DISEASES DUE TO WORK
AND
COMPENSATION

OCCURRENCE • SIGNS, SYMPTOMS • DIAGNOSIS, SPECIAL TESTS
Reference sheets

on

DISEASES

FOR WHICH

COMPENSATION MAY BE CLAIMED

under

The Workmen's Compensation Act (1923)

and

The Employees' State Insurance Act (1948)
Acknowledgements

These reference sheets could be prepared in their present form only with the help we received from various persons — in collecting information, in reference work, in preparation of the glossary, in legal interpretation, and in typing, formatting and editing.

Dr. N. K. Mehrotra has provided his valuable comments in finalising this text.

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Preface to the second edition

We published the first edition of these reference sheets in 1989. A Marathi translation was also published later and it was received very well. In the Preface to the first edition, we had written that we were aware of only one instance of a worker affected due to byssinosis claiming compensation. In 1990, the National Campaign on Dust Related Lung Diseases was launched by PRIA, Delhi and the Vyavasayik Svasthya Suraksha Mandal, Gujarat and others. Detection and diagnosis camps for byssinosis were conducted in Ahmedabad and Bombay. Now some forty workers in Ahmedabad are getting compensation for byssinosis — a lung disease caused by cotton dust. One textile mill in Bombay has improved its work environment after the camps, after news reports and the attention paid by the Medical Director of Industrial Health and Safety.

In 1991, almost 70 years after the enactment of the Workmen’s Compensation Act in 1923, a committee was set up by the Central Government to frame rules in respect of Schedule III of the Workmen’s Compensation Act. They have given their report and it may become the official set of rules in respect of Schedule III. This is a welcome development.

Things have changed. We too have received comments and suggestions after the first edition. We have accordingly made certain changes in this second edition. We have 1) reworked the chapter on Steps in claiming compensation, 2) added a chapter on TLVs, and 3) added an index of body parts and symptoms.

We hope you will find this edition even more useful.

March 1, 1995

Vijay Kanhere
Preface to the first edition

This is the second set of reference sheets on diseases at work.

In the textile industry, a large number of workers are affected by lung disease — byssinosis — and other diseases. Any worker who is affected by byssinosis can claim compensation under the ESI Act (1948) or the Workmen’s Compensation Act (1923). Yet, we are aware of only one instance where a worker in Ahmedabad claimed compensation for byssinosis and won his claim. Workers are entitled to claim compensation for many occupational diseases but very few claims are filed.

One reason, among many, for why very few claims are filed is the lack of information about that part of the labour laws which covers such claims.

As you will notice, in some instances, the relevant schedule of the Act lists only the substance causing the diseases without specifying the diseases, while in other cases lists only the disease without specifying the substance causing it. So, where does one easily get the information about the diseases caused by any particular substance? How does one find out which are concerned industries and occupations?

In these reference sheets we have attempted to fill this gap in information by listing industrial occurrences, signs and symptoms, and diagnosis and special tests, if any, for each item in the schedule. This information can help us make better use of compensation laws covering occupational diseases.

The other difficulty is the inability to follow all the steps and cumbersome procedures involved in claiming compensation. These steps are covered separately in this set of reference sheets. However, for simplifying the procedures, united action by unions would be needed.

We know that compensation is not the complete answer and making conditions of work healthier is the only real solution. It is increasingly being acknowledged that it is in fact criminal to neglect the health of workers and to knowingly expose them to hazards. But employers have got away with such negligence.

When a worker is paralysed, or suffers from disease due to work, the loss to the person and family, the disruption of social life, and the mental tension cannot be compensated for by money. X-rays and other radiations may affect the reproductive system of men and women, and there is a possibility that the next generation may also get affected. Loss of comfort and healthy life of the next generation cannot be compensated for by money. But, not getting any compensation is even worse. A worker who is already suffering due to occupational disease, should at least get compensation for the loss in capacity and the suffering it causes and has already caused.

