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IMPORTANT

professional protection magazine

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Use your head

— when choosing a helmet

In designated hardhat areas, your helmet should be as natural a part of your clothing as your shoes.

The purpose of a hardhat is not only to protect the head from falling objects, although this is the most common type of accident.

Heavy objects can also be thrown, toppled, swung, and otherwise moved with great momentum.

It is therefore important to select a hard hat with its field of use in mind. The hard hat should sit comfortably and securely on the head, and should resist being knocked off the head — even by objects hitting the head from the side.

But there are many other considerations in the selection process. Here are a few samples:

- **Is the work environment cold?**

In cold storage, cool rooms and other low-temperature workplaces, it may be necessary to wear a woollen hat or beanie inside the helmet, A slightly large hard hat is therefore required. Remember, though, that if a larger size is selected, the inner head covering should **always** be worn. Without it, the fit will be too loose.

- **Is the work environment hot?**

Many workplaces are themselves hot, or feature a lot of radiating heat from high-temperature sources. In these places, the hard hat should be designed to withstand the heat. Specially designed helmets from heat-resistant materials are available. Some hard hats not only withstand heat, but also provide effective heat insulation, Also pay attention to buckles and chin straps, which should hold the helmet securely yet comfortably.

- **Is there a risk of encountering electricity?**

Naturally, in these situations, metal hard hats are out of the question, It may also be necessary to select helmets that are specifically designed for the purpose.

- **Is there a risk of getting caught in presses or other "squeezing" machinery?**

There are hard hats which feature particularly strong sides to resist pressure from both sides of the helmet.

- **Are ear muffs also required in the area?**

If ear muffs and helmets are to be worn simultaneously, it is necessary to select either special earmuffs or special hard hats. Hard hats are often available with side mounts for ear muffs. Alternatively, if conventional hard hats are used, the ear muffs must feature extra thin headbands for use under the hardhat, or neck- or chin bands, which do not interfere with the hard hat.

- **Is personal respiratory protection required?**

The head cradle or head strap of the respirator should under NO circumstances be worn on top of the helmet. For proper protection, the respirator must be fitted in the normal way, directly on the crest of the head, underneath the helmet,

- **Is eye protection needed**

Many hard hats can be fitted with a splash visor or other type of face shield, such as an impact-proof polycarbonate visor. These visors may be more convenient than goggles or pro-

tective spectacles. However, visors and face shields cannot be a substitute for enclosed, sealed gas goggles.

- **Are other accessories needed?**

  Helmet-mounted mining lamps

  Neck flaps

  Interior linings

  Sweat bands

  Colour-coded designs

  Ventilation holes (NOT if there is a risk of splashes from hot materials, corrosive chemicals etc.)

The Australian Standards AS 1800 and AS 1801 take up many of the points mentioned above,

If the hard hat is fitted with a chin strap, this should be properly fastened and adjusted, This is especially important in work that requires a lot of head movement, and in workplaces with a great deal of moving machinery or vehicles. In some countries, and in many companies, the use of chin bands is a must.

Naturally, the most important concern is that hard hats are worn by everyone without exception at **All times in all areas** where they are required.

These areas should be clearly marked, employees should be well aware of the requirement, and supervisors should be very alert and act immediately if anyone fails to wear head protection.

Source: Enqvist J. & Hallin N 1994, ***Arbetsmiljö*, No 3,** p8; ***Occupational Personal Protection,*** 1994, Standards Australia, SAA HB9—1994, pp. 63—72

Changes to PPM

From this issue of Professional Protecfion Magazine, you may notice a few minor changes to our format, Most of the journal, however, stays exactly the way to which our readers have become accustomed over the past nine years (yes, we started in 1985!)

- **Still no ads**

Yet again, a decision has been made to remain an advertising-free publication. Although advertising revenue would greatly help us financially, and could perhaps lead to expansion of PPM both in terms of number of pages and research resources, Advertising will still not be permitted in the magazine.

