

US EPA ARCHIVE DOCUMENT

MEMORANDUM

APR 22 1993

SUBJECT: Bromine Phase IV Data Base Evaluation

BARCODE: D186426, EFGWB 93-0318

TO: Fred Betz, Acting Chief, SACS Branch

PREPARED BY: P.J. Hannan, Chemist, Chemical Review Section 3, EFGWB

FROM: Brinson Conerly-Perks, Chemist, Chemical Review
Section 3, EFGWB *S.B. Conerly-Perks* 4/20/93

THROUGH: Akiva Abramovitch, Head, Chemical Review
Section 3, EFGWB *Akiva Abramovitch*
and
Henry Jacoby, Chief, Environmental Fate and Ground
Water Branch *Henry Jacoby*

BACKGROUND

Chemical characteristics:

Bromine is a dense, dark-reddish brown, liquid which boils at 58.8 C (the vapor pressure at 21 C = 175 mm). It is a powerful oxidizing agent which can react violently with certain organic and inorganic compounds. In its elemental form it can be used for the synthesis of alkyl or aryl bromides which then serve as intermediates for the preparation of a variety of compounds. Bromination is generally a slower reaction than the corresponding chlorination but there are advantages to its use. For example, regarding addition of halogens to unsaturated paraffins, chlorine is too reactive and substitution reactions take place as well as additions. Bromine tends to add to double bonds with little substitution taking place. Bromine addition is very sensitive to catalysis by polar molecules and by light. For these reasons bromine serves unique purposes in the realm of organic chemistry but interest in its environmental effects is centered on its inorganic applications which are summarized in Table 1.

Uses:

For the purification of water, to be used as potable water on board ship or on oil well drilling rigs, bromine is the active ingredient (30%) in cartridges containing a resin matrix. For the preparation of such cartridges, a resin is treated with NaBr solution for conversion to the bromine form, after which a calculated amount of Br₂ is added slowly. Upon removal of the excess brominated water, the resin is washed. Passage of water through this bromine-laden resin renders it potable. The dissolved available bromine in the treated water must be



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between 0.2- and 1.0 ppm for the control of microorganisms.

Bromine solutions as disinfectants are found in diverse situations. They serve as acaricides, bacteriostats, fungicides, insecticides, and virucides in indoor food, indoor non-food, indoor medical, and indoor residential applications. Subjects of these disinfectant uses include agricultural/farm premises, carpets, bathrooms, bedding, solid waste containers, upholstery, and hard surfaces such as floors. Contact times for effective action are on the order of 10 minutes. In addition bromine can be added to cooling water systems to reduce the buildup of pathogenic microorganisms.

RECOMMENDATION

The usual hydrolysis and other environmental fate requirements for pesticides can be omitted here because the reactions of bromine are well known (1,2); furthermore, the uses described are indoor and require only limited quantities.

1. Z.E. Jolles, Ed., "Bromine and its Compounds" (E. Benn, London, 1966)
2. M.T.P. Int. Rev. Sci.: Inorg. Chem. Series One, Vol. 3, V. Gutman, Ed., (Butterworths, London, 1972)

Indoor Uses of Bromine ¹

Use Groups

Use Sites

Indoor medical

Hospitals; veterinaries

Indoor food

Feeding- and watering-
appliances for livestock
and poultry.

Indoor non-food

Commercial premises

Indoor residential

Bathrooms; garbage cans;
floors

¹The active ingredient, total available bromine, in a variety of products ranges from 0.1 to 0.69%. Application methods include spraying, wiping, or fogging and the contact times required for effective decontamination are 2 to 10 minutes.

