacuum cleaner must be fitted with an exhaust micro filter (HEPA type) (consider explosion-proof machines designed to be grounded during storage and use).
  - Dampen with water to prevent dusting before sweeping.
  - Place in suitable containers for disposal.

**MAJOR SPILLS**
- Environmental hazard - contain spillage.
  - CAUTION: Advise personnel in area.
  - Alert Emergency Responders and tell them location and nature of hazard.
  - Control personal contact by wearing protective clothing.
  - Prevent, by any means available, spillage from entering drains or water courses.
  - Recover product wherever possible.
  - IF DRY: Use dry clean up procedures and avoid generating dust. Collect residues and place in sealed plastic bags or other containers for disposal. IF WET: Vacuum/shovel up and place in labelled containers for disposal.
  - ALWAYS: Wash area down with large amounts of water and prevent runoff into drains.
  - If contamination of drains or waterways occurs, advise emergency services.

**PROTECTIVE ACTIONS FOR SPILL**

<table>
<thead>
<tr>
<th>Isolation Distance</th>
<th>Downwind Protection Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 meters</td>
<td>10 meters</td>
</tr>
</tbody>
</table>

**FOOTNOTES**
1. PROTECTIVE ACTION ZONE is defined as the area in which people are at risk of harmful exposure. This zone assumes that random changes in wind direction confines the vapour plume to an area within 30 degrees on either side of the predominant wind direction, resulting in a crosswind protective action distance equal to the downwind protective action distance.
2. PROTECTIVE ACTIONS should be initiated to the extent possible, beginning with those closest to the spill and working away from the site in the downwind direction. Within the protective action zone a level of vapour concentration may exist resulting in nearly all unprotected persons becoming incapacitated and unable to take protective action and/or incurring serious or irreversible health effects.
3. INITIAL ISOLATION ZONE is determined as an area, including upwind of the incident, within which a high probability of localised wind reversal may expose nearly all persons without appropriate protection to life-threatening concentrations of the material.
4. SMALL SPILLS involve a leaking package of 200 litres (55 US gallons) or less, such as a drum (jerrican or box with inner containers). Larger packages leaking less than 200 litres and compressed gas leaking from a small cylinder are also considered "small spills". LARGE SPILLS involve many small leaking packages or a leaking package of greater than 200 litres, such as a cargo tank, portable tank or a "one-tonne" compressed gas cylinder.
6. IERG information is derived from CANUTEC - Transport Canada.

**ACUTE EXPOSURE GUIDELINE LEVELS (AEGL) (in ppm)**

- **AEGL 1:** The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic nonsensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure.
- **AEGL 2:** The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.
- **AEGL 3:** The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience life-threatening health effects or death.
**Section 7 - HANDLING AND STORAGE**

**PROCEDURE FOR HANDLING**
- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- Prevent concentration in hollows and sumps.
- DO NOT enter confined spaces until atmosphere has been checked.
- DO NOT allow material to contact humans, exposed food or food utensils.
- Avoid contact with incompatible materials.
- When handling, DO NOT eat, drink or smoke.
- Keep containers securely sealed when not in use.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately.
- Launder contaminated clothing before re-use.
- Use good occupational work practice.
- Observe manufacturer's storing and handling recommendations.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

Empty containers may contain residual dust which has the potential to accumulate following settling. Such dusts may explode in the presence of an appropriate ignition source.
- Do NOT cut, drill, grind or weld such containers
- In addition ensure such activity is not performed near full, partially empty or empty containers without appropriate workplace safety authorisation or permit.

**RECOMMENDED STORAGE METHODS**
- Glass container.
- Polyethylene or polypropylene container.
- Check all containers are clearly labelled and free from leaks.

**STORAGE REQUIREMENTS**
- Observe manufacturer's storing and handling recommendations.

**SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS**

![Chemical Symbols]

X: Must not be stored together
O: May be stored together with specific preventions
+: May be stored together

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**Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION**

