

## SAFETY DATA SHEETS

**This SDS packet was issued with item:**

078778439

**The safety data sheets (SDS) in this packet apply to the individual products listed below. Please refer to invoice for specific item number(s).**

078778447 078778454 078882556 078941619



Merck & Co., Inc.  
One Merck Dr.  
Whitehouse Station, NJ 08889

## MATERIAL SAFETY DATA SHEET

*Merck Animal Health urges each user or recipient of this MSDS to read the entire data sheet to become aware of the hazards associated with this material.*

### SECTION 1. IDENTIFICATION OF SUBSTANCE AND CONTACT INFORMATION

**MSDS NAME:** Florfenicol (300 mg/mL)-Flunixin (16.5 mg/mL)-2-Pyrrolidone Injectable Solution

**SYNONYM(S):** RESFLOR (2-Pyrrolidone) Injectable Solution  
RESFLOR Injectable Solution - Reformulation  
RESFLOR (2-Pyrrolidone) Cattle Injectable  
**RESFLOR Gold**

**MSDS NUMBER:** SP001649

**EMERGENCY NUMBER(S):** (908) 423-6000 (24/7/365) English Only  
Emergencies - CHEMTREC:  
(800) 424-9300 (Inside Continental USA)  
(703) 527-3887 (Outside Continental USA)

**MERCK MSDS HELPLINE:** (800) 770-8878 (US and Canada)  
(908) 473-3371 (Worldwide)  
Monday to Friday, 9am to 5pm (US Eastern Time)

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## SECTION 2. HAZARDS IDENTIFICATION

### EMERGENCY OVERVIEW

Solution  
Yellow-brown  
Odor unknown  
Toxic by inhalation.  
May be harmful if swallowed.  
Irritating to eyes.  
May cause allergic reactions in susceptible individuals.  
*May cause effects to:*  
gastrointestinal tract  
respiratory system  
blood  
liver  
kidney  
male reproductive system  
fetus

May cause impaired fertility.  
May cause developmental effects.  
Toxic to aquatic organisms.  
May cause long-term adverse effects in the aquatic environment.

### POTENTIAL HEALTH EFFECTS:

The toxicological properties of the mixture(s) have not been fully characterized in humans or animals. However, there are data to describe the toxicological properties of the individual ingredients. The following summary is based upon available information about the individual ingredients of the mixture(s), or of the expected properties of the mixture(s).

Florfenicol is a broad spectrum antibiotic used in veterinary products. Florfenicol may cause allergic reactions in susceptible individuals. Based on animal studies, florfenicol may cause slight eye irritation, constipation, changes in blood cell counts, changes in stool, or liver effects. It may also cause developmental effects or effects to male reproductive organs.

Flunixin meglumine is a potent non-narcotic, non-steroidal agent with pain killing, anti-inflammatory, and fever-reducing activity. Based on animal studies, flunixin meglumine may cause severe eye irritation or irreversible ocular effects. It may also cause irritation of the skin, mucous membranes, respiratory tract, and gastrointestinal tract. Repeated dermal contact to high concentrations may cause severe skin irritation. Prolonged inhalation may produce serious lung effects. Repeated ingestion or inhalation of high doses may cause internal bleeding, predominantly of the gastrointestinal tract.

Glyceryl triacetate may cause slight to moderate eye irritation based on animal studies.

2-Pyrrolidone may cause fetal effects based on animal studies.

Malic acid is a relatively strong acid. It may cause severe eye irritation, and skin and mucous membrane irritation.

### LISTED CARCINOGENS

No carcinogens or potential carcinogens listed by OSHA, IARC, NTP or ACGIH are present in concentrations >0.1% in this mixture.

## SECTION 3. COMPOSITION AND INFORMATION ON INGREDIENTS

**PRODUCT USE:** Veterinary product

**CHEMICAL FORMULA:** Mixture.

The formulation for this product is proprietary information. Only hazardous ingredients in concentrations of 1% or greater and/or carcinogenic ingredients in concentrations of 0.1% or greater are listed in the Chemical Composition table. Active ingredients in any concentration are listed. For additional information about carcinogenic ingredients see Section 2.

### CHEMICAL COMPOSITION

**MSDS NAME:** Florfenicol (300 mg/mL)-Flunixin  
(16.5 mg/mL)-2-Pyrrolidone Injectable Solution  
Latest Revision Date: 20-Jan-2012

**MSDS NUMBER:** SP001649

INGREDIENT	CAS NUMBER	PERCENT
Florfenicol	73231-34-2	25
Glyceryl Triacetate	102-76-1	40-50
2-Pyrrolidone	616-45-5	20-30
Malic Acid	6915-15-7	<10
Flunixin Meglumine	42461-84-7	2.2

**ADDITIONAL INFORMATION:**

This MSDS is written to provide health and safety information for individuals who will be handling the final product formulation during research, manufacturing, and distribution. For health and safety information for individual ingredients used during manufacturing, refer to the appropriate MSDS for each ingredient. Refer to the package insert or product label for handling guidance for the consumer.

**SECTION 4. FIRST AID MEASURES**

**INHALATION:**

Remove to fresh air. Administer artificial respiration if breathing has ceased. IMMEDIATELY consult a physician.

**SKIN CONTACT:**

In case of skin contact, while wearing protective gloves, carefully remove any contaminated clothing, including shoes, and wash skin thoroughly with soap and water. If irritation or symptoms occur or persist, consult a physician.

**EYE CONTACT:**

In case of eye contact, immediately rinse eyes thoroughly with plenty of water. If wearing contact lenses, remove only after initial rinse, and continue rinsing eyes for at least 15 minutes. If irritation occurs or persists, consult a physician.

**INGESTION:**

Rinse mouth and drink a glass of water. Do not induce vomiting unless under the direction of a qualified medical professional or Poison Control Center. If symptoms persist, consult a physician.

**NOTE TO PHYSICIAN:**

This product contains florfenicol, a broad spectrum antibiotic which may cause allergic reactions in susceptible individuals. Flunixin meglumine is a potent Non-Steroidal Anti-inflammatory Drug (NSAID), and overexposure may cause gastrointestinal irritation and bleeding, kidney and central nervous system effects.

**SECTION 5. FIRE FIGHTING MEASURES**

**FLAMMABILITY DATA:**

Flash Point: Not determined (liquids) or not applicable (solids).

**SPECIAL FIRE FIGHTING PROCEDURES:**

Wear full protective clothing and self-contained breathing apparatus (SCBA).

**SUITABLE EXTINGUISHING MEDIA:**

Carbon dioxide (CO2), extinguishing powder or water spray.

See Section 9 for Physical and Chemical Properties.

**SECTION 6. ACCIDENTAL RELEASE MEASURES**

**PERSONAL PRECAUTIONS:**

Wear appropriate personal protective equipment as specified in Section 8. Keep personnel away from the clean-up area.

**SPILL RESPONSE / CLEANUP:**

All spills should be handled according to site requirements and based on precautions cited in the MSDS. In the case of liquids, use proper absorbent materials. For laboratories and small-scale operations, incidental spills within a hood or enclosure should be cleaned by using a HEPA filtered vacuum or wet cleaning methods as appropriate. For large dry or liquid spills or those spills outside enclosure or hood, appropriate emergency response personnel should be notified. In manufacturing and large-scale operations, HEPA vacuuming prior to wet mopping or cleaning is required.

**ENVIRONMENTAL PRECAUTIONS:**

This product is toxic to aquatic organisms. Do not allow product to reach ground water, water course, sewage or drainage systems.

See Sections 9 and 10 for additional physical, chemical, and hazard information.

## SECTION 7. HANDLING AND STORAGE

### HANDLING:

Keep containers adequately sealed during material transfer, transport, or when not in use. Wash face, hands, and any exposed skin after handling. Do not eat, drink, or smoke when using this substance or mixture.

Appropriate handling of this material is dependent on many factors, including physical form, duration and frequency of process or task, and effectiveness of engineering controls. Site-specific risk assessments should be conducted to determine the feasibility and the appropriateness of all exposure control measures. See Section 8 (Exposure Controls) for additional guidance.

### STORAGE:

Store in a cool, dry, well ventilated area.

See Section 8 for exposure controls and additional safe handling information.

## SECTION 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

The following guidance applies to the handling of the active ingredient(s) in this formulation.

