

COMMERCIALISATION: **History** Industrial chemical; introduced as an algicide and aquatic herbicide by Shell Chemical Co. in 1960. Marketed by Baker Petrolite Corporation (now Baker Hughes) since 1962. **Patents** US 2042220; US 2959476. **Manufacturers** Baker Hughes

APPLICATIONS: **Spectrum and Route of Action** Contact herbicide. Breaks down cell walls. **Uses** Control of submersed aquatic weeds and algae in irrigation canals and drainage ditches, at 1–15 mg/l, by injection below the water surface; control of floating weeds, e.g. *Pistia*, *Eichhornia* and *Jussiaea* spp., if concentration is maintained for extended period. **Phytotoxicity** Water for irrigation of crops may be treated at 1–15 ppm. **Formulation types** Liquid **Compatibility** It is not permitted to mix with other preparations. **Site of Action** Chemically reacts, non-specifically, with thiol groups on amino acids and enzymes, resulting in disruption of respiration and other cellular functions. **Selected products** MAGNACIDE H (Baker Hughes)

ANALYSIS: **Residues Analysis (water)** GLC-ECD (*Environ. Chem. Methods*), UV-Vis spectroscopy of the 2,4-dinitrophenylhydrazone, differential pulse polarography

REGULATORY: **Toxicological & Environmental Reviews** EHC 127 (1991); HSG 67 (1991); ICSC 0090 (2001); CAC 43 (2002); IARC 63 (1995); EPA RED, Sep. 2008.

EPA Status Reregistration **IARC class** 2A **Toxicity class:** WHO (a.i.) Ib

MAMMALIAN TOXICOLOGY: **Acute oral (LD₅₀, mg/kg)** rats 29; mice (female) 17.7; mice (male) 13.9 **Acute dermal (LD₅₀, mg/kg)** rabbits 231 **Acute Inhalation (LD₅₀, mg/l)** rats 8.3 (4 h) **Skin irritation** Irritant **NOEL** (90 d) for rats 5 mg/kg b.w. daily. Administration of 200 mg acrolein/l water to rats for 90 d causes no ill-effects. No reproductive toxicity in 2-generation feeding study in rats at 7.2 mg/kg daily. No teratogenic effect in rabbits at levels causing maternal toxicity (maximum dose 2 mg/kg daily). **ADI/RfD** (EPA) cRfD 0.0005 mg/kg b.w. [2003].

ECOTOXICOLOGY: **Birds** Acute oral LD₅₀ for bobwhite quail 19, mallard ducks 30.2 mg/kg (tech.). **Fish** LC₅₀ (24 h) for rainbow trout 0.15, bluegill sunfish 0.079, shiners 0.04, mosquito fish 0.39 mg/l. **Daphnia** LC₅₀ (48 h) 0.022 mg/l. **Algae** EC₅₀ (120 h) for *Selenastrum capricornutum* 0.050, *Anabaena flos-aquae* 0.042, *Navicula pelliculosa* 0.07, *Skeletonema costatum* 0.03 mg/l. **Other aquatic spp.** LC₅₀ (48 h) for shrimps 0.10, oysters 0.46 mg/l; EC₅₀ (14 d) for *Lemna gibba* 0.07 mg/l.

ENVIRONMENTAL FATE: **Animals** In goat and hen, no acrolein was detected in tissues or excreta, or in goat milk or hen eggs, following administration of high doses. All residues identified are natural products. Data on naturally occurring metabolites found in aquatic species are also available. **Soil/Environment** DT₅₀ in water 150 h (pH 5), 120–180 h (pH 7), 5–40 h (pH 9). Acrolein is metabolised easily in soil, being mineralised to CO₂. In field dissipation studies, DT₅₀ 7.5–10.2 h. Metabolic pathways involving oxidation, reduction and hydration have been proposed. **Plants** Following high application rates to lettuce, no acrolein was detected 1 day following last application. At harvest, 3 highly polar conjugates (representing in total <0.5 ppm) were detected.