

FORMALDEHYDE

GUIDELINES FOR SAFE WORKING PRACTICES



**Australian Chicken Meat
Federation (ACMF) Inc**

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AUSTRALIAN CHICKEN MEAT FEDERATION

FORMALDEHYDE - GUIDELINES FOR SAFE WORKING PRACTICES

1. USAGE

Formaldehyde is used in the poultry industry as an effective disinfectant on farms and in hatcheries and hatchery vehicles. It is most important in the reduction of contamination levels caused by bacteria, viruses and moulds at all levels in the production chain.

It is used in solution form as formalin, as a free gas, or in solid form as paraformaldehyde prills. Formalin is a colourless liquid with a very slightly acid pungent odour. It is used as an aqueous solution usually containing methanol to prevent polymerisation.

Formaldehyde gas is generated by any one of the following methods:-

- (a) By vaporisation from formaldehyde solution. Used when fogging, spraying within a building, and in hatcheries during hatching process.
- (b) Given off from the chemical reaction of mixing formaldehyde solution with potassium permanganate (Condys crystals) in a metal container. Also known as "bomb fumigation". Used for egg and equipment fumigation, usually in a fumigation cabinet.
- (c) Given off when solid crystalline paraformaldehyde prills are heated in an electrical frypan or similar container to 21 8°C. Used for egg and equipment fumigation usually in a fumigation cabinet.
- (d) Given off by very slow release over 2-3 week period when the solid crystalline paraformaldehyde prills are used in nest litter, when 10 grams lasts 2-3 weeks.

2. TOXICITY

Australian Exposure Standards (AES)¹

The Australian Exposure Standard for formaldehyde is 1 ppm. Formaldehyde is also a Category 2 carcinogen and a known sensitiser. The Exposure Standards (ES) are determined by the National Occupational Health and Safety Commission (NOHSC). NOHSC is commonly known as Worksafe Australia. These are published in the publication "Exposure Standards for Atmospheric Contaminants in the Occupational Environment".

¹ National Occupational Health & Safety Commission "Exposure Standards for Atmospheric Contaminants in the Occupational Environment"

An exposure standard represents an airborne concentration of a particular substance in the workers' breathing zone, exposure to which, according to current knowledge, should not cause adverse effects nor cause undue discomfort to nearly all workers. There are generally three types of exposure standards.

ES-TWA - The Exposure Standard - Time Weighted Average, represents an average airborne concentration of a particular substance when calculated over a normal eight hour working day, for a 5 day working week. For formaldehyde this is 1 ppm.

ES-STEL - The Exposure Standard - Short Term Exposure Limit, represents a 15 minute TWA exposure which should not be exceeded at any time during a working day even if the eight hour TWA is within the TWA exposure standard. Exposures at the STEL should not be longer than 15 minutes and should not be repeated more than four times per day. There should be at least 60 minutes between successive exposures at the STEL. For formaldehyde this is 2 ppm.

ES PEAK - A maximum or peak airborne concentration of a particular substance determined over the shortest analytically practicable period of time which does not exceed 15 minutes.

Note: AES's may be altered in the future as new health information becomes available.

Category 2 Carcinogen

Probable human carcinogens are those substances for which there is sufficient evidence to provide a strong presumption that human exposure may result in the development of cancer. This evidence is generally based on appropriate long term animal studies, limited epidemiological evidence or other relevant information.

Long term animal inhalation on mice and rats have shown an increase in nasal tumours with increased concentrations of formaldehyde. However, epidemiological data on the cancer risk in man is inadequate.

Sensitiser

Some substances such as formaldehyde can cause a specific immune response in some people. Such substances are called sensitisers and the development of a specific immune response is termed "sensitisation". Exposure to a sensitiser, once sensitisation has occurred, may manifest itself as a skin rash or inflammation or as an asthmatic condition.

3. HUMAN HEALTH HAZARD DATA

Effects of Short Term (Acute) Exposure to Formaldehyde

Inhalation - Formaldehyde vapour can cause severe irritation of the nose, throat and windpipe. Tingling on the nose and throat may develop in some individuals at 0.5ppm, or even lower levels. Lachrymation occurs from 4ppm, however some individuals acclimatise to the irritant effect of formaldehyde at this level. After 30 minutes, discomfort increases considerably. More than 10 ppm can be tolerated for only a few minutes. At

about 10-20 ppm breathing is difficult. Severe burning sensations develop in the nose, throat and windpipe, producing a cough. Serious injury is likely to occur at concentrations of about 50-100 ppm. Acute inhalation at higher concentrations has caused lung injury such as pulmonary oedema (a life threatening accumulation of fluid in the lungs) and pneumonitis (inflammation of the lungs) and death. The symptoms of pulmonary oedema can be delayed until hours after the exposure.

Effects of Long Term (Chronic) Exposure to Formaldehyde

Inhalation - Chronic exposure to formaldehyde gas may cause respiratory irritation, chronic obstruction of the airways and impaired lung function. A few reports discuss respiratory sensitisation caused by formaldehyde. These suggest that formaldehyde may be a weak lung sensitiser.