### OCCUPATIONAL EXPOSURE BAND (OEB):

OEB 3: 10-100 mcg/m<sup>3</sup>. Materials in an OEB 3 category are considered moderate health hazards. The OEB is a range of airborne concentrations expressed as an 8-hour Time Weighted Average (8-hr. TWA) and is intended to be used with Industrial Hygiene Risk Assessment to assist with industrial hygiene sampling and selection of proper controls for worker protection. Consult your site safety and industrial hygiene staff for guidance on handling and control strategies.

### OCCUPATIONAL EXPOSURE GUIDELINE (OEG):

An Occupational Exposure Guideline (OEG) of 80 mcg/m<sup>3</sup> (8-hr TWA) has been established for Florfenicol. Consult your site safety and industrial hygiene professional(s) for additional guidance.

An Occupational Exposure Guideline (OEG) of 18 mcg/m<sup>3</sup> (8-hr TWA) has been established for flunixin. Consult your site safety and industrial hygiene professional(s) for additional guidance.

### OEB/OEL NOTATION(S):

Florfenicol: This material has a notation of "A" for its ability to cause immediate allergic hypersensitivity reactions or anaphylaxis.

Flunixin Meglumine: This material has a notation of "C" for corrosivity.

### EXPOSURE CONTROLS

The health hazard risks of handling this material are dependent on many factors, including physical form, duration and frequency of process or task, and effectiveness of engineering controls. Site-specific risk assessments should be conducted to determine the feasibility and the appropriateness of all exposure control measures. Exposure controls for normal operating or routine procedures follow a tiered strategy. Engineering controls are the preferred means of long-term or permanent exposure control. If engineering controls are not feasible, appropriate use of personal protective equipment (PPE) may be considered as alternative control measures. Exposure controls for non-routine operations must be evaluated and addressed as part of the site-specific risk assessment.

### RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT (PPE):

Respiratory Protection:	Respiratory protective equipment (RPE) may be required for certain laboratory and large-scale manufacturing tasks if potential airborne breathing zone concentrations of substances exceed the relevant exposure limit(s). Workplace risk assessment should be completed before specifying and implementing RPE usage. Potential exposure points and pathways, task duration and frequency, potential employee contact with the substance, and the ability of the substance to be rendered airborne during specific tasks should be evaluated. Initial and ongoing strategies of quantitative exposure measurement should be obtained as required by the workplace risk assessment. All RPE must conform to local and regional specifications for efficacy and performance. Consult your site or corporate health and safety professional for additional guidance.
Skin Protection:	Gloves that provide an appropriate barrier to the skin are recommended if there is potential for contact with this material. Consult your site safety staff for guidance.
Eye Protection:	Safety glasses with side shields. Use of goggles or full face protection may be required based on hazard, potential for contact, or level of exposure. Consult your site safety staff for guidance.
Body Protection:	<p>In small-scale or laboratory operations, lab coats or equivalent protection is required. Disposable Tyvek or other dust impermeable suit should be considered based on procedure or level of exposure. Use of additional PPE such as shoe coverings, gauntlets, hood, or head covering may be necessary. Consult your site safety staff for guidance.</p> <p>In large-scale or manufacturing operations, disposable Tyvek or other dust impermeable suit is recommended and based on level of exposure. Use of additional PPE such as shoe coverings, gauntlets, hood, or head covering may be necessary. Consult your site safety staff for guidance.</p>

## EXPOSURE LIMIT VALUES

See Occupational Exposure Guideline (OEG) listed above.

### SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

**FORM:** Solution  
**COLOR:** Yellow-brown  
**ODOR:** Odor unknown  
**SPECIFIC GRAVITY:** 1.22  
**SOLUBILITY:**  
Water: Not determined

See Section 5 for flammability/explosivity information.

### SECTION 10. STABILITY AND REACTIVITY

**STABILITY/ REACTIVITY:**  
Stable under normal conditions.

**INCOMPATIBLE MATERIALS / CONDITIONS TO AVOID:**  
None known.

**HAZARDOUS DECOMPOSITION PRODUCTS / REACTIONS:**  
No dangerous decomposition is expected if used according to manufacturer's specifications.

### SECTION 12. ECOLOGICAL INFORMATION

There are no data for the final product or its formulation(s). The information presented below pertains to the following ingredient(s).

#### ECOTOXICITY DATA

##### INGREDIENT ECOTOXICITY

Florfenicol: 96-hr LC50 (bluegill): >830 mg/L  
Florfenicol: 96-hr LC50 (trout): >780 mg/L  
Florfenicol: 48-hr EC50 (daphnid): >330 mg/L  
Florfenicol: Algae maximum cell density: MIC = 1.5 mg/L  
Florfenicol: Algae maximum growth rate: MIC >2.9 mg/L

Flunixin meglumine: 96-hr LC50 (trout): 9.2 mg/L  
Flunixin meglumine: 96-hr LC50 (bluegill): 46 mg/L  
Flunixin meglumine: 48-hr EC50 (Daphnia): 25 mg/L  
Flunixin meglumine: 72 hr IC50 (Algae): 36-120 mg/L

#### ENVIRONMENTAL DATA

##### OTHER INGREDIENT ENVIRONMENTAL DATA:

Florfenicol: log Pow (log octanol/water partition coefficient): 2.36  
Florfenicol: Solubility 1.32 mg/ml at pH 7  
Florfenicol: Biodegradability: Not readily biodegradable but there is evidence of inherent biodegradability.

Flunixin Meglumine: log Pow (log octanol/water partition coefficient): 1.34

Glyceryl Triacetate: log Pow (log octanol/water partition coefficient): 0.25  
Glyceryl triacetate is not expected to bioaccumulate or bioconcentrate in aquatic organisms. The estimated BCF is 1.3. It is expected to hydrolyse in soil and water to rapidly biodegradable products.

Malic Acid: log Pow (log octanol/water partition coefficient): -1.26

##### ENVIRONMENTAL FATE AND EFFECTS:

Photolytic half-life of Florfenicol in synthetic humic water (SHW) or pure water (PW) was 196 days in SHW and 171 days in PW.

### SECTION 11. TOXICOLOGICAL INFORMATION

The toxicological properties of the mixture(s) have not been fully characterized in humans or animals. The information presented below pertains to the following individual ingredients, and not to the mixture(s).

**MSDS NAME:** Florfenicol (300 mg/mL)-Flunixin  
(16.5 mg/mL)-2-Pyrrolidone Injectable Solution  
Latest Revision Date: 20-Jan-2012

**MSDS NUMBER:** SP001649

## ACUTE TOXICITY DATA

### INHALATION:

Florfenicol: No mortality occurred in rats exposed to florfenicol for 4 hours at 0.28 mg/L (the maximum concentration tested). Clinical effects included dry rales, anogenital staining, secretory discharge, soft stool, and decreased body weights. These effects were seen immediately or up to one-week post exposure. Some effects did not resolve by study termination.

Flunixin Meglumine: Inhalation LC50 (4hr): <0.52 mg/L (rat)

Mortality occurred in all rats (10/10) between days 3 and 6 following a single 4-hour exposure to an average analytical concentration of 0.52 mg/L (maximum attainable exposure). Signs exhibited following exposure included lacrimation, nasal discharge, dried red material around facial area, and yellow anogenital staining. Significant weight loss was noted following exposure in all animals.

### SKIN:

Florfenicol was not irritating to rabbit skin.

Flunixin meglumine: Slightly irritating

Flunixin meglumine produced mild, transient dermal irritation in rabbits. Dose-related skin irritation effects were observed in rabbits during a 21-day repeat skin application study (see below under Subchronic to Chronic Toxicity).

Glyceryl triacetate was not irritating when absorbed through the skin of guinea pigs.

2-Pyrrolidone was not irritating to the skin of rabbits.

Malic acid was moderately irritating to the skin of rabbits, and strongly irritating to the skin of guinea pigs.

### EYE:

Florfenicol was slightly irritating to the eyes of rabbits.

Flunixin Meglumine: Severely irritating

All six animals exhibited severe conjunctival irritation including redness, swelling, discharge, and necrosis, as well as corneal opacity, ulceration and iridial damage. Severe ocular irritation was irreversible in most animals.

Rabbits treated with 0.1 ml of undiluted glyceryl triacetate exhibited slight to moderate irritation, but produced no effect when immediately rinsed for six minutes.

2-Pyrrolidone was not irritating to the eyes of rabbits.

Malic acid was severely irritating to the eyes of rabbits.

### ORAL:

Florfenicol: Oral LD50: >2000 mg/kg (rat, mouse).

Dogs (one animal/sex) were administered successive oral doses of florfenicol that ranged from 160 to 1280 mg/kg. No clinical effects occurred at doses as high as 640 mg/kg. At 640 mg/kg, the only female died from inhalation of vomitus. Vomiting or soft stool occurred at 640 to 1280 mg/kg.

