NOSB NATIONAL LIST
FILE CHECKLIST

CROPS

MATERIAL NAME: #7 Hydrogen Peroxide

✓ NOSB Database Form

✓ References

✓ MSDS (or equivalent)

✓ TAP Reviews from: Vivian Purdy
(Additional TAP Review expected from: Bill Wolf)

NOSB/NATIONAL LIST
COMMENT FORM
CROPS

Material Name: #7 Hydrogen Peroxide

Please use this page to write down comments, questions, and your anticipated vote(s).

COMMENTS/QUESTIONS:

---

1. In my opinion, this material is:
_____ Synthetic _____ Non-synthetic.

2. This material should be placed on the proposed National List as:
_____Prohibited Natural _____Allowed Synthetic.

TAP REVIEWER COMMENT FORM for USDA/NOSB

Use this page or an equivalent to write down comments and summarize your evaluation regarding the data presented in the file of this potential National List material. Complete both sides of page. Attach additional sheets if you wish.

This file is due back to us by: Sept. 15, 1995

Name of Material: Hydrogen Peroxide

Reviewer Name: ______________________

Is this substance Synthetic or non-synthetic? Explain (if appropriate)

____

If synthetic, how is the material made? (please answer here if our database form is blank) Good question - need manufacturing process to determine.

This material should be added to the National List as:

X Synthetic Allowed ____ **Prohibited Natural**

or, or X Non-synthetic (This material does not belong on National List)

Are there any use restrictions or limitations that should be placed on this material on the National List?

Please comment on the accuracy of the information in the file:

Any additional comments? (attachments welcomed)

Do you have a commercial interest in this material? ____ **Yes;** X **No**

Signature [signature] **Date** 9-7-95

Please address the 7 criteria in the Organic Foods Production Act:
(comment in those areas you feel are applicable)

(1) the potential of such substances for detrimental chemical interactions with other materials used in organic farming systems;

Corrosive. The oxygen in H_2O_2 will easily combine with other elements.

(2) the toxicity and mode of action of the substance and of its breakdown products or any contaminants, and their persistence and areas of concentration in the environment;

breaks down quickly into harmless substances.
Toxicity to bacteria + fungi not well understood in its mode of action.

(3) the probability of environmental contamination during manufacture, use, misuse or disposal of such substance;

seems negligible, but we need to know more about manufacture.

(4) the effect of the substance on human health;

dilute forms used as mouth rinse and topical antiseptic

(5) the effects of the substance on biological and chemical interactions in the agroecosystem, including the physiological effects of the substance on soil organisms (including the salt index and solubility of the soil), crops and livestock;

Adding oxygen to the ecosystem (the effective breakdown product of peroxide) seems a gentle stimulation not out of line with organic production. As a fungicide field spray, we don't know as well what it is affecting before it breaks down.

(6) the alternatives to using the substance in terms of practices or other available materials; and

Peroxide is preferable to chlorine as a disinfectant.

~~Its use in~~

(7) its compatibility with a system of sustainable agriculture.

Its use in compost is fine, and as a disinfectant. In field sprays its action is less well know, but I surmise that it is minimally disruptive, especially in comparison to other fungicides.

NOSB Materials Database

Identification

Common Name Hydrogen Peroxide **Chemical Name**

Other Names

Code #: CAS **Code #: Other**

N. L. Category Synthetic Allowed **MSDS** yes

Chemistry

Family

Composition H_2O_2

Properties Pure hydrogen peroxide has an active oxygen content of 47%. Relatively stable.

How Made This is important to know!

My non-techical understanding is that oxygen is forced into water by pressure. This may not be right – I could find no source of info on manufacture. If so – is that a "biological or natural process"? Under the pressure, water and oxygen naturally combine to H_2O_2, making it non-synthetic?!

Use/Action

Type of Use Crops

Use(s) Carrier for foliar sprays. Oxygenator. Bleaching agent. Disinfectant. Aeration in compost piles.

Fungicide – experiments with this both post-harvest and in the field.

Action Breaks down readily into water and oxygen or hydrogen and hydoxyl depending on pH. This liberates free oxygen which makes it easier for plants to take up nutrients through their leaves.

Combinations

Status

OFPA

N. L. Restriction

EPA, FDA, etc

Safety Guidelines

Directions

Registration not required **State Differences**

Historical status

Internationl status

NOSB Materials Database

OFPA Criteria

2119(m)1: chemical interactions

concentrations greater than 8% H_2O_2 are corrosive. *

2119(m)2: toxicity & persistence

Breaks down into water and oxygen in environment.

or into hydrogen and hydroxyl depending on pH *

2119(m)3: manufacture & disposal consequences

2119(m)4: effect on human health

Concentrations greater than 50% can cause burns, * though generally much lower concentrations are sold + used.