- **Streamlined source references**

For the sake of consistency, all sources are now given according to the Harvard-system (also known as the ***author-date*** system of referencing. This is a widely accepted system in scholarly and scientific circles. The author is always given first, followed by the year of publication, title of article, publication (in italic script), publisher and place of printing (if relevant), issue, and page numbers. A typical source reference may look like this:

Source: Johnson P, 1994, 'Respirators and beards', ***Occupational Health,*** Chicago, USA, vol 4, no 16, pp 344—348

If available, the original source material can be requested from the publisher. Keep in mind, however, that many articles in PPM are derived from sources in foreign languages (notably German and the Scandinavian languages),

- **Summary**

Each issue of PPM features a summary of all its articles on the back cover. The summary gives you an instant idea of the contents of the article, which will assist you if you're looking for any particular subject.

- **Index available soon**

A comprehensive index of everything ever published in PPM will be available soon. The index comprises a topical key-word index, as well as a dictionary index. The availability of the index will be announced as soon as it becomes available,

- **Self-cover**

In order to save on paper and packing, PPM now carries your name and address directly on the back cover. Note, however, that **no editorial space has been lost —** the magazine contains just as much information as it used to.

We hope that these changes will benefit all our readers, If you have any comments or suggestions, please write or fax,

Snippets

— from the September 1993 occupational medicine conference in Nice

Electricity cancer

Children whose fathers work in the power industry stand a greater risk of cancer, according to a study by the Swedish National Institute of Occupational Health, The study involved children of men who worked in electricity production and distribution between 1960 and 1985.

6,600 children were surveyed. The expected cancer rate was 9.2 among all children, while the examined group showed 15 cases of cancer — 1.6 times the expected rate,

The children had cancer of the central nervous system, leukaemia and kidney cancer,

No increase in the number of cases of low birth weight or still-birth was detected,

However, the results must be interpreted with care. Other factors may have influenced the outcome of the study. ***(Siv Tornquist, SNIOH)***

Printers' sperm

Indian printers in Calcutta who are exposed to lead in their work have severe damage to their sperm, according to a study, The print workers were around 30 years old, and had worked for ten years, eight hours a day in the printeries.

The average blood concentration of lead was 20 micrograms,

Woodwork teachers

Woodwork teachers complain more of skin problems, eye irritation and blocked noses than other teachers, and suffer more frequently of chronic bronchitis. Wood dust is believed to be the cause, An additional cause is the use of wood glue. Smoking has been shown to increase the risk of chronic bronchitis thirty-fold, ***(Irena Cynkier, Huddinge, Sweden)***

Noise damage to the unborn

Women who work in noisy, draughty workplaces, and who are required to perform heavy lifting are more likely to experience premature births and low birth weights. Women who are exposed to dust are also in this category,

These are the findings of a Danish survey encompassing 5,000 births of women in the textile, footwear and clothing industries.

An added finding was that it took the women longer to become pregnant,

Difficult to conceive

An Italian study showed that conception depends on a multitude of external factors, The average period between "starting to try" and conception was three months, Women who worked in stressful, noisy, physically demanding conditions, and women who were exposed to chemicals, had to wait more than twelve months. Smokers were even more disadvantaged, adding three months to the waiting period of others, ***(Angela Spinelli, Rome)***

Source: Ekelof, E. 1993, ***Arbetsmiljo*** No **12, p** 13

Hairdresser's lament

Hairdressers may be exposed to cancer-producing substances, according to the international cancer research institute in Lyon, France, A recent report lists one definite carcinogen, two probable carcinogen and seven suspected carcinogen in the hairdressers' environment. A further eleven substances are difficult to ascertain, since toxicological information is incomplete.

International research shows that hairdressers stand a higher risk of bladder cancer, lymphatic cancer and lung cancer.

Other European countries are taking steps to overview their hairdressers' work situations.

Source: *Arbetsmiljo* No 2 1994, p 13

Asbestos deaths

Asbestos may be responsible for the deaths of another 7,000 Australians, according to the Queensland division of the National Safety Council of Australia.

Speaking at the Safety Council's new skills training centre last March, NSCA Queensland general manager, Ken Horrigan, said that recent research suggested that companies and governments could also face compensation claims totalling $1 billion,

"The research findings from leading Australian statistical experts, Tim Andrews and Geoff Atkins, show the number of Australian workers dying from mesothelioma, a fatal cancer linked with exposure to asbestos, has more than tripled in the past decade," Mr Horrigan said.

He claimed that the yearly Australian rate of asbestos-related deaths was already one of the highest in the world, and still increasing. A further 6,000 cases of mesothelioma and another 1,000 asbestosis cases could be expected in the next 20 years, In the 1986—1990 five-year period, there were 1,180 mesothelioma deaths.