Also, claims of compensation will create pressure on employers to improve the working conditions. The attempt should be to change working conditions and also to win compensation. If the pressure of claims increases, some attempt on the part of employers at improvement of work procedures and work conditions is possible.

We hope that these sheets will spread the word that workers affected by diseases caused by work (occupational diseases) can claim compensation. We also hope that they will help impel workers to act and that, in the long run, they will help in making workplaces more healthy and so, more human.

May 1st, 1989

Vijay Kanhere
Foreword

The present edition of "Diseases for which compensation may be claimed under the Workmen’s Compensation Act (1923) and the Employees State Insurance Act (1948)" is a revised update of its earlier edition, very painstakingly prepared by Mr. Vijay Kanhere and published by the Society for Participatory Research in Asia (PRIA), New Delhi in 1989. As already acknowledged by PRIA in its first edition, I had an occasion to glean through the text of the galley proof and consequently a few modifications, additions and alterations as found necessary were suggested which were incorporated in that edition.

Now I am glad to learn that the above edition found ready acceptability with the result that all the copies have been exhausted. In the meantime Mr. Vijay has done yet another commendable job in revising and updating the first edition which is exactly what was very much needed in such a situation. I have all praise for the immense efforts made by Mr. Vijay and his team, in the first instance, of bringing out such a decent and informative write up on compensable diseases, and subsequently updating its contents. I am sure this volume will also find a large number of takers all around, be they workers, employers, lawyers, occupational health physicians or ESI officials, etc.

Last but not the least, I have all praise for the PRIA team engaged in this field of activity who have been providing information to all those interested in Occupational Health and Safety, by providing valuable publications like this one. It is even more heartening to learn from Mr. Vijay that the present volume has been translated and is being published in Marathi also. I extend my heartfelt congratulations to all those who have done this commendable job and expect that in the near future, they will translate it into other Indian languages also for wider dissemination of information which is the sole objective of all such publications.

April 1995

Dr. N. K. Mehrotra
How to use these reference sheets

1) We have tried to make the text as easy as possible. There is a glossary of technical terms or difficult words given at the end. For the rest, any good English dictionary will be useful.

2) The diseases covered by compensation in the Acts are listed in Schedule III of the Workmen's Compensation Act and the ESI Act. The Schedule is divided into three parts — A, B, and C. The Acts make this division for defining the period of employment after which one is entitled to claim compensation. The details are given in the section on 'Steps in claiming compensation for occupational diseases'.

3) The reference sheets are arranged in the order in which the diseases are listed in Schedule III which is also the way the diseases are referred to. For example, Infectious diseases are the first item in Part A of Schedule III. So we have referred to them as A-1. (It is also the first reference sheet.) Look for A-1 on the outside upper corner of the page to locate it. In the same way, B-1 would follow A-5, since Part A contains only five entries; And C-1 would follow B-24 since Part B contains 24 entries. (Note: The headings on the sheets are sometimes a little different from those in the Schedule. Do not bother about the difference; follow the numbers.) Use the Schedule as a key to find your way between the sheets.

4) You should first find out which physical factors (such as heat) or substances you work with, and then try to find out if any of them is covered by any of the items in the Schedule. Sometimes a class or group of substances are named (or listed). For example, B-3 (see below) includes homologous of (compounds with structure similar to) benzene. In such cases we have tried to give a few examples out of the number of chemicals the term covers. These examples are not complete. If you have any questions or need help about this do write to us.

5) Each reference sheet has three parts. The first part is "industrial occurrence". It broadly lists where the particular substance may be encountered. However, since it is obvious that a substance or chemical is likely to be affecting workers whenever it is produced, we have not listed the production of that substance as a separate item in its industrial occurrence.

These lists are not necessarily complete. So, even if your industry or occupation may not be listed in the sheets under a particular substance, you are still entitled to claim compensation if that particular substance is used in your workplace and you are affected by it. The working of the Schedule is very clear about this. For example, see item B-3 (that is, item 3 in Part B). It says.