Flunixin Meglumine: Oral LD50: 53 to 157 mg/kg (rat), 176 to 249 mg/kg (male mouse, female estimated)

Flunixin (free acid): Oral LD50: 468.3 mg/kg (guinea pig)

Common effects observed in acute oral studies across species include gastrointestinal effects (perforation/ulceration and hemorrhage), hypoactivity, pallor, spleen enlargement, congestion of kidneys, lungs, or gastrointestinal tract, and respiratory distress. Necropsy of animals that died from flunixin meglumine revealed abnormalities of the brain, epididymides, abdominal cavity, thymus, liver, mesenteric lymph nodes, esophagus, mesentery, pancreas, and lungs. No signs of toxicity were observed following acute oral administration of 100 & 200 mg/kg to rhesus monkeys. However, 1 of 3 monkeys died following administration of 300 mg/kg. That monkey showed lethargy, prostration, and salivation prior to death, and signs of hyperemic mucosa in gastrointestinal tract and lungs at necropsy. Flunixin administered orally to mice at a dose of 300 mg/kg (100x the projected clinical dose) caused slight tremors and ataxia which resolved within 24 hours. Effects from acute oral and IV treatment of horses with 1.1 mg/kg flunixin were limited to sporadic incidence of fecal occult blood.

Glyceryl triacetate: Oral LD50: 3000-12800 mg/kg (rat); 1100-6100 mg/kg (mouse).

Symptoms observed during the determination of the oral LD50 in rats and mice were weakness and ataxia.

2-Pyrrolidone: Oral LD50: 328-6500 mg/kg (rat); 6500 mg/kg (guinea pig)

Malic Acid: Oral LD50: > 3200 mg/kg (rat); 1600-3200 mg/kg (mouse)

Signs of acute poisoning in rats and mice are weakness, retraction of the abdomen, respiratory distress, and cyanosis.

### DERMAL AND RESPIRATORY SENSITIZATION:

Flunixin Meglumine was found not to be sensitizing in guinea pigs when tested by intradermal induction at 1% and topically at 100%.

Glyceryl triacetate was not a skin sensitizer in guinea pigs.

**ADDITIONAL INFORMATION:**

Florfenicol: Intraperitoneal LD50: 1913-2253 mg/kg (rat)

Clinical signs of toxicity noted in rats treated with 1000 to 2000 mg/kg florfenicol included hypoactivity, wet or stained urogenital hair, chromorhinorrhea, or discolored stool. Abnormal pathological findings in rats included white, granular foci on surface of the liver or intestines, or pale or friable kidneys (high dose group).

**REPEAT DOSE TOXICITY DATA****SUBCHRONIC / CHRONIC TOXICITY:**

Florfenicol was administered orally to dogs, rats, and mice at dosages as high as 100 to 400 mg/kg/day for up to 13 weeks. Effects including decreased body weight, changes in liver weight or liver enzyme levels, changes in testicular weight, testicular atrophy, decreased white blood cell counts, and decreased hemoglobin levels were observed at high dosages. Cellular changes in the liver or lymph nodes of rats and mice, and histopathologic changes in the brain and spinal cord of dogs were also noted at these high dosages. Although some effects were reversible after a 4-week withdrawal from treatment, testicular effects in rats persisted. Intramuscular injections of 45 mg/kg of florfenicol in swine produced diarrhea, injection site lesions, decreased body weight, decreased food and water consumption, changes in serum electrolytes and proteins, decreased red blood cell and white blood cell counts, decreased spleen weight, and decreased kidney weight.

In 52-week oral toxicity studies in dogs and rats, high dosages of florfenicol (12 and 48 mg/kg/day, respectively) increased liver weight and produced cellular changes in the gall bladder of dogs. In rats, florfenicol at the high dosage reduced body weight gain, reduced testicular weight, induced changes in hematologic and clinical chemistry parameters, and increased the incidence of testicular tubular atrophy. In two-year chronic studies in mice and rats, florfenicol caused similar effects as those observed in other long-term studies including reduced body weight gain, reduced red blood cell count, reduced hemoglobin levels, and testicular effects such as small testes, tubular atrophy and aspermatogenesis in both the high dosage rats (48 mg/kg/day) and mice (200 mg/kg/day).

Repeat oral dosing studies have been performed with flunixin across multiple species. The most common adverse effect seen in these studies is gastrointestinal irritation/ulceration and bleeding as indicated by blood in the stools. Other common adverse effects observed across species from oral, IV or IM routes of exposure include nephrotoxicity, emesis, anorexia, and bleeding. Blood cell count changes, blood coagulation effects, and immune organ effects were observed secondary to gastrointestinal erosion and bleeding. Liver, nervous system and behavioral effects were also noted in mice. In addition to ulceration and bleeding, significant mortality was observed in rats at 8 and 16 mg/kg dosed for six weeks. [6-week oral toxicity NOAEL: 2 mg/kg (rats); 90-day oral toxicity NOAEL: 5 mg/kg (monkeys), 3.0 mg/kg (rats); one year oral toxicity NOEL: 1 mg flunixin/kg (rats)]

In several 21-day repeat skin application studies in rabbits using up to 80 mg/kg flunixin meglumine or the free acid in spray or cream formulations, no conclusive treatment-related toxicity could be established. The incidence and severity of dermal irritation increased in a dose-related manner with severe irritation seen at 80 mg/kg/day.

Rats exposed to inhalation doses of glyceryl triacetate at 250 ppm for 13 weeks, and saturated vapors for 5 days, produced no symptoms or histopathological effects.

**REPRODUCTIVE / DEVELOPMENTAL TOXICITY:**

In a two-generation reproductive study, oral administration as high as 12 mg/kg/day of florfenicol reduced epididymal weights, decreased pup survival, and reduced lactation index in rats [NOAEL: 3 mg/kg/day].

There was no evidence of teratogenicity in rats administered florfenicol at dosages of 4, 12 or 40 mg/kg/day. Slight maternal toxicity, evidenced by decreased food and water consumption, was observed above 4 mg/kg/day. At 40 mg/kg/day, an increased incidence of delayed ossification and decreased fetal weight occurred. The NOAEL for maternal and fetal toxicity in rats was determined to be 4 mg florfenicol/kg/day.

Two teratogenicity studies were performed in mice. In the first study, the mice were administered florfenicol at dosages of 40, 120, or 400 mg/kg by gavage on days 6-15 of gestation. Florfenicol produced embryoletality at the 400 mg/kg/day dose level, which was evidenced by the high incidence of intrauterine deaths. Significant decreases in mean fetal body weight, soft tissue defects, and retarded skeletal ossification were also observed at 400 mg/kg/day. Skeletal ossification was less pronounced, in a dose-related fashion, at the lower doses tested (40 and 120 mg/kg/day). A developmental NOAEL could not be determined for these data [NOAEL for maternal: 120 mg/kg]. In the second teratogenicity study, florfenicol was retested at lower administered dosages of 1, 3, or 60 mg/kg/day. Maternal effects were limited to a slight increase in water consumption at the 60 mg/kg/day dose. There was no evidence of any adverse effects on the embryo/fetus at doses as high as 60 mg/kg/day in this study. However, based upon the retarded skeletal ossification effects observed in the first study at 40 mg/kg/day the NOAEL for the two studies combined was determined to be between 3 and 40 mg/kg/day.

Reproductive and teratology studies in rats, mice and rabbits were performed with flunixin. Although significant maternal toxicity, including mortality, was reported, these studies indicate that flunixin does not affect offspring development, male or female fertility, or mating behavior. A slight increase in the length of gestation and difficult labor with an increase in stillbirths were observed. No evidence of any drug-related teratogenic effects were observed. Maternal toxicity observed in these studies was consistent with those findings in acute and repeated dose oral toxicity studies with the addition of pale eyes, ears and extremities. [Reproductive or developmental NOELs ranged from 2-21 mg/kg in studies with multiple species. Maternal toxicity NOELs ranged from 3-9 mg/kg in these studies].

2-Pyrrolidone was embryotoxic but not teratogenic in mice exposed through oral and intraperitoneal routes of exposure. Maternal toxicity and malformations were observed in rats orally administered 1900 mg/kg/day. In a study conducted in rats, the inhalation of 150 ppm of 2-pyrrolidone on days 7 to 20 of gestation was associated with decreased pup weights and delays in developmental milestones.