The steady increase could be explained by two major factors: the general conditions in a number of Australian industries 20 to 40 years ago, and the average latency period of mesothelioma of 37 years,

Mr Horrigan predicted that the number of cases would continue to rise until about the year 2010, and then fade, thanks to the introduction of tighter asbestos controls in the 1960s.

"This does not mean industries and employers can be complacent," Mr Horrigan said. "The biggest risk from asbestos today comes when it is being removed or it is accidentally disturbed, Employers have a responsibility to ensure staff have the appropriate training, skills and equipment to minimise any asbestos risk."

Accompanying Mr Horrigan on an official visit to the skills training centre, the Hon, Ross Free, Federal Minister for Schools, Vocational Education and Training, stated that safety training was the legal and moral responsibility of employers, and that all workers should be trained in potential dangers and safe work practices,

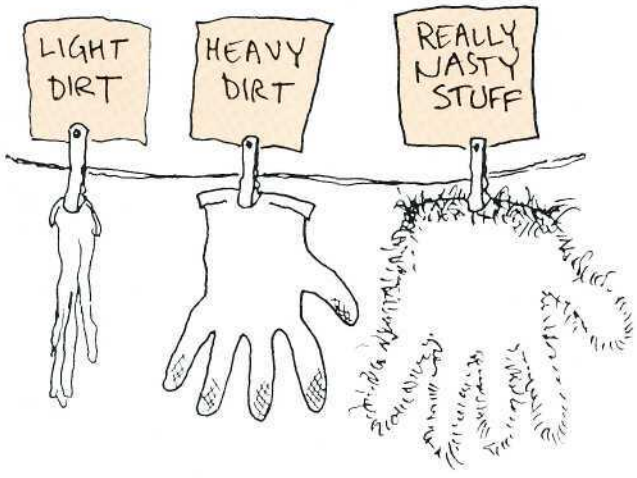
The new NSCA skills training centre will be used as a training facility for workplace health and safety officers and other employees in a variety of skills areas, including asbestos removal, Other areas include safety education of riggers, dogmen, scaffold workers, and people whose workplaces involve trenches, forklifts, chainsaws, and explosive power tools.

Source: National Safety Council of Australia, Queensland division, March 1994, *Asbestos Responsible for 7000 more Deaths*

Don't treat chemicals

with kid gloves

Selecting the right kind of protective gloves for chemical handling is a process that requires careful consideration. The wrong glove — no matter how thick in appearance — could give little or no protection.



Ground rules

There are a few basic points that you need to keep in mind at all times when selecting and using gloves:

- **Whatever type of glove you choose, the chemicals will affect it sooner or later. The penetration (or permeation, or degradation) can happen without any visible indications, and without the wearer noticing it.**

Permeation: the chemical dissolves into the material and passes through it without breaking it

Penetration: the chemical seeps in through holes, cracks and other defects in the material

Degradation: the chemical affects the physical make-up of the material, for example making it porous or softening it

- **A glove material that gives excellent protection from one chemical may provide very poor protection from another.**
- **Appearances can be deceptive: a thin glove could mean better protection than a thin one, depending on the material.**
- **Remember that it may sometimes be impossible to tell different types of materials apart. Gloves of identical colour and appearance may be made of different materials.**
- **Once a chemical has permeated a glove, it will continue to leak through. This is important when you consider re-use and replacement routines.**
- **Glove selection should be based on permeation tests involving the particular chemical. Guesswork can be dangerous.**

There's a jungle out there...

There is a maze of materials, linings, fused combinations and laminated materials used in gloves, Here is a list of the most common ones:

- **Butyl rubber**

A synthetic rubber with good resistance to a large number of chemicals

- **Natural rubber**

Rubber from the rubber tree, High elasticity.

- **Neoprene or Chloroprene**

Chemical characteristics that are generally better than natural rubber

- **Nitrile rubber**

Good resistance to cuts and pricks

- **Polyethene** (PE)

A plastic material. Often, multiple layers of PE are welded together into a thin glove. Often used as disposable gloves.