2119(m)5: agroecosystem biology

Increasing oxygen in the environment will increase plant and bacterial metabolism. I suppose it is possible to overuse it with bad effects, but generally it is a gentle, "natural" stimulation within the ecosystem.

2119(m)6: alternatives to substance

Mechanical aeration (in compost), Chlorine compounds (as disinfectant)

Peroxide is greatly preferable to chlorine!

2119(m)7: Is it compatible?

References

Kirk-Othmer Encyclopedia of Chemical Technology, 3rd. Ed., 1982. John Wiley & Sons, NY.

See also attached.

* World Book Encyclopedia

NOSB Materials Database

Identification

Common Name Hydrogen Peroxide

Chemical Name

Other Names

Code #: CAS

Code #: Other

N. L. Category Synthetic Allowed

MSDS yes

Chemistry

Family

Composition H_2O_2

Properties Pure hydrogen peroxide has an active oxygen content of 47%. Relatively stable.

How Made

Use/Action

Type of Use Crops

Use(s) Carrier for foliar sprays. Oxygenator. Bleaching agent. Disinfectant. Aeration in compost piles.

Action Breaks down readily into water and oxygen or hydrogen and hydoxyl depending on pH. This liberates free oxygen which makes it easier for plants to take up nutrients through their leaves.

Combinations

Status

OFPA

N. L. Restriction

EPA, FDA, etc

Safety Guidelines

Directions

Registration not required

State Differences

Historical status

Internationl status

NOSB Materials Database

OFPA Criteria

2119(m)1: chemical interactions

2119(m)2: toxicity & persistence

Breaks down into water and oxygen in environment.

2119(m)3: manufacture & disposal consequences

2119(m)4: effect on human health

2119(m)5: agroecosystem biology

2119(m)6: alternatives to substance

Mechanical aeration (in compost), Chlorine compounds (as disinfectant)

2119(m)7: Is it compatible?

References

Kirk-Othmer Encyclopedia of Chemical Technology, 3rd. Ed., 1982. John Wiley & Sons, NY.

See also attached.

HYDROGEN PEROXIDE REFERENCES

AU: Forney,-C.F.; Rij,-R.E.; Denis-Arrue,-R.; Smilanick,-J.L.
TI: Vapor phase hydrogen peroxide inhibits postharvest decay of table grapes.
SO: HortScience. Alexandria, Va. : The American Society for Horticultural Science. Dec 1991. v. 26 (12) p. 1512-1514.
CN: DNAL SB1.H6
AB: The potential use of vapor phase hydrogen peroxide (VPHP) to prevent decay caused by Botrytis cinerea Pers. ex Fr. in table grapes (Vitis vinifera L.) was investigated. Vapor phase hydrogen peroxide significantly reduced the number of germinable Botrytis spores on grapes. The number of germinable spores on 'Thompson Seedless' and 'Red Globe' grapes had been reduced 81% and 62%, respectively, 24 hours following treatment. The incidence of decay on inoculated 'Thompson Seedless' and 'Red Globe' grapes was reduced 33% and 16%, respectively, after 8 days of storage at 10C compared with control fruit. Vapor phase hydrogen peroxide reduced the decay of noninoculated 'Thompson Seedless' and 'Red Globe' grapes 73% and 28%, respectively, after 12 days of storage at 10C. Treatment with VPHP did not affect grape color or soluble solids content.

AU: Imlay,-James-Allen.
TI: The mechanisms of toxicity of hydrogen peroxide.
SO: 1987. iv, 246 leaves : ill.
CN: DNAL DISS-88-13,923

AU: Lewis,-S.M.; Holzgraefe,-D.P.; Berger,-L.L.; Fahey,-G.C.-Jr.; Gould,-J.M.; Fanta,-G.F.
TI: Alkaline hydrogen peroxide treatments of crop residues to increase ruminal dry matter disappearance in sacco.
SO: Anim-Feed-Sci-Technol. Amsterdam : Elsevier Science Publishers B.V. May 1987. v. 17 (3) p. 179-199.
CN: DNAL SF95.A55

AU: Amjed,-M.; Jung,-H.G.; Donker,-J.D.
TI: Effect of alkaline hydrogen peroxide treatment on cell wall composition and digestion kinetics of sugarcane residues and wheat straw.
SO: J-Anim-Sci. Champaign, Ill. : American Society of Animal Science. Sept 1992. v. 70 (9) p. 2877-2884.
CN: DNAL 49-J82
AB: Our objective was to characterize changes in cell wall composition and digestibility of sugarcane bagasse, pith from bagasse, and wheat straw after treatment with alkaline hydrogen peroxide (AHP). The AHP treatment solution contained 1% H202 (wt/vol) maintained at pH 11.5 with NaOH. Alkaline hydrogen peroxide improved crop residue digestibility, probably as a result of the removal of core and noncore lignin fractions.

