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# US Lead epidemic

*Work-related lead poisoning has reached epidemic proportions in California, reports the California Occupational Health Program.*

Since 1988, Californian industry has reported some 20,000 cases of elevated blood lead levels in workers.

A survey showed that Latin Americans and construction workers were worst hit by the epidemic in California. (California is one of 15 US states where reporting of blood levels is mandatory).

The most common contact with lead occurred in construction workers involved in maintenance, painting and demolition of bridges. Lead-based paint was commonly used on bridges, making welding, blasting, burning and cutting potentially hazardous.

The Occupational Health & Safety Administration (OSHA) reported that 65 per cent of air samples collected at bridges, tunnels and elevated highways had a lead concentration exceeding 200 micrograms per cubic metre.

Many cases of lead exposure were reported by people working outside containment structures.

It was recommended that workers make a habit of showering and changing clothing



after work. Failure to do so could mean contamination of the workers' cars and homes.



Source: Occupational Hazards magazine, Cleveland, Ohio, Jan 1992 p29

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# Fuel is Poles apart

*The Swedes have developed a new alternative fuel for low-level environmental impact in Antarctica.*

The new fuel is the result of work conducted by the Swedish Occupational Environment Institute in Umeå in the north of Sweden. It was initially developed for use in chainsaws to eliminate lung damage in timber workers who are exposed to the exhaust fumes.

The new fuel contains no benzene, and no additives such as lead. It is primarily a two-stroke fuel that can be used in lawnmowers, snow scooters and similar. The fuel has also been modified for use in automobiles.

The product has made its way from the Arctic laboratory to the Antarctic. It is used to drive snow scooters on the Swedish Antarctic research station, Wasa. Here, it is used for its low impact on the very sensitive polar environment.



Source: Arbetarskydd 10/1992p9 (from Forskning Pågår)

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## CHEMICAL FACTS

# Sulphuric acid

<b>Other names:</b>	Oil of vitriol
<b>Characteristics:</b>	Colourless to yellow brown, oily liquid.
<b>Odour:</b>	Odourless to slightly sharp smell.
<b>Aust. TWA:</b>	1 mg/m <sup>3</sup>
<b>Solubility:</b>	Miscible
<b>Fire:</b>	Non combustible, but highly reactive. Forms hydrogen in contact with metals with risk of explosion. Concentrated acid may cause fire or explosion in contact with wood, cotton, nitrates, chlorates.
<b>Inhalation:</b>	Soreness, coughing, breathing difficulties and loss of consciousness. Lung oedema at high concentrations. Extended and repeated exposure may cause chronic bronchitis and corrosive damage to the teeth.
<b>Skin contact:</b>	Serious corrosive damage. Blisters and wounds. Even dilutions are corrosive.
<b>Eye splashes:</b>	Intensive pain and corrosive damage. Great risk of permanent damage and blindness.
<b>Ingestion:</b>	Serious corrosive damage. Burning pain, vomiting, shock and kidney damage.
<b>Prevention:</b>	Good ventilation. Local exhaust may be required. Keep containers closed. Work place and work procedures should be designed to avoid contact with the acid. Never mix sulphuric acid with water or other substances without making sure there is no danger in doing so. Emergency shower and eye wash stations should be available.



Sources: Swed. Worksafe Directorate, Skyddsblad #7; NIOSH Guide to Chemical Hazards

# Shave it or Shove it

*Employees who need respiratory protection are sometimes asked to come to work clean shaven... or else. What if you want to keep your beard for aesthetic, cosmetic or religious reasons?*

David P. Lewis Jr. is an American industrial hygienist who is proud of his beard. He wants to keep it: it is an important part of his physical appearance.

Yet often in his profession, he is exposed to hazardous atmospheres and needs to wear respiratory protection,

David Lewis thinks that the "no beard" philosophy should be dropped in many work places. He thinks it is far too easy for management to threaten workers with loss of jobs, relocation, or reallocation of work duties if they don't turn up with a clean shaven face every morning.

Like every sound occupational health expert, Lewis promotes the ideal solution to airborne health hazards:

- Remove the toxic environment, or
- Remove the need for workers to enter the toxic environment

But in many cases, personal respiratory protection remains as the only feasible solution.

Mr Lewis believes that many companies stop at tight-fitting respirators that require a clean-shaven face for adequate seal and minimum leakage, and look no further. He writes:

"What about loose-fitting systems such as air supplied hoods? These systems should be acceptable protective systems for bearded employees, but their use is not stressed."

