

Directives for the Use of Prussic Acid (Zyklon) for the Destruction of Vermin (Disinfestation)

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I. PROPERTIES OF PRUSSIC ACID (HYDROCYANIC ACID)

Prussic acid is a gas which is generated by evaporation

- Boiling point: 25 degrees Centigrade
- Freezing point: -15 degrees Centigrade
- Specific gravity: 0-69
- Steam density: 0-97 (Air: 1-0)
- The liquid evaporates easily.
- Liquid: transparent, colourless.
- Smell: peculiar, repulsively sweet.
- Extradordinarily great penetrative powers.
- Prussic acid is soluble in water.

Danger of explosion: 75g. prussic acid 1 cbm air. (Normal application approx. 8-10 g. per cbm, therefore not explosive). Prussic acid may not be brought into contact with an open flame, glowing wires, etc., because then it burns up slowly and loses all its effectiveness (carbonic acid, water, and nitrogen are formed).

Toxic effect on warm-blooded animals: Since prussic acid has practically no indicative irritant effect it is highly toxic and very dangerous. Prussic acid is one of the most powerful poisons. 1mg. per kg. of body weight is sufficient to kill a human being. Women and children are generally more susceptible than men. Very small amounts of prussic acid do not harm the human body, even if breathed continuously. Birds and fishes are particularly susceptible to prussic acid.

Toxic effect on insects: The effects of prussic acid on insects do not depend on the temperature to the same extent as that of other gases, that is, it is also effective in low temperatures (even at 5 degrees Centigrade). The eggs of many insects, particularly bugs and lice, are more susceptible than the full-grown insects.

Toxic effects on plants: The degree of toxicity depends on the type of vegetation on the plants. Plants with thick leaves are less susceptible than those with thin ones. Mildew and dry-rot are not killed by prussic acid. Prussic acid does not destroy bacteria.

II. METHOD OF USING PRUSSIC ACID

ZYKLON is the absorption of a mixture of prussic acid and an irritant by a carrier. Wood fibre discs, a reddish brown granular mass (diagriess - Dia gravel) or small blue cubes (Erco) are used as carriers.

Apart from serving its purpose as indicator, this irritant also has the advantage of stimulating the respiration of insects. Prussic acid and the irritant are generated through simple evaporation. Zyklon will keep for 3 months. Use damaged cans first. The contents of a can must all be used up at once. Liquid prussic acid damages polish, laquer, paint, etc. Gaseous prussic acid is harmless. The toxicity of the prussic acid remains unchanged by the addition of the irritant; the danger connected with it is however considerably decreased.

Zykon can be rendered inoffensive by combustion.

III. POSSIBLE POISONING

1. **Slight Poisoning:** Dizziness, headache, vomiting, general feeling of sickness, etc. All these symptoms pass if one immediately gets out into the fresh air. Alcohol reduces resistance to prussic acid gassing, therefore do not drink alcohol before fumigation. Prescribe: 1 tablet Cardiazol or Veriazol in order to prevent heart disorders, if necessary repeat after 1-3 hours.
2. **Severe poisoning:** The affected person will collapse suddenly and faint. First aid: fresh air, remove gas mask, loosen clothing, apply artificial respiration. Lobelin, intermuscular 0-01 g. Do not give camphor injections.
3. **Poisoning through the skin:** Symptoms as for 1. Treat the same way.
4. **Stomach poisoning:** Treat with Lobelin intermuscular 0-01 g., ferrous sulphate, burnt magnesia.

IV. PROTECTION AGAINST GAS

When fumigating with Zyklon use only special filters, e.g.: the filter insert "J" (blue-brown) of the Auergesellschaft Berlin or of the Draegerwerke, Luebeck. Should gas seep through the mask, leave the building immediately and change filters after also checking the mask and its fit to see whether they are tight. The filter insert is exhausted if gas enters through the mask. If using filter "J", first move around in the open air for approx. 2 minutes so that a certain amount of moisture from the breath may gather in the filter insert. Under no circumstances should filters be changed inside gas-filled rooms.

V. PERSONNEL

A disinfestation squad consisting of at least 2 members is employed for each disinfestation project. The fumigation chief is responsible for the fumigation. His particular duties are inspection, airing, release and safety measures. The fumigation chief is to appoint a deputy in case has has to leave. The orders of the

fumigation chief are to be followed without delay.