- **Polyvinyl alcohol (PVA)**

A water-soluble plastic material, As long as it is kept away from water, this material sports very good resistance to a large number of chemicals

- **Polyvinyl chloride (PVC)**

A firm plastic material which becomes flexible when a softening agent is added in the manufacturing process. The amount of softener used determines the chemical resistance of the glove,

- **Viton**

A rubber material with better chemical resistance than most other rubbers, However, viton gloves may be rather expensive,

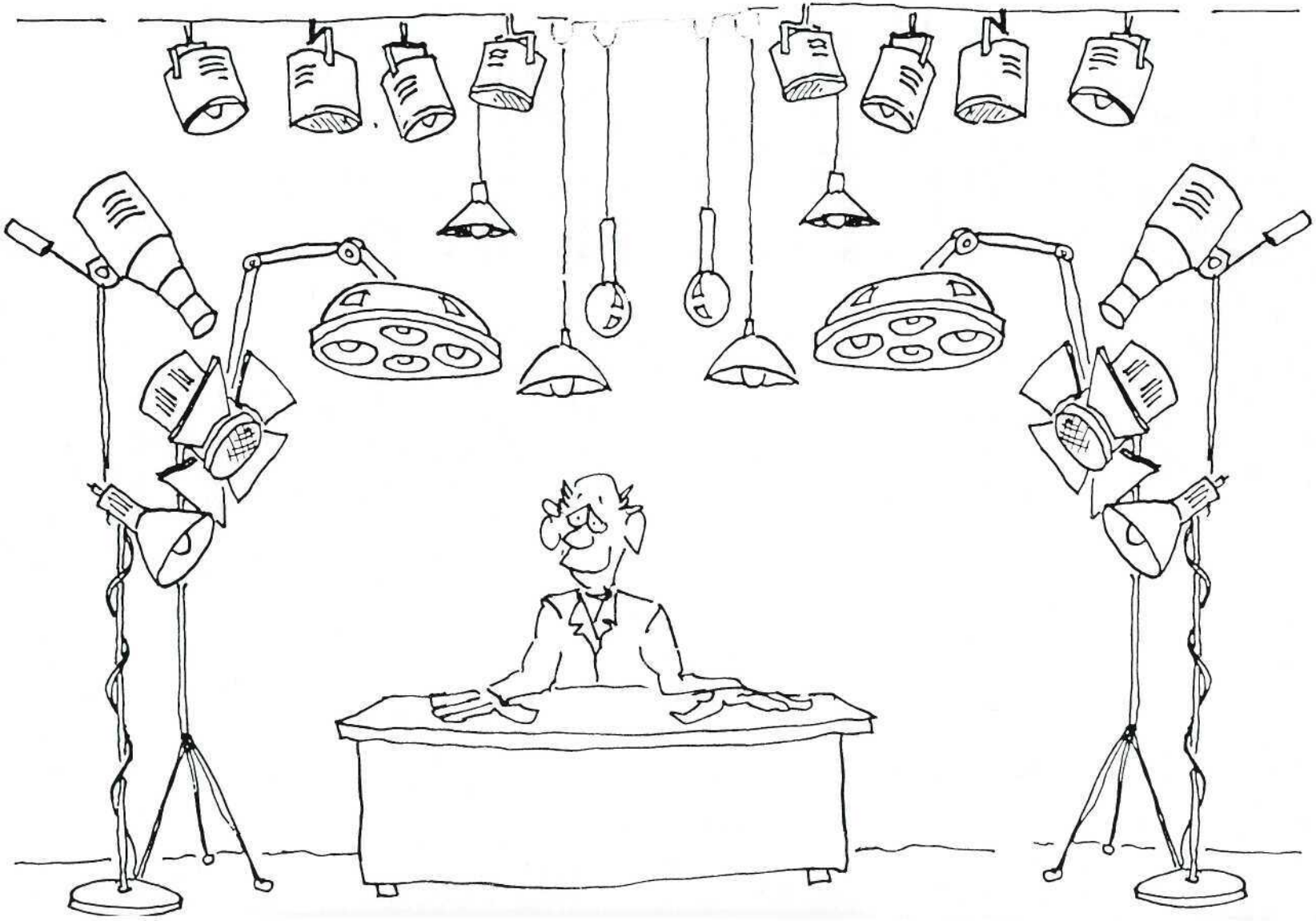
Other materials include:

- Ethene-vinyl alcohol
- **Chlorosulphonethene rubber (Hypalon)**
- **Polyvinylidene chloride (Saran)**
- **Teflon**
- Teflon-FEP

(Cont. page 8)

Ready! Lights! Action!