**EXPOSURE CONTROLS**

<table>
<thead>
<tr>
<th>Source</th>
<th>Material</th>
<th>TWA ppm</th>
<th>TWA mg/m³</th>
<th>STEL ppm</th>
<th>STEL mg/m³</th>
<th>Peak ppm</th>
<th>Peak mg/m³</th>
<th>TWA F/CC</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>US - Oregon Permissible Exposure Limits (Z3)</td>
<td>cis-clomiphene citrate (Inert or Nuisance Dust: Total dust)</td>
<td>10</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>US OSHA Permissible Exposure Levels (PELs) - Table Z3</td>
<td>cis-clomiphene citrate (Inert or Nuisance Dust: Respirable fraction)</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
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<td>US - Hawaii Air Contaminant Limits</td>
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<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants</td>
<td>cis-clomiphene citrate (Particulates not otherwise regulated Respirable fraction)</td>
<td>5</td>
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<td></td>
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</tr>
<tr>
<td>US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants</td>
<td>cis-clomiphene citrate (Particulates not otherwise regulated (PNOR)(f)- Respirable</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Limits for Air Contaminants

<table>
<thead>
<tr>
<th>Location and Standard</th>
<th>Compound (Particulates not otherwise regulated)</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>US - Michigan Exposure Limits for Air Contaminants</td>
<td>cis-clomiphene citrate (Respirable dust)</td>
<td>5</td>
</tr>
<tr>
<td>US - Oregon Permissible Exposure Limits (Z3)</td>
<td>trans-clomiphene citrate (Inert or Nuisance Dust: (d) Total dust)</td>
<td>10 *</td>
</tr>
<tr>
<td>US OSHA Permissible Exposure Levels (PELs) - Table Z3</td>
<td>trans-clomiphene citrate (Inert or Nuisance Dust: (d) Respirable fraction)</td>
<td>5</td>
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<tr>
<td>US OSHA Permissible Exposure Levels (PELs) - Table Z3</td>
<td>trans-clomiphene citrate (Inert or Nuisance Dust: (d) Total dust)</td>
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</tr>
<tr>
<td>US - Hawaii Air Contaminant Limits</td>
<td>trans-clomiphene citrate (Particulates not otherwise regulated - Total dust)</td>
<td>10</td>
</tr>
<tr>
<td>US - Hawaii Air Contaminant Limits</td>
<td>trans-clomiphene citrate (Particulates not otherwise regulated - Respirable fraction)</td>
<td>5</td>
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<td>trans-clomiphene citrate (Particulates not otherwise regulated (PNOR)(f)- Respirable fraction)</td>
<td>5</td>
</tr>
<tr>
<td>US - Michigan Exposure Limits for Air Contaminants</td>
<td>trans-clomiphene citrate (Particulates not otherwise regulated, Respirable dust)</td>
<td>5</td>
</tr>
</tbody>
</table>

The following materials had no OELs on our records
- clomiphene citrate: CAS:50-41-9

**MATERIAL DATA**

**CIS-CLOMIPHENE CITRATE:**
**CLOMIPHENE CITRATE:**
**TRANS-CLOMIFENE CITRATE:**
- It is the goal of the ACGIH (and other Agencies) to recommend TLVs (or their equivalent) for all substances for which there is evidence of health effects at airborne concentrations encountered in the workplace.
- At this time no TLV has been established, even though this material may produce adverse health effects (as evidenced in animal experiments or clinical experience). Airborne concentrations must be maintained as low as is practically possible and occupational exposure must be kept to a minimum.

**NOTE:** The ACGIH occupational exposure standard for Particles Not Otherwise Specified (P.N.O.S) does NOT apply.

**PERSONAL PROTECTION**

Consult your EHS staff for recommendations

**EYE**
- When handling very small quantities of the material eye protection may not be required.
- For laboratory, larger scale or bulk handling or where regular exposure in an occupational setting occurs:
  - Chemical goggles
  - Face shield. Full face shield may be required for supplementary but never for primary protection of eyes
  - Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lenses should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59]

**HANDS/FEET**
- NOTE: The material may produce skin sensitization in predisposed individuals. Care must be taken, when removing gloves and other protective equipment, to avoid all possible skin contact.
- Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include: such as:
  - frequency and duration of contact,
- chemical resistance of glove material,
- glove thickness and
dexterity
Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739).
- When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374) is recommended.
- When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374) is recommended.
- Contaminated gloves should be replaced.
Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.
- Rubber gloves (nitrile or low-protein, powder-free latex). Employees allergic to latex gloves should use nitrile gloves in preference.
- Double gloving should be considered.
- PVC gloves.
- Protective shoe covers.
- Head covering.
Experience indicates that the following polymers are suitable as glove materials for protection against undissolved, dry solids, where abrasive particles are not present.
- polychloroprene
- nitrile rubber
- butyl rubber
- fluorocautchouc
- polyvinyl chloride
Gloves should be examined for wear and/ or degradation constantly.