Untrained persons or persons who are trained but who do not yet hold a certificate may not be called upon to work on gassing operations, nor may they be taken into gas-filled rooms. The fumigation chief must also know where to contact his personnel. Every person must at all times be able to prove he has official authorization for the use of prussic acid for extermination purposes.

VI. EQUIPMENT

Each member must at all times carry with him:

1. His own gas mask.
2. At least 2 special filter inserts against Zyklon prussic acid.
3. The leaflet *First Aid for Prussic Acid Poisoning*.
4. Work order.
5. Authorization certificate.

Each disinfestation squad must at all times carry:

1. At least 3 special inserts as extra stock.
2. 1 gas detector.
3. 1 instrument for injecting Lobelin.
4. Lobelin 0-01 g. ampules.
5. Cardiazol, Veriazol tablets.
6. 1 lever or pickhammer for opening cans of Zyklon.
7. Warning signs as per regulation.
8. Material for sealing.
9. Sheets of paper to serve as pads.
10. Flashlight.

All equipment to be kept clean and in good order at all times. Damage to equipment is to be repaired at once.

VII. PLANNING FUMIGATIONS

1. Can the fumigation be carried out at all?
 - a. Type of building and situation.
 - b. Condition of roof.
 - c. Condition of windows.
 - d. Presence of heating shafts, air shafts, breaks in the walls, etc.
2. Determine the kind of vermin to be exterminated.
3. Calculate the space. (Do not rely on drawings but take measurements yourself. Take only outside measurements, include walls).
4. Prepare personnel. (Remove domestic animals, plants, food and drink, undeveloped photographic plates, and gas mask filters).
5. Find which openings will be particularly difficult to seal. (Air shafts, drains, large opening which have been boarded up, roofs).

6. Settle necessary safety measures. (Guarding, work detachment for sealing).
7. Fix the date for the fumigation and the time for clearing the building.
8. If necessary, arrange safety measures for the neighbourhood in good time.
9. Notify authorities.

VIII. PREPARATION FOR FUMIGATION

1. Seal.
2. Open all doors, closets, drawers, etc.
3. Pull bedding apart.
4. Remove all liquids (remains of coffee, washing water, etc.).
5. Remove all food.
6. Remove all plants and domestic animals (aquaria, etc.).
7. Remove all undeveloped photographic plates and films.
8. Remove adhesive plaster, all medical supplies, whether open or in paper bags (particularly coal).
9. Remove all gas mask filters.
10. Prepare to check on results.
11. Clear out personnel.
12. Take over keys (every door key).

IX. THE STRENGTH OF THE GAS AND THE TIME REQUIRED FOR IT TO TAKE EFFECT DEPENDS ON:

- The type of vermin.
- The temperature.
- The amount of furniture in the rooms.
- The imperviousness of the building.

For inside temperatures of more than 5 degrees Centigrade, it is customary to use 8 g. prussic acid per cbm.

Time needed to take effect: 16 hours, unless there are circumstances such as a closed-in type of building, which requires less time. If the weather is warm it is possible to reduce this to a minimum of 6 hours. The period is to be extended to at least 32 hours if the temperature is below 5 degrees Centigrade.

The strength and time as above are to be applied in the case of :bugs, lice, fleas, etc. with eggs, larvae and chrysalises.

For clothers-moths: temperatures above 10 degrees Centigrade, 16 g. per cbm and 24 hours to take effect.

For Flour-moths: same as for bugs.

X. FUMIGATION OF A BUILDING

1. Check everybody has left the building.
2. Unpack boxes of Zyklon. Make the appropriate amount ready for each floor.
3. Distribute the cans. One man to go into the building and receive the cans which have been brought up the work detachment and to distribute them. (Have them put next to the pads).

4. Dismiss the work detachment.
5. Post the guard. Fumigation chief to instruct the guard.
6. Check that sealing and clearing have been completed.
7. Put on gas masks.
8. Open the cans and pour out the contents. The contents are to be spread thinly so that the Zyklon can evaporate quickly and the necessary density of gas can be achieved as soon as possible. This process is to start on the top floor, but the cellar is dealt with before the ground floor, should the cellar have no exit. Rooms that have been dealt with should as far as possible not be re-entered. This processing is to be done slowly and calmly. The staircase particularly should only be used slowly. The processing may only be interrupted in an emergency.
9. The exit door to be locked, sealed (do not forget the keyhole) and its key handed over to the fumigation chief.
10. On the door fix a warning with the legend: *Danger - Poison Gas. Danger to Life, No Admittance*. This warning sign is to be in several languages if necessary, and in any case it must be marked with at least one death's head, clearly visible.
11. Gas masks, apparatus for resuscitation and gas detectors are to be kept available at all times. Every member of the fumigation squad must know where these objects are located.
12. At least 1 member of the fumigation squad must always remain near the building which is being fumigated. The guard must be notified of his position.