Lewis asks why PAPR (powered air purifying respirators) technology can't be applied to loose-fitting hoods. He asks why mouth-piece respirators, that already exist for emergency evacuation use, could not be developed to suit bearded workers.



"Are respirator manufacturers going to wait for a respirator that is developed by a bearded worker?", asks David Lewis, challenging respirator users, industrial hygienists, safety professionals, engineers, and respirator manufacturers to actively pursue a solution.

Lewis ends his case by suggesting that the story would be different if it were illegal for management to demand that workers shave in order to work with respirators.



Source: David P. Lewis, CIP; "Shave Your Beard or Lose Your Job!", Journ. of the Intern:l Soc:y for Resp. Prot., Vol 8 No 2 1990

## Handy Hints



### OFF BALANCE

**Before you lift, make sure you have correct balance and plenty of room to move.**

# Train your Brain

## Remaking memory lost to solvents

*A new study shows that people with brain damage due to solvent exposure can regain some brain processes through training.*

It is possible for severely brain damaged people to "train" their brain back to a level where they can return to a meaningful occupation.

A Swedish psychologist, May Lindgren, has been studying solvent-induced brain damage for several years at the occupational health clinic in Malmö. She claims that people who have such brain damage have not received any actual help to remedy the damage.

It was previously believed, that recuperation from solvent damage was an impossibility, and no specific treatment was ever tried.

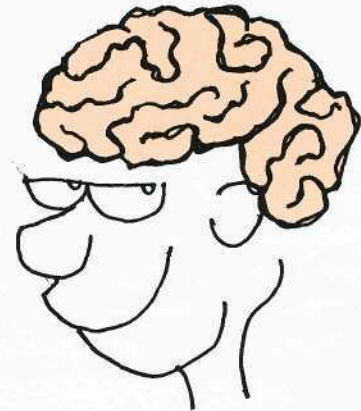
The patients are in a difficult situation: occupational health clinics are only able to diagnose the condition, *not to treat it*; rehabilitation centres aren't able to accept brain damaged patients; and psychological institutions are closed to them, because they aren't mentally ill.

### Severe effects

Brain damage caused by solvents is not considered to be a major type, but it still has massive ramifications for the individual. It is a "family" disease which affects the victim's entire circle of friends and relatives, according to Ms Lindgren.

The condition appears slowly and insidiously. The solvent affects mainly the left half of the brain, where memory and verbal capacity are situated. The right side of the brain, where spatial and visual thinking occurs, is less affected.

Ms Lindgren explains that the memory can be improved by special concentration and memory exercises. The method involves "shifting" memory into the visual part of the



brain. Patients create images of words, and can remember words by associating them with mental pictures.

The technique is not confined to brain damaged patients, but is also used by actors, company managers, and politicians. It takes a lot of practice and effort for the method to work,

### Fighting the stigma

The general public knows precious little about solvent-induced brain damage. Patients often talk of their condition using Latin words to describe it. If you say that you've got *toxic encephalopathy*, people seem more open and accepting. On the other hand, if you simply say that you have brain damage, you are immediately classed as "a nutcase".

Nothing could be further from the truth. Solvent victims are intelligent, clever people whose working lives have been severely marred.

Solvent-related brain damage manifests itself as loss of memory, emotional volatility, aggressive outbursts, severe depression, apathy and listlessness.

### Instilling hope

Ms Lindgren believes in her program, which is already up and running in Sweden: through realistic objectives, memory exercise and special adaptation measures, most of the affected people should be able to return to a meaningful working life.



Source: Nora Weintraub, Arbetarskydd 10/1992 p9

# Danger overhead

*Many electrocutions occur when scaffolds are moved too close to overhead power lines.*

In the United States, a disturbing number of electrocutions have happened because of ignorance or carelessness among workers using scaffolds.

The National Institute for Occupational Safety & Health (NIOSH) has instituted a regulation that no part of a scaffold should reach within 3 metres of a power line. The same goes for metal tools.

NIOSH said that 80-90 per cent of all power lines were not insulated. Workers should have proper respect for power lines — even when working on the ground.

You don't have to touch a power line for an accident to happen. Electrical fields, coronas, surround the power lines, and are active several feet away from the line. Coming in contact with the invisible field constitutes the same risk as touching the live wire itself.

Workers on the ground often forget about the power lines above, and stand a risk of being electrocuted if they move metal scaffolding too close to the wires.



