



# SAFETY DATA SHEET

## 1. Identification

|                                                               |                                                                           |                 |
|---------------------------------------------------------------|---------------------------------------------------------------------------|-----------------|
| <b>Product identifier</b>                                     | <b>Estradiol</b>                                                          |                 |
| <b>Other means of identification</b>                          |                                                                           |                 |
| <b>Catalog number</b>                                         | 1250008                                                                   |                 |
| <b>CAS number</b>                                             | 35380-71-3                                                                |                 |
| <b>Synonyms</b>                                               | Estradiol-17-beta * Dihydrofollicular hormone                             |                 |
| <b>Chemical name</b>                                          | Estra-1,3,5(10)-triene-3,17beta-diol hemihydrate                          |                 |
| <b>Recommended use</b>                                        | Specified quality tests and assay use only.                               |                 |
| <b>Recommended restrictions</b>                               | Not for use as a drug. Not for administration to humans or animals.       |                 |
| <b>Manufacturer/Importer/Supplier/Distributor information</b> |                                                                           |                 |
| <b>Manufacturer</b>                                           |                                                                           |                 |
| <b>Company name</b>                                           | U. S. Pharmacopeia                                                        |                 |
| <b>Address</b>                                                | 12601 Twinbrook Parkway<br>Rockville<br>MD<br>20852-1790<br>United States |                 |
| <b>Telephone</b>                                              | RS Technical Services                                                     | 301-816-8129    |
| <b>Website</b>                                                | www.usp.org                                                               |                 |
| <b>E-mail</b>                                                 | RSTECH@usp.org                                                            |                 |
| <b>Emergency phone number</b>                                 | CHEMTREC within US & Canada                                               | 1-800-424-9300  |
|                                                               | CHEMTREC outside US & Canada                                              | +1 703-527-3887 |

## 2. Hazard(s) identification

|                       |                       |             |
|-----------------------|-----------------------|-------------|
| Physical hazards      | Not classified.       |             |
| Health hazards        | Carcinogenicity       | Category 1A |
|                       | Reproductive toxicity | Category 1  |
| Environmental hazards | Not classified.       |             |
| OSHA defined hazards  | Not classified.       |             |
| Label elements        |                       |             |



|                                                  |                                                                                                                                                                                              |
|--------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Signal word</b>                               | Danger                                                                                                                                                                                       |
| <b>Hazard statement</b>                          | May damage fertility or the unborn child.                                                                                                                                                    |
| <b>Precautionary statement</b>                   |                                                                                                                                                                                              |
| <b>Prevention</b>                                | Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves/protective clothing/eye protection/face protection. |
| <b>Response</b>                                  | If exposed or concerned: Get medical advice/attention.                                                                                                                                       |
| <b>Storage</b>                                   | Store locked up.                                                                                                                                                                             |
| <b>Disposal</b>                                  | Dispose of contents/container in accordance with local/regional/national/international regulations.                                                                                          |
| <b>Hazard(s) not otherwise classified (HNOC)</b> | None known.                                                                                                                                                                                  |
| <b>Supplemental information</b>                  | Potent pharmacologically active material.                                                                                                                                                    |

### 3. Composition/information on ingredients

#### Substance

| Chemical name | Common name and synonyms                       | CAS number | %   |
|---------------|------------------------------------------------|------------|-----|
| Estradiol     | Estradiol-17-beta<br>Dihydrofollicular hormone | 35380-71-3 | 100 |