3. Diseases caused by benzene or its toxic homologues. All work involving exposure to the risk concerned. (Emphasis ours)

6) The second part of each sheet is "Signs and symptoms". Here we have tried to include as many important signs as possible.

7) The third part of each sheet is "Diagnosis, special tests". You will have to ask your doctor about the special tests. In the section on 'Steps in claiming compensation for occupational diseases' we have described how to deal with medical records; they are quite important in claiming compensation.

8) The information in these sheets about chemicals, physical factors such as compressed air, industrial occurrences, signs and symptoms, and diagnosis is based on:


   d) For tumors in urinary bladder, etc., we have also referred to:


   e) There are many infectious diseases related to work. We have only listed infectious diseases recorded in India. For them we have also referred to:


   f) There is another excellent book which is both informative and is also written for workers with a clear pro-worker perspective.:


9) These sheets are not a substitute for reference books. If you need more detailed information, you may refer to the books listed for most of it. If you require further details, please write to us. (Addresses for correspondence are given on the inside back cover.)

10) We are aware that there are many shortcomings in our attempt. Do write to us with your suggestions, comments, and any enquiries you may have.
Steps in Claiming Compensation for Occupational Diseases

If you are affected by occupational disease, you can claim compensation under two laws: 1) Workmen's Compensation Act (1923) and 2) Employees' State Insurance (ESI) Act (1948).

The Preliminaries
The who and how of claiming compensation

1) Have you an ESIS card?
   a) Yes, I have an ESIS card.
      You will have to claim compensation under the ESI Act from the ESI Corporation.
      You should read sections I and II below.
   b) No, I do not have an ESIS card.
      You will have to claim compensation under Workmen’s Compensation Act.
      You should read sections I and II below.

2) Well, but my salary is more than 1000 Rs per month. It seems that the Workmen’s Compensation Act does not apply in my case.

   Previously there was such a limiting clause, but now it has been changed. Even if your salary is more than 1000 Rs per month, you can still claim compensation under the Workmen’s Compensation Act, but while calculating the amount of compensation, your salary will be assumed to be 1000 Rs per month only. Whatever salary you are earning above 1000 Rs per month will not be taken into account while calculating the compensation. This condition does put you at a loss. It should be changed. You, your union and all the unions together should strive to change this clause.

3) I work as a contract worker. I do not have an ESIS card. How will I get compensation?

   You are also eligible to get compensation under the Workmen’s Compensation Act.

   As an illustration let us look at the case of Rajabhau Tawade. He is a contract worker. While working in a chemicals factory, he was affected by a certain gas. His lungs have been damaged. According to the Workmen’s Compensation Act, though Rajabhau is a contract worker, if the work he does is essential for the work process, he is entitled to compensation. In short, if any work done by a worker is essential for a particular industry or business, whether it is done by a casual worker, a temporary worker or a contract worker, the affected worker is eligible for compensation.

   Let us look at another case. Divakar works as a gardener in a factory. He is suffering from a skin disease due to insecticide used in his work. The work of gardening may not be essential for that industry or business. Nevertheless, since he is a permanent worker, he is entitled to compensation.

   In short, only if a worker is not permanent, and simultaneously, his work is not essential to that industry or business, only then will a worker not be in a position to take advantage of the Workmen’s Compensation Act. All the other workers are eligible to receive compensation according to the Workmen’s Compensation Act and may claim its benefits.
4) I am a laboratory worker in the Municipal Corporation. I do not have an ESIS card. Someone said that the Workmen's Compensation Act is not applicable to us. Is this correct?

As in the case mentioned above, this also is a misunderstanding. Schedule II of the Act gives a list of those to whom the Act is applicable. This list mentions 'Municipal workers on outdoor duty'. Because of this there is a misunderstanding, and people think the Act is not applicable to municipal workers working indoors. This is not so. The list in Schedule II mentions those to whom the Act is applicable, but that does not mean that those who are not included in the list cannot get the benefit of the Act. It simply means that the Act is applicable to municipal workers working outdoors.