Source: Occupational Hazards magazine, Cleveland, Ohio, Jan 1992 p29



## CHEMICAL FACTS

### Hydrogen peroxide

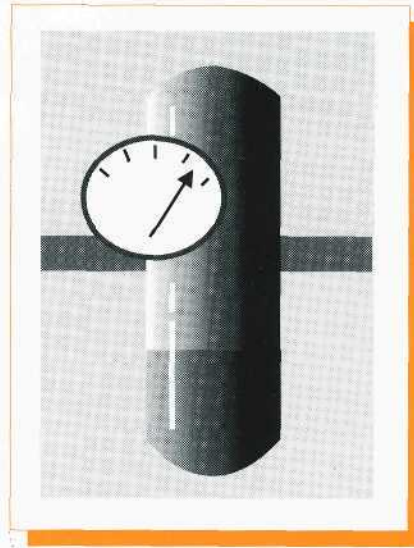
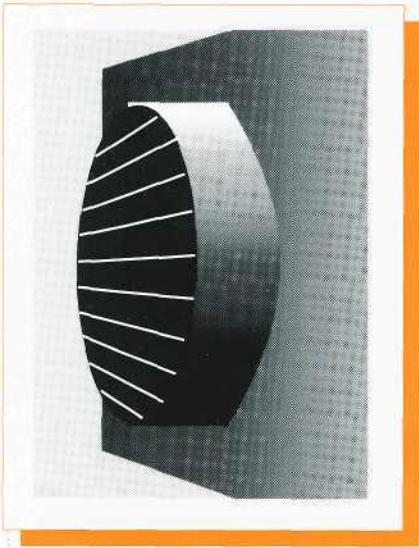
- Other names:** Peroxide, Hydrogen dioxide
- Characteristics:** Colourless liquid
- Odour:** Sharp smell
- Aust. TWA:** 1 ppm — 1.5 mg/m<sup>3</sup>
- Fire:** Not combustible, but may cause spontaneous combustion in clothing, shoes etc. Releases oxygen in contact with organic substances. Rapid emission of oxygen in contact with certain metals and metal salts. May rupture sealed containers due to sudden pressure rise.
- Inhalation:** Nose and throat pain. Sneezing and coughing. High concentrations may cause lung oedema.
- Skin contact:** The skin whitens immediately, followed by reddening, blistering and corrosive damage.
- Eye splashes:** Intense pain and corrosive damage. Risk of permanent eye damage and blindness. The injury may occur several hours or days after exposure. Mist and vapour is very irritating on the eyes.
- Ingestion:** Stomach pain, corrosive damage. Swallowed peroxide releases large amounts of oxygen, which may rupture the stomach.
- Prevention:** Good ventilation required. Keep containers well covered to avoid contamination of the peroxide. Work procedures should be designed to avoid direct contact with the substance. Storage and handling routines should eliminate any chance of contact with other substances, in order to avoid spontaneous combustion and explosion. Emergency shower and eye wash stations should be available. Avoid heating the peroxide. Wear eye protection or face shield, chemical gloves and protective clothing. Respiratory protection may be required.



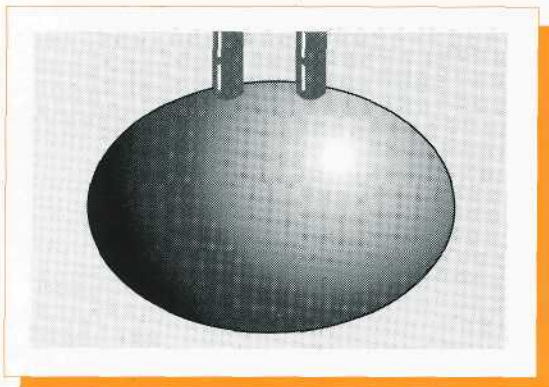
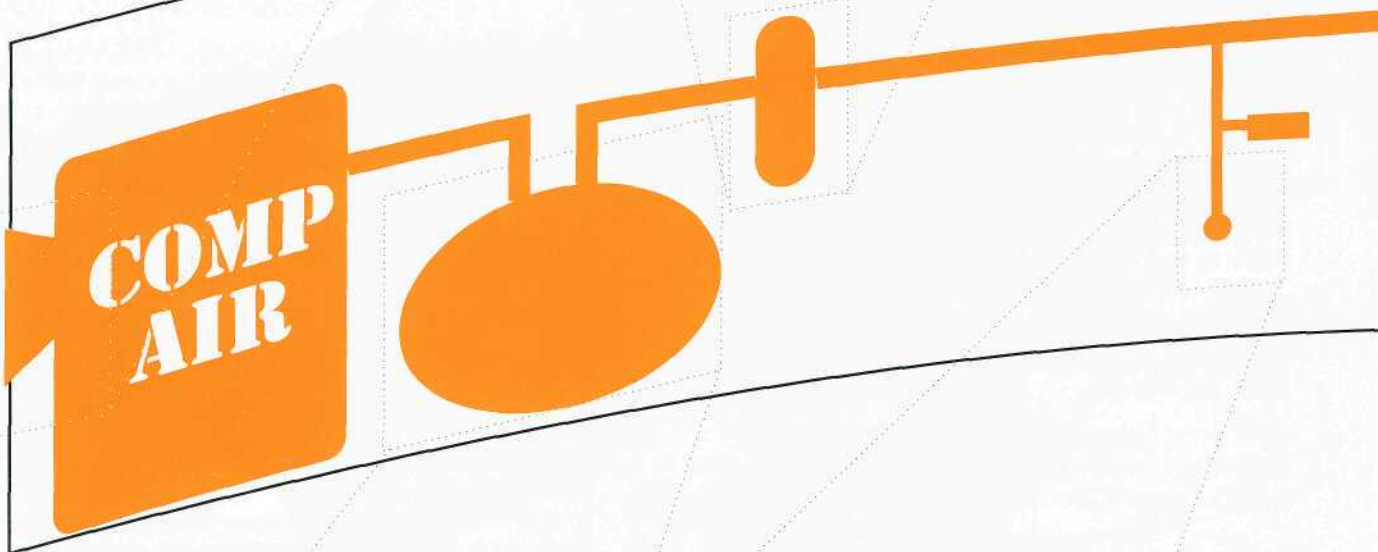
Source: Skyddsblad; NIOSH guide