### 4. First-aid measures

|                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Inhalation                                                             | If breathing is difficult, remove to fresh air and keep at rest in a position comfortable for breathing. Call a physician if symptoms develop or persist.                                                                                                                                                                                                                                                                                                                                                                              |
| Skin contact                                                           | Rinse skin with water/shower. Get medical attention if irritation develops and persists.                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Eye contact                                                            | Rinse with water. Get medical attention if irritation develops and persists.                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Ingestion                                                              | Rinse mouth. If ingestion of a large amount does occur, call a poison control center immediately.                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Most important symptoms/effects, acute and delayed                     | Endocrine system effects. Potent pharmacologically active material. Occupational exposure to small amounts may cause physiological effects.                                                                                                                                                                                                                                                                                                                                                                                            |
| Indication of immediate medical attention and special treatment needed | Provide general supportive measures and treat symptomatically.                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| General information                                                    | Remove from exposure. Remove contaminated clothing. For treatment advice, seek guidance from an occupational health physician or other licensed health-care provider familiar with workplace chemical exposures. In the United States, the national poison control center phone number is 1-800-222-1222. If person is not breathing, give artificial respiration. If breathing is difficult, give oxygen if available. Persons developing serious hypersensitivity (anaphylactic) reactions must receive immediate medical attention. |

### 5. Fire-fighting measures

|                                                               |                                                                                                                                                                                        |
|---------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Suitable extinguishing media                                  | Water. Foam. Dry chemical or CO2. Use fire-extinguishing media appropriate for surrounding materials.                                                                                  |
| Unsuitable extinguishing media                                | None known.                                                                                                                                                                            |
| Specific hazards arising from the chemical                    | No unusual fire or explosion hazards noted.                                                                                                                                            |
| Special protective equipment and precautions for firefighters | Wear suitable protective equipment.                                                                                                                                                    |
| Fire fighting equipment/instructions                          | Use water spray to cool unopened containers. As with all fires, evacuate personnel to a safe area. Firefighters should use self-contained breathing equipment and protective clothing. |
| Specific methods                                              | Cool containers exposed to flames with water until well after the fire is out.                                                                                                         |
| General fire hazards                                          | No unusual fire or explosion hazards noted.                                                                                                                                            |

### 6. Accidental release measures

|                                                                     |                                                                                                                                                                                                                                                                                                                          |
|---------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Personal precautions, protective equipment and emergency procedures | Keep unnecessary personnel away. Wear appropriate personal protective equipment. Avoid inhalation of dust from the spilled material. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. For personal protection, see section 8 of the SDS. |
| Methods and materials for containment and cleaning up               | Avoid the generation of dusts during clean-up. Prevent entry into waterways, sewer, basements or confined areas. Sweep up or vacuum up spillage and collect in suitable container for disposal. Clean surface thoroughly to remove residual contamination. For waste disposal, see section 13 of the SDS.                |
| Environmental precautions                                           | Avoid discharge into drains, water courses or onto the ground.                                                                                                                                                                                                                                                           |

### 7. Handling and storage

|                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Precautions for safe handling                                | As a general rule, when handling USP Reference Standards, avoid all contact and inhalation of dust, mists, and/or vapors associated with the material. Clean equipment and work surfaces with suitable detergent or solvent after use. After removing gloves, wash hands and other exposed skin thoroughly. Select and use containment devices and personal protective equipment based on a risk assessment of material potency and exposure potential. |
| Conditions for safe storage, including any incompatibilities | Store in tight container as defined in the USP-NF. This material should be handled and stored per label instructions to ensure product integrity.                                                                                                                                                                                                                                                                                                       |

## 8. Exposure controls/personal protection

### Occupational exposure limits

The following constituents are the only constituents of the product which have a PEL, TLV or other recommended exposure limit. At this time, the other constituents have no known exposure limits.

### Exposure limit values

#### Industrial Use

##### Material

##### Type

##### Value

Estradiol (CAS 35380-71-3)

TWA

0.1 micrograms/m3

### Biological limit values

No biological exposure limits noted for the ingredient(s).

### Appropriate engineering controls

No open handling. For laboratory operations, use approved ventilation or containment system (biological safety cabinet, ventilated balance enclosure, glovebox). Control exposures to below the occupational exposure level (if available). Select and use containment devices and personal protective equipment based on a risk assessment of exposure potential. Cover all containers for solutions and slurries while being transferred.