In Schedule III (it is included in this book) Section A you will find that against communicable diseases, work in the laboratory and health work is included. From this it is clear that though laboratory work is not outdoor work, the Act is applicable to workers working in municipal laboratories.

In short, there is a possibility that workers working in a laboratory may contract communicable diseases due to their work. If you are so affected, you can claim compensation according to the Act.

PART I
What to do in order to claim compensation

First and foremost, ensure and maintain correct records.

1) Ask your doctor to record the nature of your work in detail, not only as 'worker'. Insist and get the details recorded, for example, as one who 'comes in contact with noise', or 'comes in contact with benzene', etc. According to the amended Factory Act, you have the right to demand information from your employer regarding the hazards at the workplace. For example, in some factories, containers containing chemicals are labelled only by numbers. You have the right to ask the owner or someone who knows chemistry which chemical is in the container.

2) From the symptoms given in the reference sheets given in this book you can find out who might have been affected. If there are additional symptoms it means you may need more information. For further information you may write to us. Our correspondence address is given at the end of the book.

3) Are medical check-ups carried out at your workplace?

a) Yes, they are.

You then have the right to get the reports of the medical check-ups according to Section 41-c of the Factory Act. If necessary you can complain to the Factory Inspector and get the records.

b) No. No medical check ups are carried out at the workplace.

If no medical check up is carried out at your workplace, or if it is inadequate or unsatisfactory, you can get yourself examined at some other hospital. (Note the address and the timings of our OHSC clinic given at the end of the book.)

4) If the doctor certifies that I am suffering from a disease caused by work, will I not be dismissed because I am affected?

This fear is baseless. Many times it is found that some doctors too threaten you with such consequences. Let us look at one such case.

In Baroda, a government doctor told a worker, "Look, I can certify that you are suffering from ulcer caused by chromium, but you may lose your job." Because the worker believed the doctor he told the doctor, "Don't give me such a certificate." But it was an empty threat. You are already suffering from disease, no employer
can legally take any action like firing you which further penalises you. You can rely both on organised action and the law. No employer can dismiss you for taking help of Acts like the Workmen’s Compensation Act. You can get back your job through the court.

One should preserve all records, case papers, etc., of the treatment undergone. The workers in this case could have easily proved that they were working and could work even after contracting chrome ulcer. In order to achieve two essential things — getting compensation and improving the conditions at work — do not give in to such empty threats.

Preserve all records of treatment. Doctor’s certificate is not cause of illness, it is a proof of illness. This will help you show that you were working even while you were suffering from disease, that it is not right to dismiss you because of doctor’s certificate. Cause of illness is the workplace environment. If the workplace environment is going to aggravate the disease, then the working conditions should be made safer. It should be argued that providing less hazardous work to the worker is an obligation of the employer. In the beginning you may not realise the importance of preserving records, but still you should preserve them. You may have to change the section or department in which you work. Keep a record of how many days you worked in which section and what work you did. File all records carefully together.

5) I am suffering from lung disease. I have worked in three different textile mills. From whom should I claim compensation?

In this case, the importance of keeping a record of where you have worked, what work you have done becomes even more evident. You are probably suffering from byssinosis. This disease is mentioned in Schedule III. If you hold an ESI card, you must file your claim under the ESI Act. The record you have maintained of your work at all three places will show how many years you have worked with cotton dust. To get compensation under both the Acts, it is important to establish that you have worked for so many years with cotton dust.

Under the Workmen’s Compensation Act, you will have to issue notices to all three employers. The Labour Commissioner will decide which of your employers should pay what part of the total compensation you will receive. The total amount of compensation will be the same. If you hold an ESI card, you will have to claim compensation from the ESI Corporation. You should present all records to show that you have worked for the stipulated number of years.

6) I am a retired worker. I am suffering from cancer caused by asbestos. Will I be eligible for compensation even after retirement?