# COMPRESSED AIR - 1

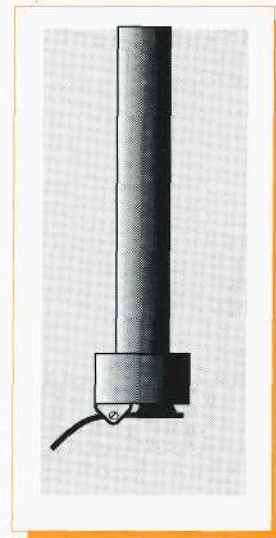
The COMPRESSOR INTAKE must provide fresh, clean air - not from inside the workshop or from the car park.



Install a WATER & OIL TRAP to separate humidity and oil mist created during compression.



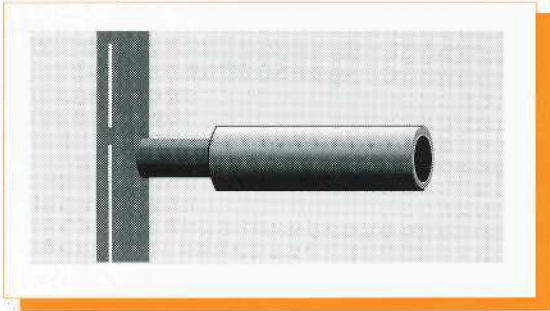
A good size HOLDING TANK is essential. It regulates the pressure of the system