Skin - Irritation and sensitisation may result from chronic exposure. Allergic reactions may produce tingling and reddening of the skin and rapid development of eczema showing red rash, scaling or cracking. Eczema may develop on the whole or portions of the face and neck and in elbow and leg creases. Sensitised workers subsequently may react to very low concentrations of formaldehyde.

Medical monitoring - Pre-employment medical examinations should be undertaken if persons are to be working with formaldehyde. A further medical examination should take place if acute symptoms of exposure become apparent.

4. FIRST AID MEASURES

Advice on dangers and first aid measures associated with the use of formaldehyde are to be clearly available on notice boards within all farms and hatcheries.

- (a) Skin Contact - Formaldehyde is an irritant. Repeated exposure may cause dermatitis either from irritation or allergy.

Treatment - Irrigate with copious quantities of water.

- (b) Mucous Membrane Contact Including Eyes
Formaldehyde gas may cause severe irritation to the mucous membranes of the respiratory tract and eyes.

Treatment - If splashed into the eyes, irrigate immediately with copious quantities of water. If swallowed drink milk or water and seek medical assistance.

- (c) Inhalation - Formaldehyde is highly irritant. Discomfort will be felt at low concentrations. If high concentrations are inhaled, coughing, difficulty in breathing, and pulmonary oedema may occur.

Treatment - Remove to fresh air immediately and perform artificial respiration if required. Seek medical assistance.

5. SAFETY PROCEDURES

Any person using formaldehyde should be thoroughly trained. Formaldehyde should always be used by experienced operators in precisely measured quantities. Effective measures and safety equipment must be in place to prevent the solution, gas or solid form contacting the skin or mucous membranes (such as in the eyes, nose, mouth), and to prevent inhalation of the gas.

6. TRAINING

Managers are responsible for the safety of all employees in the workplace. It is their responsibility to train all personnel who are required to store, handle and use formaldehyde in its various states. A record of each formaldehyde user's training background shall be maintained. Training is to be of a standard approved by WorkCover Authority.

In addition to induction training all managers, leading hands and operators will undergo at least annual review/training in uses and precautions of formaldehyde application. Specific operating instructions will be issued and available at each location. These instructions will be ratified/reviewed by the regular Occupational Health and Safety Committee meetings, and will include details of facilities precautions and usage rates. It will be the responsibility of the OH and S Committee to ensure the Standard Work Practices are read and understood.

7. STORAGE

Liquid formalin or paraformaldehyde prills must be stored in a suitable dry, well ventilated area, protected from extreme heat or fire and away from other chemicals. Liquid formalin must be stored in air tight and leak proof containers, and correctly labelled. Solid paraformaldehyde is stored in polythene/paper sacks. The contents of damaged sacks and unused contents of open sacks must be stored in a leak proof container with a lid.

8. FORMALDEHYDE USAGE - HATCHERY

The minimum protective clothing to be worn when handling or pouring formalin solution is an authorised full face piece large filter respirator (rated to 100 times AES), elbow length rubber gloves and overalls.

The minimum protective clothing to be worn when handling paraformaldehyde prills for use as a fumigant (measuring and dispensing into electric frypans or other heating container), is goggles and elbow length rubber gloves and overalls.

Records - A record book will be retained at each hatchery to log regular formaldehyde survey levels. Surveys will be made in each working area of the hatchery at least once each 6 months or more frequently if high levels are suspected. The method of testing, tester and details will be logged and each entry will be signed by the supervising hatchery manager. Testing devices may be a Drager tube or a Formalda-meter (Lion Brand) or similar,

and will be to standards set either by Worksafe or the Company Technical Services staff (Formaldehyde-meter or similar measuring devices will need regular calibration. The supplier of the Formaldehyde-meter should be consulted regarding gases which may interfere with the reading of the instrument).

9. FORMALDEHYDE USAGE - BREEDING FARM

The minimum protective clothing to be worn when handling or pouring formalin solution is an authorised full face piece large filter respirator (rated to 100 times AES) elbow length rubber gloves and overalls.

The minimum protective clothing to be worn when handling paraformaldehyde prills for use as a fumigant (measuring and dispensing into electric frypans or other heating container), is goggles, elbow length rubber gloves and overalls.

The minimum protective clothing to be worn when dispensing paraformaldehyde prills into nests is a half face piece small filter respirator (rated to 10 times AES) with goggles, elbow length rubber gloves and overalls. Alternatively a full face piece large filter respirator with gloves and overalls can be worn.

Exposure to formaldehyde during normal egg collection after paraformaldehyde prills have been added to nests is normally well below the threshold limit value of 1 ppm, however light disposable non-absorbent gloves may be worn by operators if skin sensitisation occurs.

When spraying or fogging liquid formaldehyde (formalin) solution inside sheds the minimum protective clothing is a full face self contained breathing apparatus as a face mask with positive pressure of at least a 2 hour capacity to meet Australian Standard 2927-1 987². In addition elbow length rubber gloves and head to toe protective waterproof clothing must be worn. A second person must be available and equipped with the same protective clothing in case of accident. A full face piece large filter respirator (rated to 100 times AES) may be used for brief entry and exit.