Yes. Diseases listed in Part B and Part C of these reference sheets are such that you can claim compensation under both the Acts even after retirement. Cancer caused by asbestos is listed under B-23. Keep careful record of your period of service, nature of work, treatment, etc. To claim compensation under any of the two Acts you have to show:

a) that you are suffering from a disease listed in Part B or Part C of Schedule III;

b) that you have worked in the concerned industry for the number of years specified in the Act; and

c) that your disease was caused by work. (Read answer 8 below to see how to show this.)

You get compensation when you prove all three points.

7) If it is for us to prove that the disease is caused by our work, what is the use of the schedule and its list of diseases?

This is an important question. In the case of diseases listed in Schedule III, it is enough just to prove that you have worked for the specified period in the specified kind of work. In case of these diseases it is not necessary for you to prove that you are suffering from disease caused by your work. It is automatically recognised by law that if you work in the specified industry in the specified capacity, then in case of the specified disease you need not prove that the disease is caused by work. It is sufficient to show that you have worked for the specified period in the specified capacity.
If you are affected by disease listed in Part A
then you can claim compensation even after working in that industry for just one day.

If you are affected by disease listed in Part B
then you can claim compensation after completion of six months of work in that industry in the specified capacity of work.

If you are affected by disease listed in Part C
then you can claim compensation after completion of work in that industry in the specified capacity of work for a period mentioned in the notification. The notification is given separately at the end of this chapter. If you have completed the specified period of work and you are affected by disease listed in Schedule III, you only have to prove

a) that you have worked in the specified industry in the specified capacity for the specified period; and

b) that you were affected by disease during this period.

This is easy to prove.

In case either the ESI Corporation or the employer(s) want to contest your claim, they have to prove that the disease has not been caused by work.

8) In the course of my work I have to lift heavy weights. I am suffering from backache. This ailment is not mentioned in Schedule III. What should I do?

In case

– you are affected by disease caused by work, but the disease is not listed in Schedule III,

– or the disease is mentioned in Schedule III, but you are asking for compensation before completion of the notified period (for example, in the case of silicosis, the notified period is five years but you are asking for compensation before completion of five years),

– or if you are claiming compensation after retirement,

in all these cases it becomes our (the workers’) responsibility to prove that the disease is caused by work.

How to show that the disease is caused by work

The following guidelines are useful in showing that the disease is caused by work:

a) Showing that the factor (heat, noise, particular chemical etc.) which causes the disease is present at the workplace; or that the method of work may lead to the disease, for example, frequently lifting heavy weights, etc.

b) Showing that the work is performed without necessary and adequate training or precautions.

c) Showing that concentrations of chemicals, etc., are not measured or monitored. If the levels are measured, then to show that the levels are unsafe. Or that when it is required, the measurements are not performed.

d) Showing that the workplace, the method of work and the over all working environment is injurious to health.

e) Showing that the necessary medical check ups are not carried out, or if they are carried out, that the reports are not made available.

f) It always helps if you can show that many people working in similar conditions also suffer from the disease.
PART II
Steps in claiming compensation under the Workmen's Compensation Act

1) After you have confirmed that you are suffering from occupational disease, you are required to give notice to your employer. The format for this notice is given at the end of this section. Giving such notice is a must.

2) Contract workers may give notice to the contractor or the principal employer who has engaged the contractor.

3) Notice may be delivered by hand but you should get a copy signed by the employer to show that he has received it. Or you may send the notice by registered post.

4) The notice must include:
   a) Name and Address of the person injured (Under the Workmen's Compensation Act, occupational disease is considered to be an injury.)
   b) Cause of injury, in ordinary language.
   c) Date on which injury occurred. (Period in which the disease was contracted or date when it was diagnosed as an occupational disease.)
   d) The amount of disability compensation. This has to be based on the percentage of disability. Get the percentage of disability certified from the doctor who gives you a certificate.

While calculating the amount of compensation, factors like your age, years of service, salary, percentage of disability, etc., have to be taken into account. The tables/charts required are included in the Act. Get your union activist or lawyer to explain them to you and work out the compensation amount.