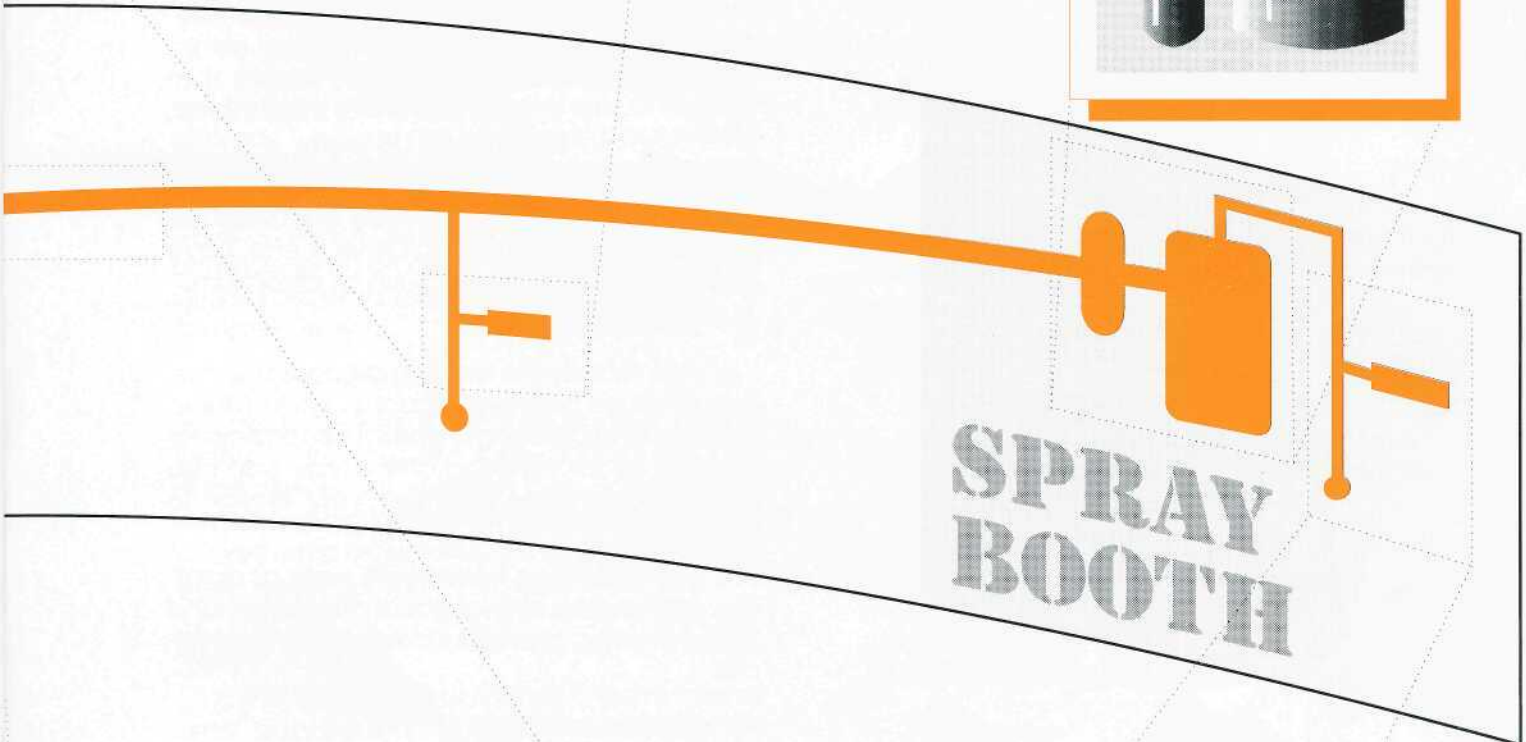
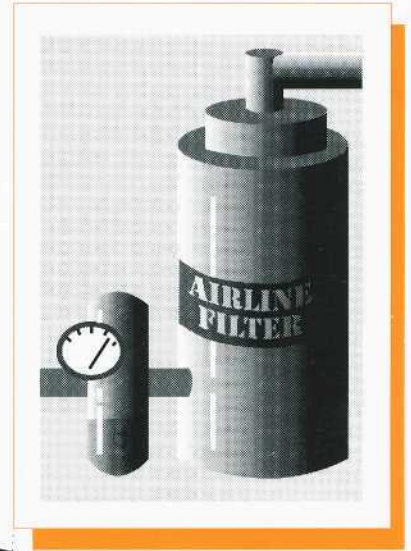
Leave a WATER TRAP at each outlet. Any condensation in the line will run back to the water trap, which should be emptied regularly.

# the right way to set up

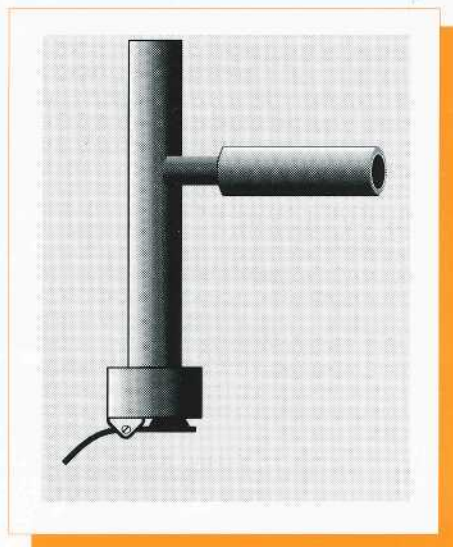
AIR TOOLS CONNECTIONS should be incompatible with breathing air connectors. Select a quick coupling which is unique to your workshop tools, and which does NOT accept breathing air connectors.



Aspecial industrial strength AIR PURIFYING FILTER must be fitted prior to any breathing air outlet.



The main line should run at a slight INCLINE. This will prevent condensation from gathering, and ensure that water runs back into water traps.



The BREATHING AIR CONNECTIONS must be incompatible with air powered tool connectors.