Entry to the sprayed area should be restricted by locking the area and using a defined danger tag system and warning signs until at least 12 hours after spraying is complete. Should entry be essential for a brief period the same protective arrangements used while spraying should apply. These will include having an extra person for safety.

Testing on all areas of the operators' environment must be carried out at six monthly intervals. Results from summer and winter months for a number of locations will be used in the annual review of the Standard Work Practices

10. CONSTRUCTION OF FUMIGATION CABINETS AND ROOMS

Cabinets and rooms must be designed for effectiveness and safety.

They must be capable of tight sealing so that there is minimal gas escape during fumigation.

² Standards Association of Australia Australian Standard No 2927-1987

A red warning light and suitable warning signs must be prominently displayed for the full duration of the fumigation process to prevent accidental entry (normally 40 minutes).

Doors must be designed to allow prompt exit from inside the room at all times.

They must be equipped with a suitable extraction system to ensure total venting of formaldehyde gas before the cabinet or room is opened. The venting of gas must be external so that personnel or birds are not exposed to vented gas. Clean air must be drawn into the cabinet or room from an uncontaminated source.

Systems must be designed so that formaldehyde gas extraction is as complete as possible. Personnel must not be exposed to unacceptable levels of fumigant when emptying the cabinet or room. Thorough venting of the fumigation cabinet or room must precede egg removal, and exhaust fans may need to be operated during the egg transfer process. Half face piece (10 times AES) or full face piece (100 times AES) respirators may need to be utilised in fumigation rooms and cool rooms during the egg handling process if fumigant is detectable by smell. The normal fumigation cycle is 20 minutes fumigation followed by 20 minutes extraction of gas.

In some locations, under certain weather conditions, formaldehyde fumes may blow into poultry sheds in relatively close vicinity to fumigation cabinets and rooms. Such problems should be addressed and solved on a specific site basis through local Occupational Health and Safety Committees. However, if a problem is a regular occurrence and shed concentrations exceed Australian exposure standards, the problem would have to be remedied.

Records - A record book will be retained at every farm to record regular formaldehyde level surveys in the immediate working areas of fumigation cabinet and cool room. Surveys will be made in each working area at least once each 6 months. The method of testing, tester and details will be logged and each entry will be signed by the farm manager. Testing devices may be a Drager tube or a Formalda-meter (Lion Brand) or similar, and will be to standards set either by Worksafe or the Company Technical Services staff (Formalda-meter or similar measuring devices will need regular calibration).

11. SPECIFICATION OF SAFETY EQUIPMENT

- (a) Overalls - Coverall style to minimise contact with arms, legs and body.
- (b) Rubber Gloves
 - (i) Non-absorbent gloves for use when dispensing paraformaldehyde prills. When worn with overalls they should not leave an unprotected area at the wrist. Gauntlet style preferred.
 - (ii) Non-absorbent and disposable gloves for use when egg collecting from nests with paraformaldehyde prills should be available for optional use by operators if required.

(c) Goggles - Safety chemical goggles.

(d) Respirators - Refer to Workcover Authority Publication:-

"List of Approved Respiratory Protective Devices". All respirators used must be approved by Workcover Authority and also comply with AS 1715-1991 and AS 1716-1991.

Half face piece small filter respirators provide protection against low levels of air contaminants (up to 10 times the AES) Full face piece large filter respirators provide protection against greater levels of air contaminants (up to 100 times the AES). Specific small filters or large filters that protect the user against formaldehyde must be used. (However it should be noted that combined gas and dust filters are available that also protect against dust and ammonia and formaldehyde).

NB: The total protection offered by the respirator depends on the good fit of the face piece on the wearer, not just the filter.

Sufficient respirators must be available at each location to ensure that all necessary operators needing respirators have access to clean, hygienic respirators, and to ensure that these are well fitted according to Australian Standard 1715-1991. When respirators are not in use they should be placed in a sealed container. Filters must be changed regularly. The frequency will depend on the concentrations of formaldehyde experienced and the manufacturers' instructions.

(e) Testing Equipment

Testing equipment to assess levels of formaldehyde throughout the working environment will be available to each location and used at least once each 6 months. Such criteria and testing systems must satisfy the local Occupational Health and Safety Committee. Testing should be undertaken in the company of a designated employee and results be made available to all employees. In an emergency situation, testing equipment must be available at leading hand level if the manager is not present.

12. USE AND REVIEW OF THIS BOOKLET

These Guidelines for Safe Working Practices were prepared on the basis of known technical and work knowledge as at December 1991. They are subject to review on an annual basis.

A copy of this booklet is to be given to all employees who work, or come in contact with formaldehyde.

An electronic copy (PDF) of this document was created in August 2006 and is available from ACMF's website www.chicken.org.au

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The Employers' Federation of NSW endorses this Standard Work Practice

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