**MUTAGENICITY / GENOTOXICITY:**

Florfenicol was negative in a bacterial mutagenicity study (Ames), a mammalian mutagenicity study (mouse lymphoma), a bone marrow micronucleus assay, an in vitro chromosomal aberration assay in CHO cells, a cytogenetics assay in bone marrow, and an unscheduled DNA synthesis assay in rat hepatocytes.

Flunixin meglumine was negative in the Ames and mouse micronucleus assays. It was positive in mouse lymphoma L5178Y cells, both in the absence and presence of S-9 metabolic activation and in the chromosomal aberration assay in CHO cells in vitro both in the absence and presence of S-9 metabolic activation. It has been reported to alter cellular DNA and caused primary DNA damage in E. coli. Flunixin free acid yielded the same results as flunixin meglumine. However, it was inconclusive in the bacterial repair assay in E. coli whereas flunixin meglumine was strongly positive. The meglumine moiety (N-methyl-D glucamine) was negative in all studies performed except the micronucleus study in which it was positive in one study and negative in a second.

2-Pyrrolidone was not mutagenic in a bacterial mutagenicity assay (Ames).

Malic acid was negative in bacterial mutagenicity studies (Ames), either in the absence or presence of metabolic activation. Malic acid was not clastogenic in Chinese hamster fibroblast cells.

**CARCINOGENICITY:**

Florfenicol was not carcinogenic in a 2-year study in rats administered dosages up to 48 mg/kg/day for 5 days a week or in mice at dosages up to 200 mg/kg/day for 5 days per week.

Flunixin meglumine had no carcinogenic effects or increase in tumor incidence relative to controls in either a 104-week study in rats administered 2, 4 and 8 mg flunixin meglumine/kg/day in the diet, or in mice administered 0.6, 2.0 and 6.0 mg flunixin meglumine/kg/day in the diet for 97 weeks. Significant toxicity observed in rats and mice included decreased body weights, increased mortality (high dose groups) and dose-related increases in gastrointestinal lesions in all treated groups. Compound-related lesions observed at necropsy included dose-related gastrointestinal ulcers, ulcer perforation with secondary peritonitis and adhesion formation, and large or edematous lymph nodes. Dose-related nonproliferative lesions were present in the gastrointestinal tract and mesenteric lymph node. Necrosis and ulceration of the mucosa, transmural necrosis, mucosal and mural inflammation, lymphoid hyperplasia, peritonitis and abscess formation were present. Inflammatory lesions and necrosis secondary to the peritonitis were present in other abdominal organs. Splenomegaly (enlarged spleens) were observed at necropsy in mice and were significant in the high dose group only. [Rat NOEL for tumor formation = 8 mg flunixin meglumine/kg/day and the LOEL = 2 mg flunixin meglumine/kg/day based on GI lesions. Mouse NOEL for tumor formation = 6.0 mg flunixin meglumine/kg/day; Toxicity NOEL = 0.6 mg flunixin meglumine/kg/day].

**SECTION 13. DISPOSAL CONSIDERATIONS****MATERIAL WASTE:**

Disposal must be in accordance with applicable federal, state/provincial, and/or local regulations. Incineration is the preferred method of disposal, when appropriate. Operations that involve the crushing or shredding of waste materials or returned goods must be handled to meet the recommended exposure limit(s).

**PACKAGING AND CONTAINERS:**

Disposal must be in accordance with applicable federal, state/provincial, and/or local regulations.

**SPECIAL ENVIRONMENTAL HANDLING PROCEDURES:**

This product contains materials that are harmful to the environment. Do not allow undiluted/unneutralized product to reach ground water, water course, sewage or drainage systems.

**SECTION 14. TRANSPORT INFORMATION**

This material is not subject to the transportation regulations of DOT, IATA, IMO, and the ADR.

**SECTION 15. REGULATORY INFORMATION****TSCA LISTING**

INGREDIENT	TSCA
Glyceryl Triacetate	X
2-Pyrrolidone	X
Malic Acid	X

Substances not included in the table above are TSCA exempt or not regulated under TSCA.

**U.S. STATE REGULATIONS**

INGREDIENT	California Proposition 65	CARTK	NJRTK	CTR TK	MARTK
2-Pyrrolidone					X

INGREDIENT	PARTK	MNRTK	MIRTK	RIRTK
2-Pyrrolidone	X			

Fields in the above tables that do not contain data indicate that those materials have not been listed by local regulations.

X: Listed on applicable state hazardous substance or right-to-know lists.

## SECTION 16. OTHER INFORMATION

Although reasonable care has been taken in the preparation of this document, we extend no warranties and make no representations as to the accuracy or completeness of the information contained therein, and assume no responsibility regarding the suitability of this information for the user's intended purposes or for the consequence of its use. Each individual should make a determination as to the suitability of the information for their particular purpose(s).

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**DEPARTMENT ISSUING MSDS:**

Global Safety & the Environment  
Merck & Co., Inc.  
One Merck Drive  
Whitehouse Station, NJ 08889

**MERCK MSDS HELPLINE:**

(800) 770-8878 (US and Canada)  
(908) 473-3371 (Worldwide)  
Monday to Friday, 9am to 5pm (US Eastern Time)

**MSDS CREATION DATE:**

13-Apr-2006

**SUPERSEDES DATE:**

07-May-2010

**SECTIONS CHANGED (US SUBFORMAT):**

2, 11

**SIGNIFICANT CHANGES (US SUBFORMAT):**

OEB

**Florfenicol / Flunixin Formulation**

Version	Revision Date:	SDS Number:	Date of last issue: 04/12/2018
6.2	06/05/2018	28058-00011	Date of first issue: 11/04/2014

**SECTION 1. IDENTIFICATION**

Product name : Florfenicol / Flunixin Formulation

**Manufacturer or supplier's details**

Company name of supplier : Merck & Co., Inc

Address : 2000 Galloping Hill Road  
Kenilworth - New Jersey - U.S.A. 07033

Telephone : 908-740-4000

Telefax : 908-735-1496

Emergency telephone : 1-908-423-6000

E-mail address : EHSDATASTEWARD@merck.com

**Recommended use of the chemical and restrictions on use**

Recommended use : Veterinary product

**SECTION 2. HAZARDS IDENTIFICATION****GHS classification in accordance with 29 CFR 1910.1200**

Acute toxicity (Oral) : Category 4

Acute toxicity (Inhalation) : Category 4

Eye irritation : Category 2A

Reproductive toxicity : Category 2

Specific target organ  
systemic toxicity - repeated  
exposure : Category 1 (Liver, Brain, Testes, Spinal cord, Blood, gallbladder,  
Gastrointestinal tract, Kidney)

**GHS label elements**

Hazard pictograms :



Signal Word : Danger

Hazard Statements : H302 + H332 Harmful if swallowed or if inhaled.  
H319 Causes serious eye irritation.  
H361fd Suspected of damaging fertility. Suspected of damaging  
the unborn child.  
H372 Causes damage to organs (Liver, Brain, Testes, Spinal  
cord, Blood, gallbladder, Gastrointestinal tract, Kidney) through  
prolonged or repeated exposure.

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**Precautionary Statements**

:

**Prevention:**

P201 Obtain special instructions before use.  
P202 Do not handle until all safety precautions have been read and understood.  
P260 Do not breathe mist or vapors.  
P264 Wash skin thoroughly after handling.  
P270 Do not eat, drink or smoke when using this product.  
P271 Use only outdoors or in a well-ventilated area.  
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.

**Response:**

P301 + P312 + P330 IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. Rinse mouth.  
P304 + P340 + P312 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.  
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.  
P308 + P313 IF exposed or concerned: Get medical advice/ attention.  
P337 + P313 If eye irritation persists: Get medical advice/ attention.

**Storage:**

P405 Store locked up.

**Disposal:**

P501 Dispose of contents/ container to an approved waste disposal plant.

**Other hazards**

None known.