Fatigue in the office doesn't necessarily have to do with demanding work. If it has to cope with inadequate lighting, the brain may become overworked. This holds especially true for office work. Correct lighting can make a big difference, both to individual comfort and work performance.



Individual work stations:

- Move furniture around to avoid blinding reflections
- Switch off ceiling lights that cause reflections
- Select good local lights for each workstation, and place it strategically
- Check employees vision in relation to the tasks performed
- Avoid reflective (light-coloured) clothing
- Mix video terminal work with hard-copy reading

General environment:

- Reduce the duration of reading tasks
- Shield reflections from windows and direct daylight
- Reduce general lighting and shield lighting that produces reflections
- Complement general lighting with good, local, asymmetrical local lighting
- Paint the room in warm, unsaturated colours
- Select light sources with warm colours
- Avoid distracting movements, blinking lights, and garish colours
- Choose flicker-free light sources
- Long-term or intensive video terminal work could warrant a specially designed work area

Source: Astrom T, 1993, *Arbetsmiljo,* No 15, p 41

(from page 5)

Materials may be blended into a single material (e.g. PVC and nitrile), or laminated to each other in separate layers (e.g. butyl and neoprene).

Remember that the use of softening agents (especially in PVC) will affect the chemical resistance of the gloves. Also, keep in mind that glove performance may be measured at relatively low temperatures, If the actual temperatures in the workplace are higher, the breakthrough time may be shortened.

Limitations

There are certain limitations to any type of glove which should be kept in mind:

Chemical resistance

- All rubber and plastic materials are permeable to some extent
- No material provides protection against all chemicals
- Some chemicals will break through any type of glove in a short time

Manufacture inconsistencies

- The protection performance may vary from batch to batch
- Damaged items (holes, hairline cracks etc) may pass through manufacturing checks without detection
- The thickness may vary between different parts of the glove. For example, the areas between the fingers are often slightly thinner than the rest of the glove

Usage

- The protection performance of the glove material depends on usage factors, such as abrasion against rough surfaces and the risk of tears and punctures
- Temperature may have a significant effect on rubber and plastic materials. The hotter the temperature, the easier the chemical will pass through the material
- Some work procedures may depend on the sense of touch, or may involve sensitive finger movements. These circumstances require thinner, more tight-fitting gloves
- Gloves may feel too thin or too slippery in situations where a good grip is required

Re-use

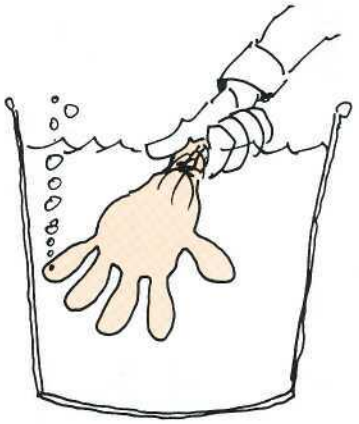
- If a chemical has started to permeate the glove, it may continue to pass through the material, even if the glove is washed

Work routines

There is a risk that the use and care of protective gloves could take a "back seat" position, especially if the gloves are worn in conjunction with other safety equipment, However, firm work procedures should be in place, Some simple procedures include the following:

- Gloves should be regularly checked for damage. This can be easily done by blowing into the glove, sealing the gauntlet like a balloon, and holding it under water. (This cannot be done with water-soluble materials)
- Rubber and plastic are both "aging" materials, and gloves should not be allowed to be worn past an established expiry date.
- If several types of gloves are used, they should be tagged or marked, in order to avoid mistakes
- Gloves should be washed and dried after each use
- Special skin creams are available for use with gloves. Gloves can also be used in conjunction with a thin fabric inner-glove
- There is a possibility of allergic sensitivity to rubber in some people

Source: Forsberg, K. & Olsson, K, G.. ***Välj rätt kemikalieskyddshandske!*** (Select the right chemical protective glove!), Swedish Work Environment Fund, Stockholm



TIP:
Easy way to test gloves for leakage

(Not water soluble materials!)