OTHER
- For quantities up to 500 grams a laboratory coat may be suitable.
- For quantities up to 1 kilogram a disposable laboratory coat or coverall of low permeability is recommended. Coveralls should be buttoned at collar and cuffs.
- For quantities over 1 kilogram and manufacturing operations, wear disposable coverall of low permeability and disposable shoe covers.
- For manufacturing operations, air-supplied full body suits may be required for the provision of advanced respiratory protection.
- Eye wash unit.
- Ensure there is ready access to an emergency shower.
- For Emergencies: Vinyl suit
- Respirators may be necessary when engineering and administrative controls do not adequately prevent exposures.
- The decision to use respiratory protection should be based on professional judgment that takes into account toxicity information, exposure measurement data, and frequency and likelihood of the worker's exposure - ensure users are not subject to high thermal loads which may result in heat stress or distress due to personal protective equipment (powered, positive flow, full face apparatus may be an option).
- Published occupational exposure limits, where they exist, will assist in determining the adequacy of the selected respiratory protection. These may be government mandated or vendor recommended.
- Certified respirators will be useful for protecting workers from inhalation of particulates when properly selected and fit tested as part of a complete respiratory protection program.
- Use approved positive flow mask if significant quantities of dust becomes airborne.
- Try to avoid creating dust conditions.

RESPRIRATOR

<table>
<thead>
<tr>
<th>Protection Factor</th>
<th>Half-Face Respirator</th>
<th>Full-Face Respirator</th>
<th>Powered Air Respirator</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 x PEL</td>
<td>Air-line*</td>
<td>-</td>
<td>PAPR-P1</td>
</tr>
<tr>
<td>50 x PEL</td>
<td>Air-line**</td>
<td>P2</td>
<td>PAPR-P2</td>
</tr>
<tr>
<td>100 x PEL</td>
<td>-</td>
<td>P3</td>
<td>-</td>
</tr>
<tr>
<td>100+ x PEL</td>
<td>Air-line*</td>
<td>-</td>
<td>PAPR-P3</td>
</tr>
</tbody>
</table>

* - Negative pressure demand  ** - Continuous flow

Explanation of Respirator Codes:
Class 1 low to medium absorption capacity filters.
Class 2 medium absorption capacity filters.
Class 3 high absorption capacity filters.
PAPR Powered Air Purifying Respirator (positive pressure) cartridge.
Type A for use against certain organic gases and vapors.
Type AX for use against low boiling point organic compounds (less than 65°C).
Type B for use against certain inorganic gases and other acid gases and vapors.
Type E for use against sulfur dioxide and other acid gases and vapors.
Type K for use against ammonia and organic ammonia derivatives
Class P1 intended for use against mechanically generated particulates of sizes most commonly encountered in industry, e.g. asbestos, silica.
Class P2 intended for use against both mechanically and thermally generated particulates, e.g. metal fume.
Class P3 intended for use against all particulates containing highly toxic materials, e.g. beryllium.
The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.

Use appropriate NIOSH-certified respirator based on informed professional judgement. In conditions where no reasonable estimate of exposure can be made, assume the exposure is in a concentration IDLH and use NIOSH-certified full face pressure demand SCBA with a minimum service life of 30 minutes, or a combination full facepiece pressure demand SAR with auxiliary self-contained air supply. Respirators provided only for escape from IDLH atmospheres shall be NIOSH-certified for escape from the atmosphere in which they will be used.
ENGINEERING CONTROLS

- Enclosed local exhaust ventilation is required at points of dust, fume or vapor generation.
- HEPA terminated local exhaust ventilation should be considered at point of generation of dust, fumes or vapors.
- Barrier protection or laminar flow cabinets should be considered for laboratory scale handling.
- The need for respiratory protection should also be assessed where incidental or accidental exposure is anticipated. Dependent on levels of contamination, PAPR, full face air purifying devices with P2 or P3 filters or air supplied respirators should be evaluated.
- Fume-hoods and other open-face containment devices are acceptable when face velocities of at least 1 m/s (200 feet/minute) are achieved. Partitions, barriers, and other partial containment technologies are required to prevent migration of the material to uncontrolled areas. For non-routine emergencies maximum local and general exhaust are necessary. Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