# The Art of the Arc

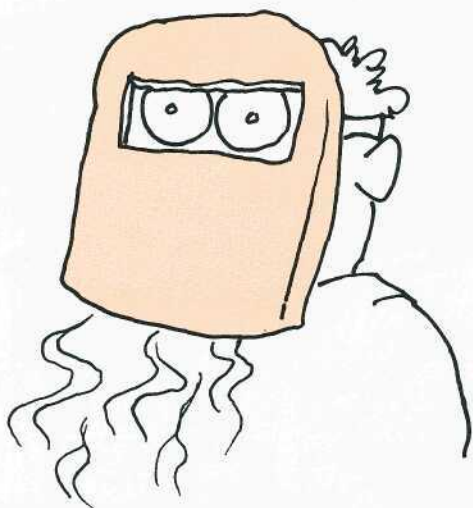
## Arc Welding — risks, effects, safe work practices

Welders are exposed to a number of health risks as well as the possibility of accidents, such as fire and electric shock.

Although welders have an excellent safety record in the industry, the risks are always there. Health effects may be insidious ones that "creep up on you" without your noticing. One great danger is that the hazard elements become routine: sooner or later, they are ignored and taken for granted.

Arc welding in all its forms (shielded metal, gas metal, tungsten arc, plasma, gouging and so on) is associated with a number of exposure problems. The most important are:

- 
- 
- 



## Fumes

All welding processes produce fumes. A fume consists of extremely small metal particles in the air. They are invisible to the eye. Fumes are formed when the filler rod or wire is heated. If you're working with a coated electrode, the fume also contains material from the melting flux.



The fumes are there whether you can see a smoke plume or not. Never judge the amount of fumes by the extent of smoke.

The fumes may contain toxic metals, depending on the materials you're working with.

For your safety, various safe exposure levels for different toxic metals have been established. If the welding involves fumes that contain higher concentrations of toxic metals, breathing protection must be worn.

Some metals are more toxic than others. For instance, cadmium, whose Australian exposure level is  $0.05 \text{ mg/m}^3$ . Other metals have been linked with cancer, such as chromium.

### **Not only welding**

It is not only the welding process itself that can produce breathing hazards. For instance, grinding and polishing metal in preparation for welding, or for cleaning afterwards, can also produce particles that are very similar to fumes.

Many surface treatments, such as painting, galvanising, anti-corrosion treatment and teflon coating can also contribute to the hazard.

- **Metal fume fever**  
*Metal fume fever is well-known to welders. This is a condition caused by the zinc contained in a galvanised surface.*
- **Polymer fume fever**  
*This condition is caused by welding surfaces that have been coated with teflon.*

You should also beware of tanks, cisterns and pipes which may have absorbed some of the substances that are stored in them or flow through them. When welded, the toxic substances might "boil out" of the metal. For instance, a tank that has contained a leaded

compound could release lead fumes when welded.

## Gases

The most common gases formed during welding include ozone, nitrogen oxides and carbon monoxide.

- **Carbon monoxide**

*Carbon monoxide can have severe effects on your muscle coordination and mental acuity. This is especially important to keep in mind if you're working on scaffolds, ladders, platforms, straddling or otherwise balancing.*

- **Ozone**

*Ozone causes headache, chest pain, and dryness in the upper respiratory tract.*

- **Nitrogen oxides**

*Nitrogen oxides are very irritating to the eyes, nose and throat. They can produce coughing and chest pain.*

The amount of harmful gases depends on the type of welding. For instance, gas metal and gas tungsten arc welding produce more nitrogen oxides and ozone, whereas little or no ozone or nitrogen oxide is produced in shielded metal arc welding. Arc gouging can produce large amounts of carbon monoxide. Plasma arc produces high levels of ozone and nitrogen oxides.

### Normally safe

Most welding practices in most normal welding situations are safe, and do not produce dangerous levels of gas. However, it is worth keeping in mind that appropriate ventilation should be ensured. Be especially aware when working in confined spaces.

## Light

The electric arc produces not only intense heat, but also intense light of three different kinds:

- **Visible light**
- **Invisible ultraviolet light**
- **Invisible infrared light**

These types of light are also present in normal sunlight, but in different proportions and intensities.

Even if the light is invisible, it still affects your eyes and your skin. For instance, although you can't see ultraviolet light, but your skin

gets tanned, and your eyes might develop unnatural growths from it.

Ultraviolet light can also burn the front surface of the eye, causing "welder's flash" or "arceye". This is caused by excessive exposure to UV light. Unlike the skin, the eye can't become tanned to protect itself from ultraviolet light.

Visible light contributes to eye fatigue.

Infrared light is usually felt as heat. However, it may affect your eyes without your no-



ticing. In certain fields of industry, infrared light has been linked with cataract formation in the eye.

## Noise

Some welding operations may cause noise that is well above safe levels. Arc gouging produces a level around 115 decibel. Plasma cutting is also very noisy.