### Individual protection measures, such as personal protective equipment

#### Eye/face protection

Wear safety glasses with side shields, chemical splash goggles, or full face shield, if necessary. Base the choice of protection on the job activity and potential for contact with eyes or face. An emergency eye wash station should be available.

#### Skin protection

##### Hand protection

Consider double gloves. Wear nitrile or other impervious gloves if skin contact is possible. When the material is dissolved or suspended in an organic solvent, wear gloves that provide protection against the solvent.

##### Other

Train employees in proper gowning and degowning practices. Wear disposable lab coat, disposable sleeve covers and two pair of gloves as appropriate for the task. Base the choice of skin protection on the job activity, potential for skin contact and solvents and reagents in use. Do not wear protective garments in common areas (e.g., cafeterias) or out-of-doors.

#### Respiratory protection

Use a powered air-purifying respirator (PAPR) with HEPA filters, disposable outerware and head cover for spill cleanup. Choose respiratory protection appropriate to the task and the level of existing engineering controls.

#### Thermal hazards

Wear appropriate thermal protective clothing, when necessary.

### General hygiene considerations

Handle in accordance with good industrial hygiene and safety practice. Pharmacological effects may be seen with occupational exposure. Handling practices in this SDS are recommendations for laboratory use of reference standards. Procedures for any other uses or quantities should be determined after an appropriate assessment.

## 9. Physical and chemical properties

### Appearance

Appearance descriptions are general information and not specific to any USP lot.

#### Physical state

Solid.

#### Form

Crystalline powder. Crystals.

#### Color

White. Cream.

### Odor

Odorless.

### Odor threshold

Not available.

### pH

Not available.

### Melting point/freezing point

343.4 - 356 °F (173 - 180 °C)

### Initial boiling point and boiling range

Not available.

### Flash point

Not available.

### Evaporation rate

Not available.

### Flammability (solid, gas)

Not available.

### Upper/lower flammability or explosive limits

#### Flammability limit - lower (%)

Not available.

#### Flammability limit - upper (%)

Not available.

#### Explosive limit - lower (%)

Not available.

#### Explosive limit - upper (%)

Not available.

|                                                    |                                                                                                                           |
|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| <b>Vapor pressure</b>                              | Not available.                                                                                                            |
| <b>Vapor density</b>                               | Not available.                                                                                                            |
| <b>Relative density</b>                            | Not available.                                                                                                            |
| <b>Solubility(ies)</b>                             |                                                                                                                           |
| <b>Solubility (water)</b>                          | Practically insoluble.                                                                                                    |
| <b>Solubility (other)</b>                          | Acetone: Soluble.<br>Chloroform: Soluble.<br>Dioxane: Soluble.<br>Ethanol: Soluble.<br>Vegetable oils: Sparingly soluble. |
| <b>Partition coefficient<br/>(n-octanol/water)</b> | 3.3                                                                                                                       |
| <b>Auto-ignition temperature</b>                   | Not available.                                                                                                            |
| <b>Decomposition temperature</b>                   | Not available.                                                                                                            |
| <b>Viscosity</b>                                   | Not available.                                                                                                            |
| <b>Other information</b>                           |                                                                                                                           |
| <b>Chemical family</b>                             | Steroid.                                                                                                                  |
| <b>Molecular formula</b>                           | C18H24O2. 1/2H2O                                                                                                          |
| <b>Molecular weight</b>                            | 281.39                                                                                                                    |

## 10. Stability and reactivity

|                                           |                                                                                               |
|-------------------------------------------|-----------------------------------------------------------------------------------------------|
| <b>Reactivity</b>                         | The product is stable and non-reactive under normal conditions of use, storage and transport. |
| <b>Chemical stability</b>                 | Material is stable under normal conditions.                                                   |
| <b>Possibility of hazardous reactions</b> | No dangerous reaction known under conditions of normal use.                                   |
| <b>Conditions to avoid</b>                | Contact with incompatible materials.                                                          |
| <b>Incompatible materials</b>             | Strong oxidizing agents.                                                                      |
| <b>Hazardous decomposition products</b>   | Irritating and/or toxic fumes or gases. Emits toxic fumes under fire conditions.              |