Babies born with nerve damage from solvents

In a recent experiment, pregnant mothers inhaled solvent fumes. They gave birth to babies who weighed less and developed more slowly. The offspring had behavioural problems, and displayed learning disabilities. The nerve damage was permanent, and still there throughout adulthood.

Of course, the experiment did not involve human babies, but rats. However, rats are used in many experiments because the way substances affect their bodies is similar to the effects in humans,

If a human baby is born with one arm 10% shorter than the other, the defect is detected immediately. However, if the child is born with a 10% reduction in memory capacity, it may take 10 years or more before the damage is detected, Sometimes, the disturbance will never be diagnosed,

Five to seven per cent of pre-school children have MBD (Minimum Brain Dysfunction), while five to ten per cent of schoolchildren have learning disabilities, such as dyslexia (reading difficulties), The cause of some of these conditions can be found in the mother's work environment.

As the central nervous system develops in the womb, the embryo is significantly more sensitive than an adult human being. Brain damage from birth can be caused by PCB, lead and mercury. These substances may enter the mother's body through food or the breathing air, and enters the foetus's blood, Animal tests have found that chemical influences on the brain of the foetus may return as serious brain damage much later in life,

The rats in the experiment mentioned above were exposed to xylene, NMP (n-methyl pyrrolidon and TBT (p-tert-butyl toluene). All of the chemicals had detrimental effects on the brain function and birth weight of the offspring.

Xylene

Xylene is common in petrol, paints, lacquers and glues. It is a volatile substance, and safety exhaust must be used. The Australian limit level for xylene is 80 ppm (50 ppm in Denmark, where the experiment took place). Rats exposed to 500 ppm for six hours a day gave birth to babies with motor disturbances, poor balance and delayed reflexes compared to a control group. They also had poor memory performance and learning difficulties. They also had difficulties interpreting sound stimuli. These problems remained as the animals grew to adult rats,

Similar effects, but less pronounced, were found even at exposure levels of four times the limit value.

NMP and TBT

NMP is a solvent present in certain paints, lacquers, paint strippers, and photo developing liquids. NMP caused low birth weights, slow development, and poor learning capacity. The blood concentration was the same in both mother and baby rats. However, the detrimental effects were caused by concentrations very close to the limit level (1 1/2 times TLV). TBT, which occurs in small amounts in some organic solvents, had the same effects at about double the exposure limit.

Researchers worried

The experiments with the rats showed that the safety margins for solvent exposure are not very broad.

The solvents affect the membranes of the nerve cells, degenerating the communication system between cells.

However, the experiment also showed that light nerve damage can be repaired: baby rats that were placed together with many other babies and lots of toys had fewer symptoms.

Source: 'Inborn nerve damage from solvents', *Arbetsmiljö* 1994, No 2 1994, p4

The lowdown on solvents

Solvents are probably the most frequently encountered topic in safety literature, including PPM magazine. And with good cause: solvents are some ofthe most commonly used substances in industry and at home. But sometimes, the subject becomes so technical, it may be difficult to remember the basic facts about solvents. Here follows a run-down on the essential features of solvents.

How solvents work

Solvents are used for a myriad of applications. Due to their capacity to dissolve oil, fat, grease and other non-water soluble materials, solvents are extremely useful for cleaning, thinning, mixing and many other processes.

Unfortunately, solvents have the same effect on fatty tissue in humans. Solvents can gather and accumulate in the fat-rich nerves of our body, and damage the nerve function, for instance in the brain.

The solvents reach the brain and other organs via the lungs, where they enter the blood stream along with oxygen, These organs, which depend on a regular supply of oxygen, are "fed" — little by little — with the solvent additive.

The objective, then, is to keep solvents away from the respiratory system. However, the ease with which solvents can enter the body and their insidious effects are major obstacles to safe handling and use of solvents.

Brain damage

Solvent-induced brain damage is generally incurable. The symptoms are usually noticed not by the affected person, but by family and friends. Memory problems, lack of concentration, irritability, depression and other personality changes are the usual signs. It is uncommon to associate these changes with the working environment,

A shift in trouble industries

The problems with solvents have been addresses countless times, and the recognition of the hazards is reflected in government legislation and positive actions by industry. Industries where solvents were in extensive use before have largely moved to minimise exposure to solvents by substitution (such as water-based paints), engineering (such as ventilation and local exhaust) or personal protection, Consequently, the greatest danger has moved away from larger industries to smaller businesses where safety consciousness and technical knowledge may be deficient.