Other hazardous noise sources include disc grinding, and liquid fuel-driven welding machines.

## Safe welding

- **Ventilation**

The welding site should be as well ventilated as possible. Keep your head well away from the smoke plume. Your visor is a mixed blessing: on one hand it can protect you from the fumes; on the other, it can act as a trap for the fumes.

Use local exhaust ventilation (point exhaust) whenever possible.

Don't work upwind from the weld: work at right angles to the breeze, if possible. Working directly upwind blocks the air flow, and

might create a "dead zone" just in front of your body.

- **Respirators**

Depending on the welding process and the materials you're working on, a respirator may be required. Make sure that the respirator actually provides protection from the hazard at hand, and that it is suited to the concentration of hazardous gas or fumes.

Don't forget that particles are one thing, gas another. A particle filter may protect you from the welding fumes, but a gas filter is necessary if you're using solvents, primers, cleaners, paints and other chemicals for preparing or finishing the work.

Don't trust your nose! In many situations, breathing hazards are both invisible and odourless.

Keep in mind that locations where air movement is slow require more comprehensive protection. In confined spaces, such as tanks and cisterns, you will need comprehensive breathing protection.

- **Ultraviolet/infrared light**

All welders should wear eye, face, neck and hand protection.

Gloves should be made of a material that is heat resistant and electrically insulated.

Eye protection varies with the type of welding process. Oxy-acetylene welding requires less shading than arc welding. Metals containing iron often produce a brighter arc than other metals, and require darker shading.

- **Noise**

Welding is often performed in noisy areas, even if the welding process itself is not harmful to the ears.

Arc gouging and cutting, plasma arc cutting are noisier than other welding techniques,

Don't forget that many other work procedures produce a lot of noise, such as grinding and polishing.



**Source:** Arc Welding and Your Health, American Industrial Hygiene Association, Akron, Ohio 1984; Black's Medical Dictionary, London 1987

**It's not the chemical  
that's unsafe:  
it's the method!**

## Substances encountered in welding

- **Cadmium**

*Can cause respiratory irritation. Pulmonary oedema possible, Massive exposure can be fatal. Extended and repeated exposure to low concentrations can cause emphysema and kidney damage.*

- **Carbon monoxide**

*Formed by incomplete combustion of fuels, fluxes and shields. Odourless and colourless — cannot be detected by the welder. Causes dull headache, dizziness, nausea. Exposure to high concentrations in confined spaces may be fatal.*

- **Chromium**

*Important component of stainless steel. Has been linked to skin disease and increased risk of lung cancer. Most normal welding operations do not produce excess amounts of chromium. However, always ensure adequate ventilation when welding stainless steel. In some instances, respiratory protection may be necessary.*

- **Copper**

*Major component in some non-ferrous alloys, such as bronze. May cause nose and throat irritation. Nausea. May cause metal fume fever.*

- **Fluorides**

*Found in many electrode fluxes and coatings. May cause eye irritation and irritation to the upper respiratory tract. High concentrations can cause pulmonary oedema and bone damage. May cause skin rashes.*