---

**SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS**

Substance / Mixture

:

Mixture

**Hazardous ingredients**

Chemical name	CAS-No.	Concentration (% w/w)
Florfenicol	73231-34-2	>= 20 - < 30
2-Pyrrolidone	616-45-5	>= 20 - < 30
Malic Acid	6915-15-7	>= 1 - < 5
1-Deoxy-1-(methylamino)-D-glucitol 2-[2-methyl-3-(perfluoromethyl)anilino]nicotinate	42461-84-7	>= 1 - < 3

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**SECTION 4. FIRST AID MEASURES**

General advice

:

In the case of accident or if you feel unwell, seek medical

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- advice immediately., When symptoms persist or in all cases of doubt seek medical advice.
- If inhaled : If inhaled, remove to fresh air.  
If not breathing, give artificial respiration.  
If breathing is difficult, give oxygen.  
Get medical attention.
- In case of skin contact : In case of contact, immediately flush skin with soap and plenty of water.  
Remove contaminated clothing and shoes.  
Get medical attention.  
Wash clothing before reuse.  
Thoroughly clean shoes before reuse.
- In case of eye contact : In case of contact, immediately flush eyes with plenty of water for at least 15 minutes.  
If easy to do, remove contact lens, if worn.  
Get medical attention.
- If swallowed : If swallowed, DO NOT induce vomiting.  
Get medical attention.  
Rinse mouth thoroughly with water.  
Never give anything by mouth to an unconscious person.
- Most important symptoms and effects, both acute and delayed : Harmful if swallowed or if inhaled.  
Causes serious eye irritation.  
Suspected of damaging fertility. Suspected of damaging the unborn child.  
Causes damage to organs through prolonged or repeated exposure.
- Protection of first-aiders : First Aid responders should pay attention to self-protection, and use the recommended personal protective equipment when the potential for exposure exists.
- Notes to physician : Treat symptomatically and supportively.

### SECTION 5. FIRE-FIGHTING MEASURES

- Suitable extinguishing media : Water spray  
Alcohol-resistant foam  
Carbon dioxide (CO<sub>2</sub>)  
Dry chemical
- Unsuitable extinguishing media : None known.
- Specific hazards during fire fighting : Exposure to combustion products may be a hazard to health.
- Hazardous combustion products : Carbon oxides  
Fluorine compounds  
Nitrogen oxides (NO<sub>x</sub>)

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- Specific extinguishing methods : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.  
Use water spray to cool unopened containers.  
Remove undamaged containers from fire area if it is safe to do so.  
Evacuate area.
- Special protective equipment for fire-fighters : In the event of fire, wear self-contained breathing apparatus.  
Use personal protective equipment.

**SECTION 6. ACCIDENTAL RELEASE MEASURES**

- Personal precautions, protective equipment and emergency procedures : Use personal protective equipment.  
Follow safe handling advice and personal protective equipment recommendations.
- Environmental precautions : Discharge into the environment must be avoided.  
Prevent further leakage or spillage if safe to do so.  
Prevent spreading over a wide area (e.g., by containment or oil barriers).  
Retain and dispose of contaminated wash water.  
Local authorities should be advised if significant spillages cannot be contained.
- Methods and materials for containment and cleaning up : Soak up with inert absorbent material.  
For large spills, provide diking or other appropriate containment to keep material from spreading. If diked material can be pumped, store recovered material in appropriate container.  
Clean up remaining materials from spill with suitable absorbent.  
Local or national regulations may apply to releases and disposal of this material, as well as those materials and items employed in the cleanup of releases. You will need to determine which regulations are applicable.  
Sections 13 and 15 of this SDS provide information regarding certain local or national requirements.

**SECTION 7. HANDLING AND STORAGE**

- Technical measures : See Engineering measures under EXPOSURE CONTROLS/PERSONAL PROTECTION section.
- Local/Total ventilation : Use with local exhaust ventilation.
- Advice on safe handling : Do not breathe vapors or spray mist.  
Do not swallow.  
Do not get in eyes.  
Avoid prolonged or repeated contact with skin.  
Handle in accordance with good industrial hygiene and safety practice, based on the results of the workplace exposure assessment  
Keep container tightly closed.

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Take care to prevent spills, waste and minimize release to the environment.

Conditions for safe storage : Keep in properly labeled containers.  
Store locked up.  
Keep tightly closed.  
Keep in a cool, well-ventilated place.  
Store in accordance with the particular national regulations.

Materials to avoid : Do not store with the following product types:  
Strong oxidizing agents  
Organic peroxides  
Explosives  
Gases

**SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION****Ingredients with workplace control parameters**

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
Florfenicol	73231-34-2	TWA	100 µg/m <sup>3</sup> (OEB 2)	Internal
1-Deoxy-1-(methylamino)-D-glucitol 2-[2-methyl-3-(perfluoromethyl)anilino]nicotinate	42461-84-7	TWA	40 µg/m <sup>3</sup> (OEB 3)	Internal
		Wipe limit	400 µg/100 cm <sup>2</sup>	Internal

**Engineering measures** : Use appropriate engineering controls and manufacturing technologies to control airborne concentrations (e.g., drip-less quick connections).  
All engineering controls should be implemented by facility design and operated in accordance with GMP principles to protect products, workers, and the environment.  
Containment technologies suitable for controlling compounds are required to control at source and to prevent migration of the compound to uncontrolled areas (e.g., open-face containment devices).  
Minimize open handling.

**Personal protective equipment**

Respiratory protection : General and local exhaust ventilation is recommended to maintain vapor exposures below recommended limits. Where concentrations are above recommended limits or are unknown, appropriate respiratory protection should be worn. Follow OSHA respirator regulations (29 CFR 1910.134) and use NIOSH/MSHA approved respirators. Protection provided by air purifying respirators against exposure to any hazardous chemical is limited. Use a positive pressure air supplied respirator if there is any potential for uncontrolled release, exposure levels are unknown, or any other

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circumstance where air purifying respirators may not provide adequate protection.

**Hand protection**

Material : Chemical-resistant gloves

Remarks : Consider double gloving.

**Eye protection**

: Wear safety glasses with side shields or goggles.  
If the work environment or activity involves dusty conditions, mists or aerosols, wear the appropriate goggles.  
Wear a faceshield or other full face protection if there is a potential for direct contact to the face with dusts, mists, or aerosols.

**Skin and body protection**

: Work uniform or laboratory coat.  
Additional body garments should be used based upon the task being performed (e.g., sleevelets, apron, gauntlets, disposable suits) to avoid exposed skin surfaces.  
Use appropriate degowning techniques to remove potentially contaminated clothing.

**Hygiene measures**

: Ensure that eye flushing systems and safety showers are located close to the working place.  
When using do not eat, drink or smoke.  
Wash contaminated clothing before re-use.  
The effective operation of a facility should include review of engineering controls, proper personal protective equipment, appropriate degowning and decontamination procedures, industrial hygiene monitoring, medical surveillance and the use of administrative controls.

**SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES**

Appearance	: liquid
Color	: yellow
Odor	: No information available.
Odor Threshold	: No data available
pH	: No data available
Melting point/freezing point	: No data available
Initial boiling point and boiling range	: No data available
Flash point	: No data available
Evaporation rate	: No data available

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Flammability (solid, gas)	:	Not applicable
Flammability (liquids)	:	No data available
Upper explosion limit / Upper flammability limit	:	No data available
Lower explosion limit / Lower flammability limit	:	No data available
Vapor pressure	:	No data available
Relative vapor density	:	No data available
Relative density	:	1.22
Density	:	No data available
Solubility(ies) Water solubility	:	No data available
Partition coefficient: n-octanol/water	:	Not applicable
Autoignition temperature	:	No data available
Decomposition temperature	:	No data available
Viscosity Viscosity, kinematic	:	No data available
Explosive properties	:	Not explosive
Oxidizing properties	:	The substance or mixture is not classified as oxidizing.
Particle size	:	Not applicable

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**SECTION 10. STABILITY AND REACTIVITY**

Reactivity	:	Not classified as a reactivity hazard.
Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	Can react with strong oxidizing agents.
Conditions to avoid	:	None known.
Incompatible materials	:	Oxidizing agents
Hazardous decomposition products	:	No hazardous decomposition products are known.

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**SECTION 11. TOXICOLOGICAL INFORMATION****Information on likely routes of exposure**

Inhalation  
Skin contact  
Ingestion  
Eye contact

**Acute toxicity**

Harmful if swallowed or if inhaled.

