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Industrial health hazards: A study of safety from chemicals before the tanning process

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Abstract
There are hazards and risks in all work places. Safety and health are possibly ensured only by knowing these risks and hazards and by properly guarding ourselves until the risks and hazards have been eliminated. Technological progress and change are constantly taking place and while they often bring improvements in both efficiency and safety at work, they also can create new risks and hazards. This paper aims at studying the measures which can be taken for the safety of workmen before the tanning phase in the tanning industry.

Keywords: Industrial health, hazards, risks

Introduction
Industrial illness normally develops over a period of time because of workplace conditions. Such conditions might include exposure to disease-causing bacteria and viruses or due to chemicals or dust.
Under the Occupational Health and Safety Act, occupational illness is defined as a condition that results from exposure in a workplace to a physical, chemical or biological agent to the extent that the normal physiological mechanisms are affected and the health of the worker is impaired.

Types of Hazards
The following are the types of hazards prominent in the industry.

1. Accident Hazards
a) Slips, trips and falls on the level, especially on wet, slippery or cluttered floors, while moving heavy loads such as containers of chemicals, bundles of hides, skin, leather, etc.
b) Electric shocks caused by contact with defective electric machinery.
c) Blows and crushing injuries caused by rotating or moving parts of machinery.
d) Acute poisoning and/or chemical burns by inhalation, ingestion or skin contact with constituents of tanning process liquors, or poisonous gases released during the tanning process (e.g., hydrogen sulfide).
e) Burns caused by contact with hot surfaces or splashes of hot solutions.
f) Cuts and stabs caused by manual or mechanized working tools.
g) Eye injuries caused by flying particles from rotary buffing machines.
h) Asphyxiation or poisoning in confined spaces, in particular during the cleaning of vats or tanning baths.

2. Physical Hazards
a) Exposure to high noise levels from mechanical equipment.
b) Callosities on hands caused by continuous strenuous work with hand tools.
c) Eyestrain due to poor illumination in the tannery.

3. Chemical Hazards
a) Skin rashes and dermatosis as a result of exposure to cleaners, solvents, disinfectants, pesticides, leather-processing chemicals, etc.
b) Allergies caused by many of the chemicals used in Leather Industry.

4. Biological Hazards
Raw hides and skins may be contaminated with a variety of bacteria, molds, yeasts, etc., and various diseases (e.g., anthrax, leptospirosis, tetanus, Q-fever, brucellosis, etc.) may be transmitted to tanners; also, the large quantities of dust produced in buffing operations would normally be contaminated with disease-bearing microorganisms, putrefaction products, etc.

5. Ergonomic, psychosocial and organisational factors
a) Acute musculoskeletal injuries caused by physical overexertion and awkward posture while moving heavy or bulky loads, in particular bundles of hides, skins and leather.
b) Low back pain due to prolonged working in a standing or semi-bending posture.
c) Heat stress, in particular when working on warm days in premises lacking good ventilation or air circulation

Safety Measures
The measures of safety of the worker in the tanneries can be divided into three categories:

1. **Safety Measures Before The Tanning Process**
   Measures to be practiced before the process of tanning actually starts. The information so furnished must be provided to the workers so that they understand to practice safe handling methods before that tanning of hides and skin is done.

1.1 Safety in use of Chemicals

More than 250 different chemicals are used in the production of leather. Workers in the tannery are exposed to these chemicals in various ways. Though each chemical is not necessarily hazardous to human health, one must be aware that the inherent source of the hazard can be either the chemical itself, any emission generated during the use or handling of the chemical (e.g. vapours, fumes, effluent) or the containers used for storage and transport of these chemicals.

Workers can be exposed to the chemicals by

a) **Inhalation: -** in form of airborne substances (gases, dust, vapours, mist and fumes.
b) **Ingestion: -** when workers are eating, drinking or smoking in the work area, without washing contaminated hands.
c) **Skin absorption** generally through pores or cuts/wounds of unprotected hands, arms, body.

The impact of such exposure can range from temporary effects such as dizziness, headache, irritation of eyes, skin or lungs, allergic reactions, collapse due to lack of oxygen, poisoning of liver, kidney, never system to long term impairments such as ulcer, bronchitis, genetic defects and, in some rare cases, even instantaneous death.

Besides the adverse effects on the human body, chemicals can be the source and the cause of fire, corrosion and damage to structures and electrical installations and may have a harmful effect on the surrounding environment when released in an uncontrolled manner.

Due to lack of space the information on the label on each container is often incomplete. Additional information can be drawn from material safety data sheets which should be provided by the chemical manufacturer with each hazardous chemical or from the supplier of such chemicals.

Finally, it is important that all people working with chemicals receive information on the hazards to health and training on how they should protect themselves.

1.2 Control Chemical Hazards

From the relevant information on the chemical hazards available, check where and to what extent workers in the tannery are exposed to these hazardous chemicals. Workers are exposed to hazardous chemicals during the following processes:

- Loading/unloading/handling of chemical containers in chemical store;
- Transfer of chemicals from chemical. Containers in chemical store;
- Mixing of chemical recipes in chemical store or work place;
- Transfer of chemicals from chemical store to work place;
- Dosing of chemicals in work place;
- Loading/unloading of raw material! pelt/leather into/from pits, paddles, drums;
- Removal of chemical wastes and effluent from work place;
- Washing and disposal of chemical containers.