AU: Jung,-H.J.G.; Valdez,-F.R.; Hatfield,-R.D.; Blanchette,-R.A.
TI: Cell wall composition and degradability of forage stems following chemical and biological delignification.
SO: J-Sci-Food-Agric. Essex : Elsevier Applied Science. 1992. v. 58 (3) p. 347-355.
CN: DNAL 382-SO12
AB: Chemical and biological delignification methods were used to investigate the relationship between the concentration and composition of lignin and degradation of forage cell walls. Stem material from lucerne (Medicago sativa L), smooth bromegrass (Bromus inermis Leyss) and maize (Zea mays L) stalks was treated with alkaline hydrogen peroxide, potassium permanganate, sodium chlorite, sodium hydroxide, nitrobenzene, and the lignolytic fungus Phanerochaete chrysosporium. Chemical delignification generally removed lignin, but the fungal treatment resulted in the removal of more polysaccharide than lignin. Alkaline hydrogen peroxide and nitrobenzene were generally the most effective delignification treatments for improving polysaccharide degradability, with the grass species responding similarly to delignification whereas lucerne was somewhat less responsive. Fungal delignification, under these experimental conditions, did not improve cell wall degradability of these forages.

AU: Sheldon,-B.W.; Brake,-J.
TI: Hydrogen peroxide as an alternative hatching egg disinfectant.
SO: Poult-Sci. Champaign, Ill. : Poultry Science Association. May 1991. v. 70 (5) p. 1092-1098.
CN: DNAL 47.8-AM33P
AB: The present study examined the effectiveness of H2O2 at different concentrations to disinfect broiler hatching eggshell surfaces and to maintain hatching potential. Under higher H2O2 demands, such as occurs on eggshell surfaces, H2O2 concentrations of 5% (vol/vol) were required to disinfect the shell surfaces (approximately 5 log

reduction). Hatchability of fertile eggs from a 44-wk-old flock was significantly increased by 2% following spraying 5% H2O2 in comparison to untreated controls. These results demonstrated that H2O2 compared favorably to formaldehyde as a hatching egg disinfectant without adversely affecting hatching potential. Under some conditions, H2O2 actually improved the hatching potential of fertile broiler eggs compared with hatchability of untreated eggs.

AU: Murzakov,-B.G.; Evdokimova,-M.D.; Dorofeeva,-I.K.; Kuzyurina,-L.A.; Yakshina,-V.M.
TI: Soil microorganisms growing in the presence of iron-containing minerals and hydrogen peroxide.
SO: Proceedings of the 9th International Symposium on Soil Biology and Conservation of the Biosphere / edited by J. Szegi. Budapest : Akademiai Kiado, 1987. p. 591-601.
CN: DNAL QH84.8.I57-1985

AU: Kinkel,-L.L.; Andrews,-J.H.
TI: Disinfestation of living leaves by hydrogen peroxide.
SO: Trans-Br-Mycol-Soc. Cambridge : Cambridge University Press. Oct 1988. v. 91 (pt.3) p. 523-528. ill.
CN: DNAL 451-B76

AU: Puntarulo,-S.; Sanchez,-R.A.; Boveris,-A.
TI: Hydrogen peroxide metabolism in soybean embryonic axes at the onset of germination.
SO: Plant-Physiol. Rockville, Md. : American Society of Plant Physiologists. Feb 1988. v. 86 (2) p. 626-630.
CN: DNAL 450-P692

AU: Howe,-R.H.L.; Chang,-W.M.L.
TI: Ozone and hydrogen peroxide injuries to green plants.
SO: Proc-Indiana-Acad-Sci. Indianapolis, Ind. : The Academy. 1983 (pub. 1984). v. 93 p. 233-236. ill.
CN: DNAL 500-IN2

AU: Lillard,-H.S.; Thomson,-J.E.
TI: Efficacy of hydrogen peroxide as a bactericide in poultry chiller water as an alternative to chlorine.
SO: J-Food-Sci. Chicago : Institute of Food Technologists. Jan/Feb 1983. v. 48 (1) p. 125-126.
CN: DNAL 389.8-F7322

AU: Tanaka,-K.; Kondo,-N.; Sugahara,-K.
TI: Accumulation of hydrogen peroxide in chloroplasts of SO2 sulfur dioxide-fumigated spinach leaves Spinacia oleracea, phytotoxicities.
SO: Plant-Cell-Physiol. Kyoto, Japan, Japanese Society of Plant Physiologists. Sept 1982. v. 23 (6) p. 999-1007.
CN: DNAL 450-P699