**Product:**

Acute oral toxicity	:	Acute toxicity estimate: 1,320 mg/kg Method: Calculation method
Acute inhalation toxicity	:	Acute toxicity estimate: 2.28 mg/l Exposure time: 4 h Test atmosphere: dust/mist Method: Calculation method

**Components:****Florfenicol:**

Acute oral toxicity	:	LD50 (Rat): > 2,000 mg/kg LD50 (Mouse): > 2,000 mg/kg LD50 (Dog): > 1,280 mg/kg
Acute inhalation toxicity	:	LC50 (Rat): > 0.28 mg/l Exposure time: 4 h
Acute dermal toxicity	:	Remarks: No data available
Acute toxicity (other routes of administration)	:	LD50 (Rat): 1,913 - 2,253 mg/kg Application Route: Intraperitoneal LD50 (Mouse): 100 mg/kg Application Route: Intravenous

**2-Pyrrolidone:**

Acute oral toxicity	:	LD50 (Rat): > 2,000 mg/kg Method: OECD Test Guideline 401
Acute inhalation toxicity	:	LC0 (Rat): 0.061 mg/l Exposure time: 8 h Test atmosphere: vapor
Acute dermal toxicity	:	LD50 (Rabbit): > 2,000 mg/kg Method: OECD Test Guideline 402 Assessment: The substance or mixture has no acute dermal toxicity

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**Malic Acid:**

Acute oral toxicity	:	LD50 (Rat): 3,500 mg/kg
Acute inhalation toxicity	:	LC50 (Rat): > 1.306 mg/l Exposure time: 4 h Test atmosphere: dust/mist Method: OECD Test Guideline 403 Assessment: The substance or mixture has no acute inhalation toxicity Remarks: Based on data from similar materials
Acute dermal toxicity	:	LD50 (Rat): 20,000 mg/kg Remarks: Based on data from similar materials

**1-Deoxy-1-(methylamino)-D-glucitol 2-[2-methyl-3-(perfluoromethyl)anilino]nicotinate:**

Acute oral toxicity	:	LD50 (Rat): 53 - 157 mg/kg LD50 (Mouse): 176 - 249 mg/kg LD50 (Guinea pig): 488.3 mg/kg LD50 (Monkey): 300 mg/kg
Acute inhalation toxicity	:	LC50 (Rat): < 0.52 mg/l Exposure time: 4 h Test atmosphere: dust/mist
Acute toxicity (other routes of administration)	:	LD50 (Rat): 59.4 - 185.3 mg/kg Application Route: Intraperitoneal LD50 (Mouse): 164 - 363 mg/kg Application Route: Intraperitoneal

**Skin corrosion/irritation**

Not classified based on available information.

**Components:****Florfenicol:**

Species	:	Rabbit
Result	:	No skin irritation

**2-Pyrrolidone:**

Species	:	Rabbit
Method	:	OECD Test Guideline 404
Result	:	No skin irritation

**Malic Acid:**

Species	:	Rabbit
Method	:	OECD Test Guideline 404
Result	:	No skin irritation
Remarks	:	Based on data from similar materials

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**1-Deoxy-1-(methylamino)-D-glucitol 2-[2-methyl-3-(perfluoromethyl)anilino]nicotinate:**

Species	:	Rabbit
Result	:	Mild skin irritation

**Serious eye damage/eye irritation**

Causes serious eye irritation.

**Components:****Florfenicol:**

Species	:	Rabbit
Result	:	Mild eye irritation

**2-Pyrrolidone:**

Species	:	Rabbit
Result	:	Irritation to eyes, reversing within 7 days

**Malic Acid:**

Species	:	Rabbit
Result	:	Irritation to eyes, reversing within 21 days
Method	:	OECD Test Guideline 405
Remarks	:	Based on data from similar materials

**1-Deoxy-1-(methylamino)-D-glucitol 2-[2-methyl-3-(perfluoromethyl)anilino]nicotinate:**

Species	:	Rabbit
Result	:	Irreversible effects on the eye

**Respiratory or skin sensitization****Skin sensitization**

Not classified based on available information.

**Respiratory sensitization**

Not classified based on available information.

**Components:****Florfenicol:**

Test Type	:	Maximization Test
Species	:	Guinea pig
Result	:	negative

**2-Pyrrolidone:**

Test Type	:	Local lymph node assay (LLNA)
Routes of exposure	:	Skin contact
Species	:	Mouse
Method	:	OECD Test Guideline 429
Result	:	negative
Remarks	:	Based on data from similar materials

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**Malic Acid:**

Test Type	: Maximization Test
Routes of exposure	: Skin contact
Species	: Guinea pig
Method	: OECD Test Guideline 406
Result	: negative
Remarks	: Based on data from similar materials

**1-Deoxy-1-(methylamino)-D-glucitol 2-[2-methyl-3-(perfluoromethyl)anilino]nicotinate:**

Test Type	: Maximization Test
Routes of exposure	: Dermal
Species	: Guinea pig
Assessment	: Does not cause skin sensitization.
Result	: negative

**Germ cell mutagenicity**

Not classified based on available information.

**Components:****Florfenicol:**

Genotoxicity in vitro	: Test Type: Bacterial reverse mutation assay (AMES) Result: negative
	Test Type: DNA damage and repair, unscheduled DNA synthesis in mammalian cells (in vitro) Test system: rat hepatocytes Result: negative
	Test Type: In vitro mammalian cell gene mutation test Test system: mouse lymphoma cells Result: negative
	Test Type: Chromosome aberration test in vitro Test system: Chinese hamster ovary cells Result: positive
Genotoxicity in vivo	: Test Type: Micronucleus test Species: Mouse Cell type: Bone marrow Application Route: Oral Result: negative

**2-Pyrrolidone:**

Genotoxicity in vitro	: Test Type: In vitro mammalian cell gene mutation test Method: OECD Test Guideline 476 Result: negative
	Test Type: Chromosome aberration test in vitro Method: OECD Test Guideline 473 Result: negative
	Test Type: Bacterial reverse mutation assay (AMES)

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Method: OECD Test Guideline 471

Result: negative

Genotoxicity in vivo : Test Type: Mammalian erythrocyte micronucleus test (in vivo cytogenetic assay)  
 Species: Mouse  
 Application Route: Intraperitoneal injection  
 Method: OECD Test Guideline 474  
 Result: negative

### Malic Acid:

Genotoxicity in vitro : Test Type: Chromosome aberration test in vitro  
 Result: negative

### 1-Deoxy-1-(methylamino)-D-glucitol 2-[2-methyl-3-(perfluoromethyl)anilino]nicotinate:

Genotoxicity in vitro : Test Type: Bacterial reverse mutation assay (AMES)  
 Result: negative

Test Type: in vitro test  
 Test system: mouse lymphoma cells  
 Result: positive

Test Type: Chromosomal aberration  
 Test system: Chinese hamster ovary cells  
 Result: positive

Test Type: in vitro test  
 Test system: Escherichia coli  
 Result: positive

Genotoxicity in vivo : Test Type: Micronucleus test  
 Species: Mouse  
 Application Route: Oral  
 Result: negative

Germ cell mutagenicity - Assessment : Weight of evidence does not support classification as a germ cell mutagen.

### Carcinogenicity

Not classified based on available information.

### Components:

#### Florfenicol:

Species : Rat  
 Application Route : oral (gavage)  
 Exposure time : 2 Years  
 Result : negative  
 Target Organs : Liver, Testes

Species : Mouse  
 Application Route : oral (gavage)  
 Exposure time : 2 Years

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Result : negative  
Target Organs : Testes, Blood

### 1-Deoxy-1-(methylamino)-D-glucitol 2-[2-methyl-3-(perfluoromethyl)anilino]nicotinate:

Species : Rat  
Application Route : oral (feed)  
Exposure time : 104 w  
LOAEL : 2 mg/kg body weight  
Result : negative  
Target Organs : Gastrointestinal tract  
Remarks : Significant toxicity observed in testing

Species : Mouse  
Application Route : oral (feed)  
Exposure time : 97 w  
NOAEL : 0.6 mg/kg body weight  
Result : negative  
Target Organs : Gastrointestinal tract  
Remarks : Significant toxicity observed in testing

**IARC** No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

**OSHA** No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

**NTP** No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

### Reproductive toxicity

Suspected of damaging fertility. Suspected of damaging the unborn child.

### Components:

#### Florfenicol:

Effects on fertility : Test Type: Two-generation reproduction toxicity study  
Species: Rat  
Application Route: Oral  
Fertility: LOAEL: 12 mg/kg body weight  
Result: decreased pup survival, reduced lactation

Effects on fetal development : Test Type: Embryo-fetal development  
Species: Rat  
General Toxicity Maternal: NOAEL: 4 mg/kg body weight  
Embryo-fetal toxicity.: LOAEL: 40 mg/kg body weight  
Result: No teratogenic effects., Fetotoxicity.  
Remarks: The effects were seen only at maternally toxic doses.

Test Type: Embryo-fetal development  
Species: Mouse  
Application Route: oral (gavage)  
General Toxicity Maternal: NOAEL: 120 mg/kg body weight  
Embryo-fetal toxicity.: LOAEL: 40 mg/kg body weight

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Result: Fetotoxicity.

