UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, DC 20460

OFFICE OF CHEMICAL SAFETY AND
POLLUTION PREVENTION

MEMORANDUM

DATE: 10 December 2015

SUBJECT: **Calcium Polysulfide.** Draft Human Health Risk Assessment for Registration Review.

PC Code: 076702	DP Barcode: D429261
Decision Number: 509379	Registration Number: Multiple
Petition: NA	Regulatory Action: Registration Review
Risk Assessment Type: Single Chemical Aggregate	Case Number: 4054
TXR Number: NA	CAS Number: 1344-81-6
MRID Numbers: NA	40 CFR §180.1232

FROM: Michael A. Doherty, Ph.D., Senior Chemist for Elizabeth Hoban
Risk Assessment Branch II (RAB2)
Health Effects Division (HED), 7509P

THRU: Christina Swartz, Chief
RAB2/HED, 7509P

TO: Katherine St. Clair/Cathryn Britton (RM 52)
Risk Management and Implementation Branch 2
Pesticide Reevaluation Division

The Pesticide Reevaluation Division (PRD) has requested that HED evaluate the information that is available for calcium polysulfide and prepare a document to identify data gaps and risk assessment work needed to complete a human health registration review risk assessment. HED has determined that no data are required, therefore, this document serves as a combination scoping document and draft risk assessment for calcium polysulfide.

Background

Calcium polysulfide (CAS #1344-81-6, also known as calcium sulfide or lime sulfur) is a registered active ingredient with insecticidal and fungicidal activity. This compound currently has an exemption from the requirement for a tolerance under 40CFR §180.1232. Currently there are four end-use products that are actively registered and have calcium polysulfide as an active ingredient in the formulation (EPA Registration Numbers 61842-30, 61842-31, 71096-6, and 71096-11). Registered uses include control of insects and fungi on almonds, apples, blueberries, caneberries, cherries, citrus, hazelnuts, currants and gooseberries, bearing and non-bearing fruit trees, grapes nectarines peaches, pears, pecans, pistachios, plums/prunes, quince, ryegrass, red clover, alfalfa, and ornamental plants, as well as for treatment of mange on horses, cattle, sheep, and swine). For crops, specific use patterns vary depending on the target pest and on the timing of the application (dormant, delayed dormant, growing season, post-harvest). Application rates are generally expressed as a dilution (e.g., 4 gallons per 100 gallons of spray) and vary widely depending on the pest and application timing. Applications may generally be made on an as-needed basis, although annual limits, ranging from 59.4 to 406.8 lbs calcium polysulfide per acre, are specified. Labels list a restricted-entry interval (REI) of 48 hours. There are no registered residential uses of calcium polysulfide.

HED Findings and Regulatory Recommendations

The tolerance exemption for calcium polysulfide is based on its degradation into calcium hydroxide and sulfur, and the hazard status of those two chemicals. Calcium polysulfide "…rapidly degrades to calcium hydroxide and sulfur in the environment and in the human body."[1] Calcium hydroxide has a designation of Generally Recognized As Safe (GRAS), "with no limitations other than current good manufacturing practice" (21CFR §184.1205), as a food additive by the Food and Drug Administration (FDA). The GRAS determination was made, in part, based on the widespread occurrence of hydroxides in the food supply. Similarly, the Agency has determined that "[t]he human risks, if any, from both dietary and occupational exposures [to sulfur] are considered to be very low because of the general knowledge of the chemical sulfur, its ubiquitous occurrence, and its low toxicity, as well as its long history of use by humans, including some pharmaceutical applications."

On this basis, HED concludes that no toxicology, residue chemistry, or exposure data are required for the purpose of registration review. Furthermore, HED confirms its previous conclusion that the aggregate human health risks associated with the uses of calcium polysulfide are not of concern (16 Dec 2014, D422649).

A review of both the OPP Incident Data System (IDS) and the Sentinel Event Notification System for Occupational Risk-Pesticides (SENSOR-Pesticides) databases show low frequency

1. Reregistration Eligibility Decision (RED) for Inorganic Polysulfides; Case #4054; 30 September 2005.

and severity of incident cases reported for inorganic polysulfide (2 Dec 2015, D430441). Therefore, there does not appear to be a concern that warrants further investigation at this time.

References

30 Sept 2005. Reregistration Eligibility Decision for Inorganic Polysulfides. List D, Case No. 4054.

6 Mar 2008. Doherty, M. Calcium Polysulfide: Proposal for Modification to the Product Label for BSP Sulfotrix ® [EPA Reg. No. 66196-3]. DP Barcode D346462.

13 Sept 2013. Drew, W. Calcium Polysulfide: Request for Label Amendment to Modify Application Frequency and/or Application Timing on Multiple Crops and Livestock. DP Barcode D410623

16 Dec 2014. Drew, W. Calcium Polysulfide: Request for Label Amendment (Amended Use Pattern) to Add Applications for Thinning of Apple Blossoms. DP Barcode D422649.

2 Dec 2015. Evans, E. and Recore, S. Inorganic polysulfide: Tier 1 (Scoping) Review of Human Incidents and Epidemiology. DP Barcode D430441

Appendix A: Physical-Chemical Properties

Table A-1. Chemical and Physical Properties for Lime Sulfur and Calcium Polysulfide[1]

Property	Description
Molecular formula	CaSx (x = 2, 3, 4, 5, 6, 7)
Molecular weight	Varies 200.4 g/mole (calcium pentasulfide, x = 5)
Solubility in water (calcium polysulfide)	Soluble in water; dissolves with precipitation of elemental sulfur
pH	Alkaline (pH = 10.9–11.9) due to hydrolysis, which is accelerated by dilution
Appearance	Ruby-red/orange
Odor	Rotten eggs; unpleasant smell of hydrogen sulfide (H2S)
Odor threshold	0.13 ppm faint, but easily noticeable at 0.77 ppm
Chemical stability	Stable at ambient temperatures and pressures when in solid form
Reactivity	Reacts with strong oxidizers to form explosive mixtures if heated to dryness, and releases toxic H_2S vapors on contact with acid.
Specific gravity	1.28 (at 15.6 °C) Viscosity 2.95 (cP, at 20 °C)

[1] From Technical Evaluation Report for Lime Sulfur (www.ams.usda.gov; accessed 8 December 2015). Cited data sources: HSDB, 2003; US EPA, 2005b; NovaSource, 2013; VGS, 2006. cP = centiPoise, equivalent to millipascals seconds (mPa•s).