Chemical Name: Bromine

Chemical Code : Shaughnessy # 8701

Reviewer: P.J. Hannan

Pesticide Type : Disinfectant

Date: April 13, 1993

Uses: Sterilization of surfaces; water purification

	<u>Submitted Studies/ Addendums</u>	<u>DER/Addendum Review/Summary Identification</u>	<u>DER/Addendum Review/Summary Review Conclusions</u>	<u>Additional Data/Info Required?</u>
DEGRADATION-LAB:				
161-1. Hydrolysis	NA			Note (1)
<u>Photodegradation:</u>				
161-2. In Water	NA			"
161-3. On Soil	NA			"
161-4. In Air	NA			"
<u>METABOLISM-LAB:</u>				
162-1. Aerobic Soil	NA			"
162-2. Anaerobic Soil	NA			"
162-3. Anaerob. Aquat.	NA			"
<u>MOBILITY:</u>				
163-1. Leaching and Adsorp./Desorp.	NA			"
163-2. Volatil.(Lab)	NA			"
163-3. Volatil.(Field)	NA			"
<u>DISSIPATION-FIELD:</u>				
164-1. Terrestr.(Soil)	NA			"
164-2. Aquat.(Sediment)	NA			"
164-3. Forestry	NA			"
164-4. Combin./Tank Mix	NA			"
164-5. Long Term Terr.	NA			"
164-5. Long Term Aqua.	NA			"
<u>ACCUMULATION STUDIES:</u>				
165-1. Conf. Rot. Crops	NA			"
165-2. Field Rot. Crops	NA			"
165-3. Irrigated Crops	NA			"
165-4. Fish (Lab)	NA			"
165-5. Aqua. Non-target Organ.(Field)	NA			"

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SPRAY DRIFT:

201-1. Droplet Spect. NA Note (1)

202-1. Field Spray Drift Evaluation NA "

GROUNDWATER MONITORING:

166-1. Small Prospect. NA "

166-2. Small Retrospect. NA "

166-3. Large Retrospect. NA "

SURFACE WATER MONITORING:

167-1. Field Runoff NA "

167-2. Surface Water Monitoring NA "

Note (1): Data requirements of the type normally associated with organic pesticides are not pertinent in the case of bromine, an inorganic element, whose chemical reactions are known and understood well.

- 1) EFGWB#/Date - placed in the second column to indicate that a review (having the indicated EFGWB# and date) of the addendum identified by MRID# in the first column/same row is in the file.
- 2) DER(EFGWB#/Date) - placed in the second column to indicate that a data evaluation record for the study identified by MRID# in the first column/same row is in the file attached to a review with the indicated EFGWB# and date.
- 3) DNS/Salv./Supp. - placed in the third column to indicate that the study or addendum identified by MRID# in the first column/same row does not satisfy (DNS) the data requirement, but could possibly be salvageable (Salv.) to do so with the submission of additional information or limited data. The results of the study can be used for supplemental information (Supp.).
- 4) DNS/Salv./NSupp. - placed in the third column to indicate that the study or addendum identified by MRID# in the first column/same row does not satisfy (DNS) the data requirement, but could possibly be salvageable (Salv.) to do so with the submission of additional information or limited data. The results of the study should not be used for supplemental information (NSupp.).
- 5) DNS/NSalv./Supp. - placed in the third column to indicate that the study or addendum identified by MRID# in the first column/same row does not satisfy (DNS) the data requirement, does not appear to be salvageable (NSalv.) to do so with the submission of additional information or limited data. The results of the study can be used for supplemental information (Supp.).
- 6) DNS/NSalv./NSupp. - placed in the third column to indicate that the study or addendum identified by MRID# in the first column/same row does not satisfy (DNS) the data requirement, and does not appear to be salvageable (NSalv.) to do so with the submission of additional information or limited data. The results of the study should not be used for supplemental information (NSupp.).
- 7) DNPS/Salv./Supp. - placed in the third column to indicate that the study or addendum identified by MRID# in the first column/same row does not partially satisfy (DNPS) the data requirement, but could possibly be salvageable (Salv.) to do so with the submission of additional information or limited data. The results of the study can be used for supplemental information (Supp.).
- 8) DNPS/Salv./NSupp. - placed in the third column to indicate that the study or addendum identified by MRID# in the first column/same row does not partially satisfy (DNPS) the data requirement, but could possibly be salvageable (Salv.) to do so with the submission of additional information or limited data. The results of the study should not be used for supplemental information (NSupp.).
- 9) DNPS/NSalv./Supp. - placed in the third column to indicate that the study or addendum identified by MRID# in the first column/same row does not partially satisfy (DNPS) the data requirement and does not appear to be salvageable (NSalv.) to do so with the submission of additional information or limited data. The results of the study can be used for supplemental information (Supp.).
- 10) DNPS/NSalv./NSupp. - placed in the third column to indicate that the study or addendum identified by MRID# in the first column/same row does not partially satisfy (DNPS) the data requirement, and does not appear to be salvageable (NSalv.) to do so with the submission of additional information or limited data. The results of the study should not be used for supplemental information (NSupp.).
- 11) Dropped Uses(codes) - placed in the second column to indicate that there are no DERs or summaries available for the study identified by MRID# in the first column/same row, but that the registrant has indicated in its Phase III response that all uses for which the data requirement is applicable will be dropped. Verify through the LUIS report that the uses have been dropped.
- 12) MRID#/MRID#A - placed in the first column to indicate that the study and addendum (A) whose MRID#s immediately precede and succeed the "/", respectively, are coupled. If a MRID# was not assigned to the addendum, substitute the date of submission for the MRID# followed by an "A" to indicate that it's an addendum. If neither a MRID# or submission date is available, but the addendum was submitted as part of the Phase III response, substitute "Phase IIIA" for "MRID#A".
- 13) NA - placed in last (4th) column to indicate that the data requirement is not applicable to the uses listed in the LUIS report.