Reproductive toxicity - Assessment : Some evidence of adverse effects on sexual function and fertility, based on animal experiments., Some evidence of adverse effects on development, based on animal experiments.

### 2-Pyrrolidone:

Effects on fertility : Species: Rat  
Application Route: Ingestion  
Result: negative

Effects on fetal development : Test Type: Embryo-fetal development  
Species: Rat  
Application Route: Ingestion  
Result: negative

### Malic Acid:

Effects on fertility : Test Type: Two-generation reproduction toxicity study  
Species: Rat  
Application Route: Ingestion  
Result: negative

Effects on fetal development : Test Type: Embryo-fetal development  
Species: Rat  
Application Route: Ingestion  
Result: negative

### 1-Deoxy-1-(methylamino)-D-glucitol 2-[2-methyl-3-(perfluoromethyl)anilino]nicotinate:

Effects on fertility : Test Type: Two-generation reproduction toxicity study  
Species: Rat  
Application Route: Oral  
General Toxicity Parent: LOAEL: 1 - 1.5 mg/kg body weight  
Symptoms: No fetal abnormalities.  
Result: No effects on fertility and early embryonic development were detected.

Effects on fetal development : Test Type: Development  
Species: Rat  
Application Route: Oral  
General Toxicity Maternal: LOAEL: 2 mg/kg body weight  
Embryo-fetal toxicity.: NOAEL: 2 mg/kg body weight  
Result: Embryotoxic effects and adverse effects on the offspring were detected only at high maternally toxic doses

Test Type: Embryo-fetal development  
Species: Rabbit  
Application Route: Oral  
General Toxicity Maternal: LOAEL: 3 mg/kg body weight  
Embryo-fetal toxicity.: NOAEL: 3 mg/kg body weight  
Result: Embryotoxic effects and adverse effects on the offspring were detected only at high maternally toxic doses

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**STOT-single exposure**

Not classified based on available information.

**Components:****1-Deoxy-1-(methylamino)-D-glucitol 2-[2-methyl-3-(perfluoromethyl)anilino]nicotinate:**

Assessment : May cause respiratory irritation.

**STOT-repeated exposure**

Causes damage to organs (Liver, Brain, Testes, Spinal cord, Blood, gallbladder, Gastrointestinal tract, Kidney) through prolonged or repeated exposure.

**Components:****Florfenicol:**

Target Organs : Liver, Brain, Testes, Spinal cord, Blood, gallbladder  
Assessment : Causes damage to organs through prolonged or repeated exposure.

**1-Deoxy-1-(methylamino)-D-glucitol 2-[2-methyl-3-(perfluoromethyl)anilino]nicotinate:**

Target Organs : Gastrointestinal tract, Kidney, Blood  
Assessment : Causes damage to organs through prolonged or repeated exposure.

**Repeated dose toxicity****Components:****Florfenicol:**

Species : Dog  
NOAEL : 3 mg/kg  
Exposure time : 13 Weeks  
Target Organs : Liver, Testes, Brain, Spinal cord

Species : Mouse  
NOAEL : 200 mg/kg  
Exposure time : 13 Weeks  
Target Organs : Liver, Testes

Species : Rat  
NOAEL : 30 mg/kg  
Exposure time : 13 Weeks  
Target Organs : Liver, Testes

Species : Dog  
NOAEL : 3 mg/kg  
LOAEL : 12 mg/kg  
Exposure time : 52 Weeks  
Target Organs : Liver, gallbladder

Species : Rat  
NOAEL : 1 mg/kg  
LOAEL : 3 mg/kg  
Exposure time : 52 Weeks

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Target Organs : Testes

**2-Pyrrolidone:**

Species : Rat  
NOAEL : 207 mg/kg  
Application Route : Ingestion  
Exposure time : 3 Months  
Method : OECD Test Guideline 408

**1-Deoxy-1-(methylamino)-D-glucitol 2-[2-methyl-3-(perfluoromethyl)anilino]nicotinate:**

Species : Rat  
NOAEL : 2 mg/kg  
LOAEL : < 4 mg/kg  
Application Route : Oral  
Exposure time : 6 w  
Target Organs : Gastrointestinal tract

Species : Rat  
NOAEL : 1 mg/kg  
Application Route : Oral  
Exposure time : 1 y  
Target Organs : Gastrointestinal tract, Kidney

Species : Monkey  
NOAEL : 15 mg/kg  
Application Route : Oral  
Exposure time : 90 d  
Target Organs : Gastrointestinal tract, Blood

Species : Rabbit  
LOAEL : 80 mg/kg  
Application Route : Dermal  
Exposure time : 21 d  
Symptoms : Severe irritation

Species : Dog  
LOAEL : 11 mg/kg  
Application Route : Oral  
Exposure time : 9 d  
Target Organs : Gastrointestinal tract  
Symptoms : Vomiting

**Aspiration toxicity**

Not classified based on available information.

**Experience with human exposure****Components:****1-Deoxy-1-(methylamino)-D-glucitol 2-[2-methyl-3-(perfluoromethyl)anilino]nicotinate:**

Inhalation : Symptoms: respiratory tract irritation

Skin contact : Symptoms: Skin irritation

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Eye contact	:	Symptoms: Severe irritation
Ingestion	:	Symptoms: Gastrointestinal disturbance, bleeding, hypertension, Kidney disorders

**SECTION 12. ECOLOGICAL INFORMATION****Ecotoxicity****Components:****Florfenicol:**

Toxicity to fish	:	LC50 ( <i>Lepomis macrochirus</i> (Bluegill sunfish)): > 830 mg/l Exposure time: 96 h Method: FDA 4.11  LC50 ( <i>Oncorhynchus mykiss</i> (rainbow trout)): > 780 mg/l Exposure time: 96 h Method: FDA 4.11
Toxicity to daphnia and other aquatic invertebrates	:	EC50 ( <i>Daphnia magna</i> (Water flea)): > 330 mg/l Exposure time: 48 h Method: OECD Test Guideline 202
Toxicity to algae	:	EC50 ( <i>Pseudokirchneriella subcapitata</i> (green algae)): > 2.9 mg/l Exposure time: 14 d Method: FDA 4.01  NOEC ( <i>Pseudokirchneriella subcapitata</i> (green algae)): 2.9 mg/l Exposure time: 14 d Method: FDA 4.01  IC50 ( <i>Skeletonema costatum</i> (marine diatom)): 0.0336 mg/l Exposure time: 72 h Method: ISO 10253  NOEC ( <i>Skeletonema costatum</i> (marine diatom)): 0.00423 mg/l Exposure time: 72 h Method: ISO 10253  EC50 ( <i>Lemna gibba</i> (gibbous duckweed)): 0.76 mg/l Exposure time: 7 d Method: OECD Test Guideline 221  NOEC ( <i>Lemna gibba</i> (gibbous duckweed)): 0.39 mg/l Exposure time: 7 d Method: OECD Test Guideline 221  EC50 ( <i>Navicula pelliculosa</i> (Freshwater diatom)): 61 mg/l Exposure time: 72 h Method: OECD Test Guideline 201

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NOEC (*Navicula pelliculosa* (Freshwater diatom)): 19 mg/l  
 Exposure time: 72 h  
 Method: OECD Test Guideline 201

EC50 (*Anabaena flos-aquae*): 0.066 mg/l  
 Exposure time: 72 h  
 Method: OECD Test Guideline 201

NOEC (*Anabaena flos-aquae*): 0.051 mg/l  
 Exposure time: 72 h  
 Method: OECD Test Guideline 201

Toxicity to fish (Chronic toxicity) : NOEC (*Pimephales promelas* (fathead minnow)): 5.5 mg/l  
 Exposure time: 32 d  
 Method: OECD Test Guideline 210

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : NOEC (*Daphnia magna* (Water flea)): 1.5 mg/l  
 Exposure time: 21 d  
 Method: OECD Test Guideline 211

### 2-Pyrrolidone:

Toxicity to fish : LC50 (*Danio rerio* (zebra fish)): > 4,600 - 10,000 mg/l  
 Exposure time: 96 h  
 Method: OECD Test Guideline 203

Toxicity to daphnia and other aquatic invertebrates : EC50 (*Daphnia magna* (Water flea)): > 500 mg/l  
 Exposure time: 48 h

Toxicity to algae : EC50 (*Desmodesmus subspicatus* (green algae)): > 500 mg/l  
 Exposure time: 72 h