<table>
<thead>
<tr>
<th>Type of Contaminant</th>
<th>Air Speed:</th>
</tr>
</thead>
<tbody>
<tr>
<td>solvent, vapors, etc. evaporating from tank (in still air)</td>
<td>0.25-0.5 m/s (50-100 ft/min.)</td>
</tr>
<tr>
<td>aerosols, fumes from pouring operations, intermittent container filling, low speed conveyor transfers (released at low velocity into zone of active generation)</td>
<td>0.5-1 m/s (100-200 ft/min.)</td>
</tr>
<tr>
<td>direct spray, drum filling, conveyor loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)</td>
<td>1-2.5 m/s (200-500 ft/min.)</td>
</tr>
</tbody>
</table>

Within each range the appropriate value depends on:

<table>
<thead>
<tr>
<th>Lower end of the range</th>
<th>Upper end of the range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: Room air currents minimal or favourable to capture</td>
<td>1: Disturbing room air currents</td>
</tr>
<tr>
<td>2: Contaminants of low toxicity or of nuisance value only.</td>
<td>2: Contaminants of high toxicity</td>
</tr>
<tr>
<td>3: Intermittent, low production.</td>
<td>3: High production, heavy use</td>
</tr>
<tr>
<td>4: Large hood or large air mass in motion</td>
<td>4: Small hood-local control only</td>
</tr>
</tbody>
</table>

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2.5 m/s (200-500 ft/min.) for extraction of gases discharged 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

Solid. Does not mix with water.

<table>
<thead>
<tr>
<th>State</th>
<th>Divided solid</th>
<th>Molecular Weight</th>
<th>598.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melting Range (°F)</td>
<td>240.8.5- 244.4</td>
<td>Viscosity</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Boiling Range (°F)</td>
<td>Not available</td>
<td>Solubility in water (g/L)</td>
<td>Partly miscible</td>
</tr>
<tr>
<td>Flash Point (°F)</td>
<td>Not available</td>
<td>pH (1% solution)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Decomposition Temp (°F)</td>
<td>Not available</td>
<td>pH (as supplied)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Autoignition Temp (°F)</td>
<td>Not available</td>
<td>Vapour Pressure (mmHG)</td>
<td>Negligible</td>
</tr>
<tr>
<td>Upper Explosive Limit (%)</td>
<td>Not available</td>
<td>Specific Gravity (water=1)</td>
<td>Not available</td>
</tr>
<tr>
<td>Lower Explosive Limit (%)</td>
<td>Not available</td>
<td>Relative Vapor Density (air=1)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Volatile Component (%vol)</td>
<td>Negligible</td>
<td>Evaporation Rate</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>

APPEARANCE

White to pale yellow powder; does not mix well with water. Soluble in ethanol, methanol. Contains 30-50% of the Z-isomer (zuclomiphene).

Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY

- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerization will not occur.

STORAGE INCOMPATIBILITY

- Avoid reaction with oxidizing agents.

For incompatible materials - refer to Section 7 - Handling and Storage.

Section 11 - TOXICOLOGICAL INFORMATION

clomiphene citrate

TOXICITY AND IRRITATION
Section 12 - ECOLOGICAL INFORMATION

Refer to data for ingredients, which follows:

CIS-CLOMIPHENE CITRATE:
TRANS-CLOMIFENE CITRATE:
CLOMIPHENE CITRATE:

DO NOT discharge into sewer or waterways.

The presence of residual pharmaceuticals and environmental endocrine disrupters (EEDs) is increasingly significant due to their impact on human health and wildlife. Of the compounds implicated as EEDs, the most potent in their oestrogenic effect are the natural and synthetic estrogens. The occurrence of estrogenic compounds in the aquatic environment in particular is of interest. Steroid estrogens at sub-microgram per liter levels are frequently detected in surface water. When at sub-microgram per liter levels, these estrogenic chemicals show greater capacities of sorption by soils and sediments. Among these estrogenic chemicals, a group of synthetic steroids, such as 17a-ethinylestradiol, is of particular concern. This concern arises in part from the increasing use of birth-control pills, formulated with exogeneous estrogenic and progestational chemicals that show high physiological activity at very low concentrations and have been associated to certain alarming effects on reproduction and developmental processes such as feminisation, decreased fertility or hermaphroditism. Steroidal estrogen hormones such as estradiol, estrone, and estriol are also of concern because there is evidence that low nanogram per liter concentrations of estrogens in water can adversely affect the reproductive biology of fish and other aquatic vertebrate species. The environmental fate of estrogens is not clearly known. Laboratory-based studies have found that the biological activity of these compounds is greatly reduced or eliminated within several hours to days due to degradation and sorption. On the other hand, field studies have demonstrated that estrogens are sufficiently mobile and persistent to impact surface and groundwater quality. Unconjugated steroidal estrogens have low solubility in water (0.8-13.3 mg L⁻¹) and are moderately hydrophobic (log Kow 2.6-4.0). Therefore, there is the potential for bioaccumulation exists. Estrogenic compounds are generally bioaccumulative and may biomagnify through the food chain resulting in adverse physiological affects. Accumulation into milk may be particularly worrying as it is fed to infants and children and their immune systems are not fully developed, therefore the physiological effects may be more serious.