## 11. Toxicological information

### Information on likely routes of exposure

|                                                                                      |                                                                                                                                                                                  |
|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Inhalation</b>                                                                    | Knowledge about health hazard is incomplete.                                                                                                                                     |
| <b>Skin contact</b>                                                                  | Based on information from therapeutic use, this material may cause: Endocrine effects.                                                                                           |
| <b>Eye contact</b>                                                                   | Knowledge about health hazard is incomplete.                                                                                                                                     |
| <b>Ingestion</b>                                                                     | Based on information from therapeutic use, this material may cause: Endocrine effects.                                                                                           |
| <b>Symptoms related to the physical, chemical, and toxicological characteristics</b> | Estrogens: Menstrual irregularities. Fluid retention. Blood clots. Mood or mental changes. Full or tender breasts. Feminization effects in males. Gastrointestinal disturbances. |

### Information on toxicological effects

#### Acute toxicity

| Product                    | Species | Test Results |
|----------------------------|---------|--------------|
| Estradiol (CAS 35380-71-3) |         |              |
| <b>Oral</b><br>LD50        | Mouse   | > 4000 mg/kg |
|                            | Rat     | > 4000 mg/kg |

**Skin corrosion/irritation** Based on available data, the classification criteria are not met.

**Serious eye damage/eye irritation** Knowledge about health hazard is incomplete.

#### Local effects

Skin irritation  
Result: Negative.  
Species: Human

**Local effects**

Skin irritation  
Result: Negative.  
Species: Rabbit

**Respiratory or skin sensitization**

**Respiratory sensitization** Knowledge about health hazard is incomplete.

**Skin sensitization** Based on available data, the classification criteria are not met.

Sensitization  
Result: Negative.  
Species: Guinea pig  
Organ: Skin

**Germ cell mutagenicity** Knowledge about mutagenicity is incomplete.

**Carcinogenicity** May cause cancer.  
Long term use of estrogens in humans has shown an increased risk of endometrial, breast and ovarian cancer. In certain animal species, long term continuous administration of estrogens increased the frequency of cancer of the breast, cervix, vagina, pancreas, testis, uterus and liver.

**IARC Monographs. Overall Evaluation of Carcinogenicity**

Estradiol (CAS 35380-71-3) 1 Carcinogenic to humans.

**OSHA Specifically Regulated Substances (29 CFR 1910.1001-1052)**

Not regulated.

**US. National Toxicology Program (NTP) Report on Carcinogens**

Estradiol (CAS 35380-71-3) Known To Be Human Carcinogen.

**Reproductive toxicity** May damage fertility or the unborn child.  
Studies suggest an association between congenital malformations in the fetus and maternal use of some estrogens during pregnancy.

**Reproductivity**

0.8 - 35 mg/day Reproductivity, Feminization of male fetus genitalia.  
Species: Rat  
10 - 100 microgram/kg Reproductivity, Adverse effects on offspring survival and reproductive organ development.  
Species: Mouse  
Reproductivity, Adverse effects on offspring survival and reproductive organ development. NOEL=0.001mg/kg  
Species: Mouse  
Test Duration: 13 weeks

**Specific target organ toxicity - single exposure** Knowledge about health hazard is incomplete.

**Specific target organ toxicity - repeated exposure** Knowledge about health hazard is incomplete.

**Aspiration hazard** Based on available data, the classification criteria are not met.

**Further information** Potent pharmacologically active material. Occupational exposure to small amounts may cause physiological effects.