EC10 (*Desmodesmus subspicatus* (green algae)): 22.2 mg/l  
 Exposure time: 72 h

Toxicity to microorganisms : EC50: > 1,000 mg/l  
 Exposure time: 30 min  
 Method: OECD Test Guideline 209

### Malic Acid:

Toxicity to fish : LC50 (*Danio rerio* (zebra fish)): > 100 mg/l  
 Exposure time: 96 h  
 Method: OECD Test Guideline 203  
 Remarks: Based on data from similar materials

Toxicity to daphnia and other aquatic invertebrates : EC50 (*Daphnia magna* (Water flea)): 240 mg/l  
 Exposure time: 48 h

Toxicity to algae : EC50 (*Pseudokirchneriella subcapitata* (green algae)): > 100 mg/l  
 Exposure time: 72 h  
 Method: OECD Test Guideline 201  
 Remarks: Based on data from similar materials

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NOEC (Pseudokirchneriella subcapitata (green algae)): 100 mg/l  
Exposure time: 72 h  
Method: OECD Test Guideline 201  
Remarks: Based on data from similar materials

Toxicity to microorganisms : EC50: > 300 mg/l  
Exposure time: 3 h  
Method: OECD Test Guideline 209  
Remarks: Based on data from similar materials

**1-Deoxy-1-(methylamino)-D-glucitol 2-[2-methyl-3-(perfluoromethyl)anilino]nicotinate:**

Toxicity to fish : LC50 (Lepomis macrochirus (Bluegill sunfish)): 28 mg/l  
Exposure time: 96 h  
Method: FDA 4.11

LC50 (Oncorhynchus mykiss (rainbow trout)): 5.5 mg/l  
Exposure time: 96 h  
Method: FDA 4.11

Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia magna (Water flea)): 15 mg/l  
Exposure time: 48 h  
Method: FDA 4.08

Toxicity to algae : NOEC (Microcystis aeruginosa (blue-green algae)): 97 mg/l  
Exposure time: 13 d  
Method: FDA 4.01

NOEC (Selenastrum capricornutum (green algae)): 96 mg/l  
Exposure time: 12 d

**Persistence and degradability****Components:****2-Pyrrolidone:**

Biodegradability : Result: Readily biodegradable.  
Biodegradation: 98 %  
Exposure time: 9 d

**Malic Acid:**

Biodegradability : Result: Readily biodegradable.  
Biodegradation: 73 %  
Exposure time: 14 d  
Method: OECD Test Guideline 301C  
Remarks: Based on data from similar materials

**1-Deoxy-1-(methylamino)-D-glucitol 2-[2-methyl-3-(perfluoromethyl)anilino]nicotinate:**

Stability in water : Hydrolysis: 0 % (28 d)

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**Bioaccumulative potential****Components:****Florfenicol:**

Partition coefficient: n-octanol/water : log Pow: 0.373

**2-Pyrrolidone:**

Partition coefficient: n-octanol/water : log Pow: -0.71

**Malic Acid:**

Partition coefficient: n-octanol/water : log Pow: -1.26

**1-Deoxy-1-(methylamino)-D-glucitol 2-[2-methyl-3-(perfluoromethyl)anilino]nicotinate:**

Partition coefficient: n-octanol/water : log Pow: 1.34

**Mobility in soil****Components:****1-Deoxy-1-(methylamino)-D-glucitol 2-[2-methyl-3-(perfluoromethyl)anilino]nicotinate:**

Distribution among environmental compartments : log Koc: 1.92

**Other adverse effects**

No data available

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**SECTION 13. DISPOSAL CONSIDERATIONS****Disposal methods**

Waste from residues : Dispose of in accordance with local regulations.

Contaminated packaging : Empty containers should be taken to an approved waste handling site for recycling or disposal.  
If not otherwise specified: Dispose of as unused product.

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**SECTION 14. TRANSPORT INFORMATION****International Regulations****UNRTDG**

UN number	: UN 3082
Proper shipping name	: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Florfenicol)
Class	: 9

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Packing group : III  
Labels : 9

**IATA-DGR**

UN/ID No. : UN 3082  
Proper shipping name : Environmentally hazardous substance, liquid, n.o.s.  
(Florfenicol)  
Class : 9  
Packing group : III  
Labels : Miscellaneous  
Packing instruction (cargo aircraft) : 964  
Packing instruction (passenger aircraft) : 964  
Environmentally hazardous : yes

**IMDG-Code**

UN number : UN 3082  
Proper shipping name : ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID,  
N.O.S.  
(Florfenicol)  
Class : 9  
Packing group : III  
Labels : 9  
EmS Code : F-A, S-F  
Marine pollutant : yes

**Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code**

Not applicable for product as supplied.

**Domestic regulation****49 CFR**

UN/ID/NA number : UN 3082  
Proper shipping name : Environmentally hazardous substance, liquid, n.o.s.  
(Florfenicol)  
Class : 9  
Packing group : III  
Labels : CLASS 9  
ERG Code : 171  
Marine pollutant : yes(Florfenicol)  
Remarks : Above applies only to containers over 119 gallons or 450 liters., Shipment by ground under DOT is non-regulated; however it may be shipped per the applicable hazard classification to facilitate multi-modal transport involving ICAO (IATA) or IMO.

**Special precautions for user**

The transport classification(s) provided herein are for informational purposes only, and solely based upon the properties of the unpackaged material as it is described within this Safety Data Sheet. Transportation classifications may vary by mode of transportation, package sizes, and variations in regional or country regulations.

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**SECTION 15. REGULATORY INFORMATION****EPCRA - Emergency Planning and Community Right-to-Know****CERCLA Reportable Quantity**

This material does not contain any components with a CERCLA RQ.

**SARA 304 Extremely Hazardous Substances Reportable Quantity**

This material does not contain any components with a section 304 EHS RQ.

**SARA 302 Extremely Hazardous Substances Threshold Planning Quantity**

This material does not contain any components with a section 302 EHS TPQ.

**SARA 311/312 Hazards** : Acute toxicity (any route of exposure)  
Serious eye damage or eye irritation  
Reproductive toxicity  
Specific target organ toxicity (single or repeated exposure)

**SARA 313** : This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

**US State Regulations****Pennsylvania Right To Know**

Triacetin	102-76-1
2-Pyrrolidone	616-45-5
Florfenicol	73231-34-2

**California Prop. 65**

This product does not contain any chemicals known to the State of California to cause cancer, birth, or any other reproductive defects.

**The ingredients of this product are reported in the following inventories:**

AICS : not determined

DSL : not determined

IECSC : not determined

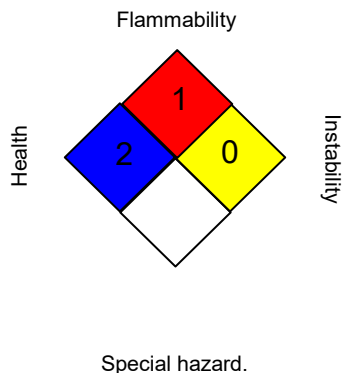
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### SECTION 16. OTHER INFORMATION

#### Further information

##### NFPA 704:



##### HMIS® IV:

<b>HEALTH</b>	*	<b>3</b>
<b>FLAMMABILITY</b>		<b>1</b>
<b>PHYSICAL HAZARD</b>		<b>0</b>

HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. The "\*" represents a chronic hazard, while the "/" represents the absence of a chronic hazard.

#### Full text of other abbreviations

AICS - Australian Inventory of Chemical Substances; ASTM - American Society for the Testing of Materials; bw - Body weight; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DOT - Department of Transportation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; EHS - Extremely Hazardous Substance; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; HMIS - Hazardous Materials Identification System; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; MSHA - Mine Safety and Health Administration; n.o.s. - Not Otherwise Specified; NFPA - National Fire Protection Association; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; RCRA - Resource Conservation and Recovery Act; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RQ - Reportable Quantity; SADT - Self-Accelerating Decomposition Temperature; SARA - Superfund Amendments and Reauthorization Act; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG -

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United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

Sources of key data used to compile the Material Safety Data Sheet : Internal technical data, data from raw material SDSs, OECD eChem Portal search results and European Chemicals Agency, <http://echa.europa.eu/>

Revision Date : 06/05/2018

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and shall not be considered a warranty or quality specification of any type. The information provided relates only to the specific material identified at the top of this SDS and may not be valid when the SDS material is used in combination with any other materials or in any process, unless specified in the text. Material users should review the information and recommendations in the specific context of their intended manner of handling, use, processing and storage, including an assessment of the appropriateness of the SDS material in the user's end product, if applicable.

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