Carcinogenicity

■ DO NOT allow product to come in contact with surface waters or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash-waters.

Wastes resulting from use of the product must be disposed of on site or at approved waste sites.

Very toxic to aquatic organisms.

CLOMIPHENE CITRATE:
CIS-CLOMIPHENE CITRATE:
TRANS-CLOMIFENE CITRATE:

Section 13 - DISPOSAL CONSIDERATIONS

Disposal Instructions
All waste must be handled in accordance with local, state and federal regulations.

Puncture containers to prevent re-use and bury at an authorized landfill.

Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.

A Hierarchy of Controls seems to be common - the user should investigate:
- Reduction
- Reuse
- Recycling
- Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.

DO NOT allow wash water from cleaning equipment to enter drains. Collect all wash water for treatment before disposal.

Recycle wherever possible.
Consult manufacturer for recycling options or consult Waste Management Authority for disposal if no suitable treatment or disposal facility can be identified.

Dispose of by: Burial in a licensed land-fill or Incineration in a licensed apparatus (after admixture with suitable combustible material)

Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.

### Section 14 - TRANSPORTATION INFORMATION

**DOT:**
- Symbols: G
- Hazard class or Division: 9
- Identification Numbers: UN3077
- PG: III
- Label Codes: 9
- Special provisions: 8, 146, 335, B54, IB8, IP3, N20, T1, TP33
- Packaging: Exceptions: 155
- Packaging: Non-bulk: 213
- Packaging: Exceptions: 155
- Quantity limitations: No limit
- Quantity Limitations: Cargo aircraft only: No limit
- Vessel stowage: Other: None

**Hazardous materials descriptions and proper shipping names:**
- Environmentally hazardous substance, solid, n.o.s

**Air Transport IATA:**
- ICAO/IATA Class: 9
- ICAO/IATA Subrisk: 里程碑
- UN/ID Number: 3077
- Packaging Group: III
- Special provisions: A97

**Shipping Name:** ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. *(CONTAINS CLOMIPHENE CITRATE)*

**Maritime Transport IMDG:**
- IMDG Class: 9
- IMDG Subrisk: None
- UN Number: 3077
- Packing Group: III
- EMS Number: F-A,S-F
- Special provisions: 274 909 944
- Limited Quantities: 5 kg

**Shipping Name:** ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.(contains clomiphene citrate)

### Section 15 - REGULATORY INFORMATION

**clomiphene citrate (CAS: 50-41-9) is found on the following regulatory lists:**
- "Canada Domestic Substances List (DSL)"
- "International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs"
- "US - California Air Toxics "Hot Spots" List" (Assembly Bill 2588) Substances which need not be reported unless manufactured by the facility" 
- "US - California Proposition 65 - Priority List for the Development of MADLs for Chemicals Causing Reproductive Toxicity"
- "US - California Proposition 65 - Reproductive Toxicity"
- "US - Maine Chemicals of High Concern List"

**Regulations for ingredients**
- cis-clomiphene citrate (CAS: 7619-53-6) is found on the following regulatory lists:
- "Canada Controlled Drugs and Substances Act Schedule IV"
- trans-clomifene citrate (CAS: 7599-79-3) is found on the following regulatory lists:
- "US - Connecticut Hazardous Air Pollutants"

### Section 16 - OTHER INFORMATION

**LIMITED EVIDENCE**
- Skin contact and/or ingestion may produce health damage*
- Limited evidence of a carcinogenic effect*

**Denmark Advisory list for selfclassification of dangerous substances**
Substance CAS Suggested codes cis- clomiphene citrate 7619- 53- 6 Xn Repr3; R63 N R50/53 trans- clomifene citrate 7599- 79- 3 Xn Repr3; R63 N R50/53

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makes no representations and assumes no liability for any direct, incidental or consequential damages resulting from its use. For additional technical information please call our toxicology department on +800 CHEMCALL.

Classification of the mixture and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references. A list of reference resources used to assist the committee may be found at: www.chemwatch.net/references.

The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

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