As chemical emit fumes, mist, vapors or dust during storage and handling, any worker may get exposed to these airborne chemical pollutants in any pair of the work place. Chemicals in liquid and gaseous form do also affect the immediate neighborhood, when let out into drains or removed from the work place by exhaust blowers and chimneys.

Measures to control chemical hazards

For safe handling of chemicals, firstly take necessary preventive measure first and then eliminate possible hazardous chemicals from the work place. Secondly, limit the chances of exposure. Thirdly as a last resort, prevent exposure to hazardous chemicals by use of personal protective equipment.

a) Eliminate hazardous chemicals and processes

Where ever feasible, fully or partly replace hazardous chemicals with less hazardous ones. In some cases, it might be difficult to find replacements. In such cases, it may be useful to look at alternative processes that can be done without using such substances or not emitting same amount of pollutants.

For example:

- Use of water based instead of solvent based chemicals.
- Partial replacement of sodium sulphide with enzymes in liming.
- Roller coating instead of spraying

b) Allow release of chemicals by use of modified work systems and local exhaust/drains

Simple changes of production process or work systems can reduce the release of chemical fumes, vapours, gases, dust or liquors containing chemicals.

Local exhaust ventilation on machines or in processes can reduce the emission of mist, vapours, gases or dust in the work place. Such extraction systems should-be in place on dry shaving, buffing, dedusting and spraying machines.

Similarly, local drainage systems for paddles and drums prevent chemical containing effluent to spill over work areas in the wet process operations.

- Dose and transfer chemicals in fully or partly closed systems.
- Always put lids and covers on chemical containers.
- Control discharge of floats from paddles and drums by using hose pipes instead of simply opening the drum doors or paddle faucets.

Ensure that the extraction or drainage system does not simply shift the pollutant from one work place to another in the factory or outside to the neighbourhood. Local exhaust/extraction systems have to be connected to adequate collection or scrubbing devices, while the drainage system should end at an effluent treatment plant

In addition to local exhaust/extraction systems, the overall ventilation and natural air circulation in areas where mist, vapours, gases or dust are likely to be released, will further reduce their concentration in the air. At the same time, such ventilation helps to bring down the level of humidity and temperature in the work place.

Before installing overall ventilation and exhaust, be aware about the local air circulation around your tannery to avoid entrance of pollution through windows or other opening or contamination of other work areas. Exhaust push-type ventilation (fans and vents) should be provided in chemical store and sub-stores and processing areas such as wattle crushing, dry shaving, buffing, dedusting, and spraying. In work areas adjacent to these areas adequate pull ventilation should be available to create a positive pressure which

prevents contaminants from entering these areas.
Generally, good housekeeping practices such as regular cleaning of work areas, floors, walls and machines, removal of waste and adherence to safe storage and handling practices reduce the number of potential pollutants in the work place.

c) Reduce the number of workers in areas with hazardous chemicals
In case these measures do not yield the expected result or are not feasible, further you may focus on reducing the exposure of the workers. Subject to availability of sufficient personnel, assign designated workers only to handle chemicals. At the same time, ensure that the exposure duration of the workers is kept as short as possible.
Besides limiting the overall exposure of your staff- such distribution of work also allows better and specific training of these workers on proper and safe chemical handling practices. Consider Job rotation as a measure, to avoid excessive exposure of the same worker over prolonged duration.

d) Limit access to areas where hazardous chemicals are likely to be present
Limiting access to areas where chemicals or chemical hazards are present (e.g. chemical stores, effluent treatment plant) is a simple way of limiting exposure. Clear instructions and display of suitable sign boards can help achieve this.

e) Use personal protective equipments
The protection of workers by providing them with personal protective equipment is an easy and immediate solution, but should be considered as the last resort only. The use of personal protective equipment often involves discomfort to the worker, particularly in hot and humid regions.
Whenever it is impossible to prevent personal exposure to chemicals and pollutant at levels at which there is no hazard to health, personal protective equipment must be used.
Personal protective equipment has limitations too. The use of dust masks in buffing areas is ineffective, if there are no local dust extraction systems available on the buffing machines. The high dust concentration in the air clogs the dust masks immediately, rendering them useless.

f) Ensure good personal hygiene of workers:
Personal protection also means adherence to basic behavioral practices and principles which must be encouraged by manager and supervisors in tanneries all the time:

- Prohibit eating, chewing, drinking and smoking in work areas, particularly where hazardous chemicals are likely to be present.
- Make sure that workers clean and wash exposed parts of body after handling chemicals or processes involving chemicals.
- Provide facilities for washing, changing and storage of clothes.
- Encourage personal hygiene of workers. Make sure that they always wash hands before eating or smoking.
- Inform and train workers on safe work practices in handling chemicals (see sections on storage and handling of chemicals).

Conclusion
Thus it becomes important to state that awareness about the chemicals and the handling is vital for prevention of hazards related to chemicals used before and during the tanning phase in the industry. The workers are continuously exposed to the chemicals so it also becomes the responsibility of the employer to safeguard the workers against the hazards.

Reference
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