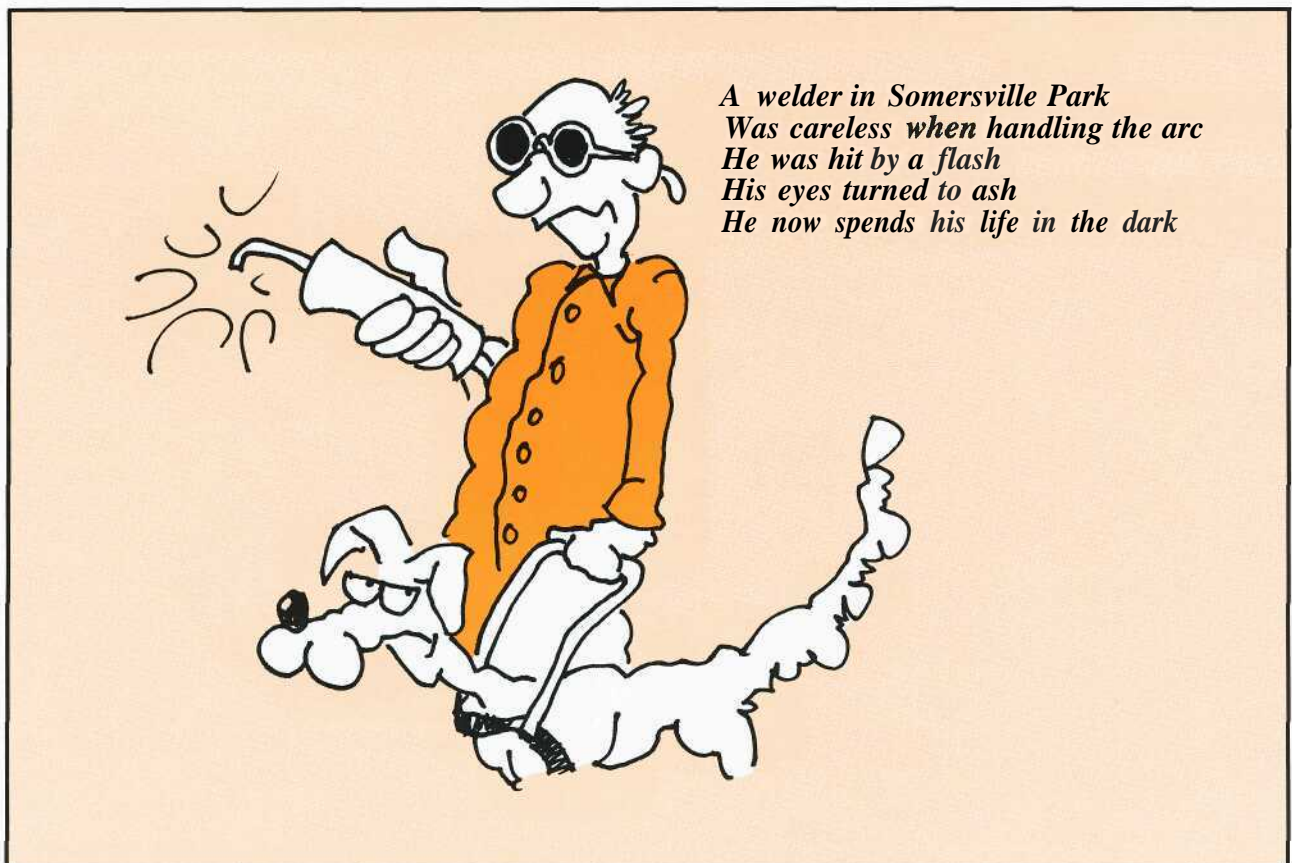
- **Iron (iron oxide fume)**

*Major component in steel. Welders are often exposed to iron oxide fume. May cause nose, throat and lung irritation. Long-term exposure may cause siderosis, a deposit of iron oxide on the lung.*

- **Lead**

*Occurs in some non-ferrous alloys, such as brass and bronze, and in certain paints. Welding metals and painted surfaces may generate hazardous concentrations of lead. Extended and repeated exposure may cause blood damage, damage to the nervous system, and damage to the urinary and reproductive systems. Symptoms include poor appetite, metal taste in the mouth, anxiety, nausea, fatigue, general weakness, muscle and joint pain. Severe lead poisoning can cause damage to the central nervous system, muscular paralysis and anaemia.*

- Manganese**  
 Component in many electrodes, May occur in some steels. Fumes do not normally reach hazardous concentrations during welding, Extended and repeated exposure may cause damage to the nervous system. Exposure to high concentrations may result in lung conditions similar to pneumonia.
- Nickel**  
 Occurs in steel and alloys, sometimes in very high proportions, Has been linked with skin conditions and an increased risk of lung cancer. Normally, welding does not generate harmful levels. However, welders should always ensure adequate ventilation when welding materials containing nickel. In some instances, respiratory protection is required.
- Nitrogen oxides**  
 The welding arc may create nitrogen oxides from the air. This occurs in gas metal arc, gas tungsten arc and plasma arc welding/cutting, Nitrogen dioxide can cause nose and throat irritation. High concentrations may result in impaired breathing, chest pains and pulmonary oedema. Believed to have long-term effects on the lungs.
- Ozone**  
 The welding arc creates ozone from the air, especially during gas metal arc, gas tungsten arc and plasma arc welding/cutting. May cause severe irritation to mucous membranes. Symptoms include headache, chest pains, and drying of the eyes, nose and throat. Massive exposure can cause pulmonary oedema. Believed to have long-term effects on the lungs.
- Vanadium**  
 Component in electrode coatings, Also occurs in some steels and in fuel oils, May cause bronchitis, emphysema, pulmonary oedema and pneumonia.
- Zinc**  
 Major component in galvanised materials. Also occurs in some paints. May cause metal fume fever in welders. Symptoms include fever, nausea, chills, coughing, headache, joint pains.



*A welder in Somersville Park  
 Was careless when handling the arc  
 He was hit by a flash  
 His eyes turned to ash  
 He now spends his life in the dark*

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