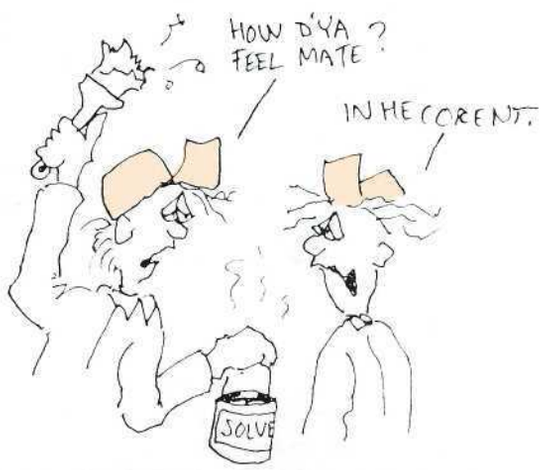
In smaller workplaces with a small number of employees, it may be easy to overlook problems, since they occur less frequently and affect fewer people. It is tempting to believe that the hazard doesn't exist,

Acute effects

Apart from long-ranging damage to the brain and other vital organs, solvents may also have acute poisoning effects, Normally, acute poisoning occurs only in connection with equipment failure and breakdown, and during maintenance and repair work.

The effect on the nerves can be very sudden and very severe, with dizziness, nausea, headache, fatigue and incoherence,

Sudden exposure to high concentrations of solvents can be prevented by control routines, gas warning systems, supervision and personal protection,



Exposure limit levels

The safe level of solvent vapour in the air is set by exposure limit values. These values are revised regularly, and employers should keep track of the changes.

Each limit value pertains to one single substance, It is important to remember that, if the air concentration of one substance is below the limit value, this doesn't mean that there is "room" for another substance.

This becomes especially important in cases where two or more substances may aggravate each other's toxic effect.

Another limitation of the set "safe" limit levels is that they do not reflect individual sensitivity to a chemical, nor the employee's working pattern, for instance hard work which requires heavier breathing and, consequently, higher intake of both air and contaminant.

These considerations make it all the more important to keep workers' exposure to solvents well below the exposure limits.

Other dangers

Most solvents are volatile, and therefore flammable or explosive, Proper fire prevention measures should be undertaken (for instance a no smoking policy, no welding, spark-free tools, no hot surfaces, and so on), fire extinguishing equipment should be in place, and staff should be trained to deal with an emergency.

Chlorinated solvents, such as trichloroethylene, may form very poisonous gas (phosgene) when heated,

Source: Enqvist, J, 1994, *Arbetsmiljö*, No. 1, p 39

CHEMICAL FACTS:

Zinc chloride

Characteristics:	White or colourless, hygroscopic crystals, powder or granules. Chlorine gas is formed in contact with oxidising materials. Attacks most metals and many other materials, such as concrete, cement and textiles.
Aust. TWA:	1 mg/m^3 (2 mg/m^3 STEL)
Fire:	Forms hydrogen chloride fumes when heated. Non-combustible. In case of fire, keep containers cool by flushing with water.
Inhalation:	Fresh air and rest. Keep warm and comfortable in reclined position. Artificial respiration or oxygen may be required. Transport to hospital.
Skin contact:	Flush immediately with copious amounts of water (even inside clothing). Remove soiled clothing after rinsing, Corrosive damage must be treated by physician,
Eye splashes:	Rinse immediately with water for at least 15 minutes, holding the eyelids well apart. Urgent transport to physician.
Ingestion:	If the person is fully conscious, give one or two glasses of milk or water. Do NOT induce vomiting! Urgent hospital transport.
Advice to doctor:	Prevent corrosive kidney damage at an early stage.
Prevention:	Good ventilation. Mechanical exhaust at the source may be needed. Keep containers closed. Emergency shower and eye rinse station. Eye protection, protective gloves and other protective clothing should be worn if there is a risk of skin contact. Full face mask with Acid Gas filter and Particle filter, or SCBA.

Source: *Skyddsblad* 1983, Swedish National Institute of Occupational Health, Stockholm, Sheet # 180

SUMMARY

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