AU: Helton,-A.W.; Dilbeck,-R.
TI: Effects of hydrogen peroxide seed-disinfestation treatments on germination and development of Pisum sativum Biocidal effects.
SO: Plant-Dis. St. Paul, Minn., American Phytopathological Society. Sept 1982. v. 66 (9) p. 784-787.
CN: DNAL 1.9-P69P

AU: Quimby,-P.C.-Jr.
TI: Preliminary evaluation of hydrogen peroxide as a potential herbicide for aquatic weeds.
SO: J-Aquat-Plant-Manage. Fort Myers, Fla., Aquatic Plant Management Society. July 1981. v. 19 p. 53-55.
CN: DNAL SB614.H9

AU: Gurevich,-A-A; Elkina,-T-V
TI: On the physiological significance of the hydrogen peroxide of aerobic respiration. [Plants]
SO: Soviet-Plant-Physiol, May/June 1972 Transl. 1973, 19 (3): 566-569. Ref.
CN: DNAL 450-F58AE

AU: Toledo,-R-T; Escher,-F-E; Ayres,-J-C
TI: Sporicidal properties of hydrogen peroxide against food spoilage organisms. [Bacillus, Clostridium]
SO: Appl-Microbiol, Oct 1973, 26 (4): 592-597.
CN: DNAL 448.3-AP5

MATERIAL SAFETY DATA SHEET
HYDROGEN PEROXIDE

SECTION I - Product Identification

PRODUCT NAME: HYDROGEN PEROXIDE
FORMULA: N/A
FORMULA WT: N/A
COMMON SYNONYMS: N/A

SECTION II - Hazardous Components

HYDROGEN PEROXIDE

SECTION III - Physical Data

BOILING POINT: 100-111C VAPOR PRESSURE(MM HG): N/A
MELTING POINT: N/A VAPOR DENSITY(AIR=1): UNK
SPECIFIC GRAVITY: N/A EVAPORATION RATE: >1
(H20=1) (BUTYL ACETATE=1)
SOLUBILITY(H20): N/A % VOLATILES BY VOLUME: 100
APPEARANCE & ODOR: CLEAR COLORLESS LIQUID.

SECTION IV - Fire and Explosion Hazard Data

FLAMMABILITY CLASSIFICATION: UNK
FLASH POINT: NA
FLAMMABLE LIMITS: UPPER - NA % LOWER - NA %
FIRE EXTINGUISHING MEDIA
WATER ONLY
SPECIAL FIRE-FIGHTING PROCEDURES
NONE LISTED
UNUSUAL FIRE AND EXPLOSION HAZARDS:
STRONG OXIDIZER;FIRE AND EXPLOSION HAZARD ON CONTACT W/OXIDIZABLE MATERIALS

SECTION V - Health Hazard Data

EFFECTS OF OVEREXPOSURE:
EYE/SKIN IRR;POSS EYE INJURY;EFFECTS MAY BE DELAYED
MEDICAL CONDITIONS PRONE TO AGGRAVATION BY EXPOSURE: NONE
PRIMARY ROUTE(S) OF ENTRY: EYE/SKIN
EMERGENCY AND FIRST AID PROCEDURES:
EYE/SKIN STAT WASH W/WATER 15 MIN-CALL DR

SECTION VI - Reactivity Data

STABILITY: UNSTABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR
CONDITIONS TO AVOID: LIGHT/HEAT
INCOMPATIBLES: REDUCING AGENTS/OXIDIZABLE MATERIALS
DECOMPOSITION PRODUCTS: NONE

SECTION VII - Spill and Disposal Procedures

DISPOSAL PROCEDURE: BY REGS
OTHER PRECAUTIONS: NONE

==

SECTION VIII - Protective Equipment

==

VENTILATION:
LOCAL OR GENERAL MECHANICAL ACCEPTABLE
RESPIRATORY PROTECTION: NONE
EYE PROTECTION: SAFETY GLASSES
SKIN PROTECTION: RUBBER
OTHER EQUIPMENT: NONE
HYGIENIC PRACTICES: NONE

==

SECTION IX - Storage and Handling Precautions

==

SPECIAL PRECAUTIONS:
COOL DARK PLACE AWAY FROM OXIDIZABLE MATERIALS

==

SECTION X - Transportation Data and Additional Information

==

N/A

(TM) and (R) : Registered Trademarks
N/A = Not Applicable OR Not Available
The information published in this Material Safety Data Sheet has been compiled from our experience and data presented in various technical publications. It is the user's responsibility to determine the suitability of this information for adoption of necessary safety precautions. We reserve the right to revise Material Safety Data Sheets periodically as new information becomes available.