XI. AIRING

The airing is connected with the greatest danger for those participating and others. Therefore, it must be carried out particularly carefully and a gas mask should always be worn. The airing should take place according to the following principles: pure air should always be within reach in the shortest possible time and the gas should flow out to that side where it cannot endanger people who are not participating. Should the airing be difficult, one trained man should remain in front of the building in order to watch how the gas is blowing away.

1. Take care to see that no strangers remain in the vicinity of the building.
2. Post the guards in such a way that they are not annoyed by the gas as it blows out, but can still watch the entrances to the building.
3. Put on a gas mask.
4. Enter the building. Close door, but do not lock it.
5. First open the windows on that side of the building where there is no wind. Air floor by floor. Start on the ground floor and after each floor take at least 10 minutes rest.
6. The doors leading to the corridor, connecting doors between rooms and windows must be opened in each room. Should there be difficulty in opening any of the windows they should only be opened after most of the gas has blown away.
7. Partitions and other methods used to seal the room which cannot be replaced quickly should only be removed after most of the gas has blown away.
8. Care should be taken to see that the heating system and water pipes do not freeze should there be a frost or danger of it.

9. Rooms with valuable contents, such as clothing stores, etc. may be locked again as soon as the windows have been opened.
10. Windows and doors which have been opened should be fastened in such a way that they cannot slam.
11. Covers in chimneys may be removed after the provisional release of the building.
12. The airing should continue for at least 20 hours.
13. The Guard should remain near the building during the whole of this time.

XII. PROVISIONAL RELEASE

A fumigated room may be released provisionally as soon as the paper strip of the gas detector is of a lighter blue than the centre colour pattern, when the doors and windows are open. Only work connected with the airing and clearing up may be done in the rooms which have been provisionally released. Under no circumstances may anyone rest or sleep in these rooms. The doors and windows must be left open all the time.

XIII. CLEARING UP AFTER PROVISIONAL RELEASE

1. Remove remains of Zyklon from the fumigated rooms. They should generally be sent back to the factory in the same way as cans and boxes. Before boxes are sent back from the fumigated rooms the inscription *Poison* must be removed from them. Damp, wet or soiled remains as well as damaged cans may not be sent back under any circumstances. They may be thrown on a rubbish or slag heap, but may never be emptied into drains.
2. Mattresses, straw palliasses, pillows upholstered furniture and similar items must be shaken or beaten for at least one hour in the open air (if rainy, at least 2 hours in the hall) under the supervision of the fumigation chief or his assistant.
3. If possible, the stuffing of straw palliasses should be changed. The old stuffing may not, however, be burnt, but may be reused after it has been aired for a further period.
4. Should the chimneys be covered from above, these coverings must be removed carefully since other wise there is a danger that the fires in the stoves and hearths will not have sufficient draught, which may cause carbon-monoxide poisoning.
5. After the final release has been made, two copies of a fumigation report are to be filled-in in the prescribed manner. The following points in particular should be shown:
 - a. Volume of fumigated rooms.
 - b. Amount of Zyklon used.
 - c. Name of fumigation chief.
 - d. Names of other personnel.
 - e. Time required for gas to take effect.
 - f. Time at which disinfested rooms were released.

XIV. FINAL RELEASE

1. Under no circumstances less than 21 hours after airing was started.
2. All items removed for beating are to be taken back into the room.
3. Doors and windows to be closed for one hour.

4. In rooms with heating facilities a temperature of at least 15 degrees Centigrade must be produced.
5. Gas detecting. The paper strip may not show a darker blue than the lightest colour, even between blankets and mattresses which have been placed on top of each other, or in rooms which are not easily accessible and which it is difficult to air. Should this not be the case, airing must be continued and the check for gas repeated after a few hours.
6. The check for gas must be made in each room of buildings which are again to be used as sleeping accommodation as soon as possible. Under no circumstances may anyone sleep in a room which has been fumigated in the night following fumigation. The windows must always remain open during the first night that the room is used again.
7. The fumigation chief or his deputy may not leave the building until the very last room has been finally released.

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