



Guidelines for the Use of Tricaine Methanesulfonate (MS-222) in Fishes and Other Aquatic Animals

The expectation is that IACUC Guidelines will be followed as best practice. They allow the Animal Care & Use Program to attain acceptable performance outcomes to meet the intent of the regulations. As such, any planned variation from the guidelines requires prior IACUC approval and must be based on a scientific rationale.

MS-222 is used for anesthesia and euthanasia of fishes, amphibians and reptiles.

Preparation:

- If injecting, pharmaceutical grade/FDA-approved MS-222 (i.e., Finquel or Tricaine S) must be used. Non-pharmaceutical grade MS-222 may be acceptable for application by immersion, provided that this use is justified in the AUP.
- MS-222 is an irritant to the eyes, respiratory system, and skin. To avoid inhalation, the fine crystalline powder should be weighed under a fume hood or with an N95 approved particulate respirator. To avoid skin contact, goggles, gloves and a lab coat should be worn.
- MS-222 is water soluble and should be prepared in water similar to the culture conditions of the animal. The water should have adequate levels of dissolved oxygen, and appropriate pH, temperature, alkalinity, hardness and salinity for the subjects.
- MS-222 is an acidic solution. The prepared solution must be buffered to a physiologically appropriate pH before use. Failure to buffer the solution will result in discomfort to the subjects.
- Use of freshly prepared solutions is recommended. It has been reported that a 10 percent solution stored at room temperature for 3 days showed no significant loss of potency. After 10 days, there was a 5 % decrease in potency. Thawed/unfrozen solution should be discarded after 10 days.

Use as an Anesthetic:

- The action of MS-222 as an anesthetic varies widely between species and is affected by water temperature, hardness, and size of the individual fish. Preliminary tests are necessary to determine the concentration and exposure time for each application.
- Higher concentrations of MS-222 result in rapid anesthesia with shorter maximum tolerated exposure times. Commonly used concentrations for rapid anesthesia range from 70 – 330 mg/L.
- Lower concentrations of MS-222 result in longer induction times and longer maximum tolerated exposure time. Commonly used concentrations for moderately rapid anesthesia range from 50 – 70 mg/L.

- Animals are revived by returning them to clean, untreated water preferably from their home environment.

Use for Euthanasia:

- MS-222 can be used to euthanize fish. Preliminary tests are necessary to determine the concentration (mg/L) and exposure time necessary for mortality.
- The concentration of MS-222 used for euthanasia should result in medullary collapse (opercular activity ceases in fish).
- The exposure time should be adequate that a return to fresh water will not result in recovery of the animal. Due to species differences in response to MS 222, a secondary method of euthanasia is recommended in some finfish and amphibians to ensure death. Regardless of whether a secondary method is used, death must be confirmed prior to carcass disposal.

Disposal:

Discard MS-222 solutions in accord with local authority regulations. Contact UGA Environmental Safety Division for details.

Sources:

AVMA Guidelines for the Euthanasia of Animals: 2013 Edition

Bove´ FJ (1962) MS-222 Sandoz: The anesthetic of choice for fish and other cold-blooded organisms. Sandoz Pharmaceuticals.