**12. Ecological information****Ecotoxicity**

| Product                    | Species | Test Results         |
|----------------------------|---------|----------------------|
| Estradiol (CAS 35380-71-3) |         |                      |
| <b>Aquatic</b>             |         |                      |
| Fish                       | LC50    | 0.002 µg/l, 96 hours |

**Persistence and degradability** No data is available on the degradability of this substance.

**Bioaccumulative potential**

**Octanol/water partition coefficient log Kow**  
3.3

**Mobility in soil** No data available.

**Other adverse effects** No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

### 13. Disposal considerations

|                                              |                                                                                                                                                                                                                            |
|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Disposal instructions</b>                 | Dispose in accordance with all applicable regulations. Under RCRA, it is the responsibility of the user of the product to determine, at the time of disposal, whether the product meets RCRA criteria for hazardous waste. |
| <b>Local disposal regulations</b>            | Dispose in accordance with all applicable regulations.                                                                                                                                                                     |
| <b>Hazardous waste code</b>                  | The waste code should be assigned in discussion between the user, the producer and the waste disposal company.                                                                                                             |
| <b>Waste from residues / unused products</b> | Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).           |
| <b>Contaminated packaging</b>                | Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.                 |

### 14. Transport information

|                                                                                 |                                                                                                               |
|---------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| <b>DOT</b>                                                                      | Not regulated as dangerous goods.                                                                             |
| <b>IATA</b>                                                                     | Not regulated as dangerous goods.                                                                             |
| <b>Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code</b> | Not applicable.                                                                                               |
| <b>General information</b>                                                      | It is the shipper's responsibility to determine the correct transport classification at the time of shipment. |

### 15. Regulatory information

|                               |                                                                                                                |
|-------------------------------|----------------------------------------------------------------------------------------------------------------|
| <b>US federal regulations</b> | This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200. |
|-------------------------------|----------------------------------------------------------------------------------------------------------------|

#### **TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)**

Not regulated.

#### **CERCLA Hazardous Substance List (40 CFR 302.4)**

Not listed.

#### **SARA 304 Emergency release notification**

Not regulated.

#### **OSHA Specifically Regulated Substances (29 CFR 1910.1001-1052)**

Not regulated.

#### **Superfund Amendments and Reauthorization Act of 1986 (SARA)**

##### **SARA 302 Extremely hazardous substance**

Not listed.

##### **SARA 311/312 Hazardous chemical**

Yes

##### **Classified hazard categories**

Carcinogenicity  
Reproductive toxicity

##### **SARA 313 (TRI reporting)**

Not regulated.

#### **Other federal regulations**

##### **Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List**

Not regulated.

##### **Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)**

Not regulated.

##### **Safe Drinking Water Act (SDWA)**

Not regulated.

#### **US state regulations**

##### **California Proposition 65**

WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

**International Inventories**

| <b>Country(s) or region</b> | <b>Inventory name</b>                                                  | <b>On inventory (yes/no)*</b> |
|-----------------------------|------------------------------------------------------------------------|-------------------------------|
| Australia                   | Australian Inventory of Chemical Substances (AICS)                     | No                            |
| Canada                      | Domestic Substances List (DSL)                                         | Yes                           |
| Canada                      | Non-Domestic Substances List (NDSL)                                    | No                            |
| China                       | Inventory of Existing Chemical Substances in China (IECSC)             | No                            |
| Europe                      | European Inventory of Existing Commercial Chemical Substances (EINECS) | No                            |
| Europe                      | European List of Notified Chemical Substances (ELINCS)                 | No                            |
| Japan                       | Inventory of Existing and New Chemical Substances (ENCS)               | No                            |
| Korea                       | Existing Chemicals List (ECL)                                          | No                            |
| New Zealand                 | New Zealand Inventory                                                  | No                            |
| Philippines                 | Philippine Inventory of Chemicals and Chemical Substances (PICCS)      | No                            |
| Taiwan                      | Taiwan Chemical Substance Inventory (TCSI)                             | Yes                           |
| United States & Puerto Rico | Toxic Substances Control Act (TSCA) Inventory                          | No                            |

\*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)

A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

**16. Other information, including date of preparation or last revision**

**Issue date** 06-10-2010

**Revision date** 01-02-2020

**Version #** 05

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