- 14) No = placed in the final (4th) column to indicate that no additional information or data is needed to completely satisfy an applicable data requirement. Identify in a footnote any studies that individually only partially satisfied the data requirement, but combined completely satisfies the data requirement. If the data requirement is not applicable to any of the uses listed in the LUIS report, use the "NA" designation defined above instead of "No".
- 15) No Information = placed in the second column to indicate that no DER or summary is available for the study identified by MRID# in the first column/same row, and that the registrant has not indicated in its Phase III response that it will submit another study or will drop uses to make the data requirement not applicable.
- 16) None = placed in the first column to indicate that the registrant did not list any studies or addendums in their Phase II and/or III responses for the given data requirement. In addition, EFGWB has no record of any studies or study/addendum combinations satisfying or partially satisfying the data requirement.
- 17) Not Reviewable = placed in the third column to indicate that based upon a review of the summary identified by MRID# in the second column/same row, EFGWB concludes that the study identified by MRID# in the first column/same row will not satisfy or partially satisfy the data requirement and appears not to be salvageable to do so. Therefore, the study should not be reviewed.
- 18) Reviewable = placed in the third column to indicate that based upon a review of the summary identified by MRID# in the second column/same row, EFGWB concludes that the study identified by MRID# in the first column/same row may possibly satisfy or partially satisfy the data requirement, or could possibly be salvageable to do so. Therefore, the study should be reviewed.
- 19) Reserved = placed in the final (4th) column to indicate that the data requirement is being held in reserve. Indicate in a footnote what information is needed to decide whether or not to impose the data requirement.
- 20) SIREview = placed in the final (4th) column to indicate that one or more studies is currently in review.
- 21) Study Withdrawn = placed in the second column to indicate that there are no DERs or summaries available for the study identified by MRID# in the first column/same row, but that the registrant has indicated in their Phase III response that another study will be submitted.
- 22) Summary(MRID#) = placed in the second column to indicate that a DER is not available for the study identified by MRID# in the first column/same row, but that a study summary with the indicated MRID# was submitted as part of the Phase III response. If a summary is submitted for a study which also has a DER, identify the DER in the second column instead of the summary. (Note that the MRID# of the summary is not the same as the MRID# of the study it summarizes).
- 23) SWB Submitted = placed in the final (4th) column to indicate that one or more studies will be submitted by the registrant as indicated in their Phase III response.
- 24) Waived = placed in the final (4th) column to indicate that the data requirement has been waived. Identify the reason for the waiver and the EFGWB#/date of EFGWB's waiver recommendation in a footnote.
- 25) Yes = placed in the final (4th) column to indicate that additional information and/or data are needed to satisfy the data requirement. Specify in a footnote what additional