5) After you have given notice, the employer may ask you to be re-examined by a doctor of his choice. If the employer intimates such intention to you within three days of receiving notice, you have to comply. However, the employer has to pay the full charges for this examination. If not, you can refuse to undergo the examination. (Section 11(1))

6) If the claim is not settled, you have to apply to the Commissioner within two years from the date of injury or date of notice given to the employer. (Section 10.) The format of the application is given in Sample Form F, Rules.

7) If you have strong union your claim will be settled within the factory and you will not have to apply to the Commissioner. Note that under the Act, any agreement or contract by the workers agreeing to waive their claim or agreeing to a compensation amount less than that specified by the Act, is null and void. You may go ahead and claim compensation without bothering about any such agreement or contract you may have signed.

8) If you are late in applying to the Commissioner, you have to request special consideration and give reasonable cause of delay. The Commissioner has the powers to disregard the delay and entertain your claim if he finds reasonable cause for delay.
PART III
Steps in claiming compensation under the Employees' State Insurance Act

1) First of all you will need a certificate from the ESIS doctor.

It is the experience that the workers themselves have to convince the ESIS doctor that they are suffering from occupational disease and they should be thoroughly checked for it. Actually the doctors themselves should keep track of such diseases and help the workers.

It is the experience that if we get a certificate from a public hospital that a worker has such and such an occupational disease, it makes it easier to convince the ESIS doctors.

Do not be afraid of losing your job because of such a certificate. This has already been discussed above.

2) After getting the certificate you have to fill up Form 16 A. You may get the form from the ESIS office or apply in the necessary format. The format is given below at the end of this chapter.

3) The local ESIS office will then arrange for your check up by the special medical board for occupational diseases. The medical board will determine the percentage of disability.

4) If you are not satisfied with the percentage of disability as determined by the special medical board you have to appeal to the Tribunal. For this it is useful to have a certificate of disability from some other general hospital or institutes like the National Institute of Occupational Health, Ahmedabad. Take advice of a good advocate.

5) Once the percentage of disability is fixed, the rate of compensation is determined from it. The amount depends on age, salary, years of service, percentage of disability, etc. The tables/charts for working this out are given at the end of the Act.

You get this compensation regularly for the rest of your life, over and above the salary you may earn at work. You continue to get this amount even after retirement.

6) After you begin receiving your compensation amount, every year in January and in July you have to fill up Form 26.

7) If the person dies due to disease, for example, silicosis, the colleagues have to get a certificate to that effect from the doctor who was last treating the patient. If the doctor certifies that the patient suffered from silicosis or any other occupational disease, the legal heirs can claim benefit from the ESIS. You have to present this certificate along with the ESIS card of the deceased person to the ESIS dispensary.

Family members/heirs have to file special applications for claiming insurance benefit.

Children are eligible to receive compensation payment up to 18 years of age and dependent heirs (for example, wife) are entitled to receive compensation payment for their lives.

The most important requirement here is to see to it that the death certificate records the cause of death properly. This is especially important if your work carries the hazard of a fatal nature like silicosis.

8) There are many different forms to be filled, there is a great deal of running about, it is frustrating, but what is important is that if you continue your efforts undaunted, you do get compensation. All the unions and the workers need to come together to make these procedures simpler.

9) Under the ESI Act, medical benefit stops if your medical leave exceeds a specified period. If your leave is due to disease caused by work, then you may apply to the regional ESIS office to extend your leave with benefits.
Format for Notice to be given to the Employer
under the Workmen's Compensation Act

(If possible seek advice from a dependable advocate while giving notice.)

To:

............... (Name of Employer/Company) ...............

............... (Address) ...............

............... ........................................

I, the undersigned, ............. (Your Name) ...............
............... ........................................ (Address) ...............

I have to inform you that,

I have worked for you from ........ (Starting date) ........ to ........ (Current date/Last date) ...............

I am suffering from ........... (Description/Nature of disease) ...............

I am suffering from this disease because of ........... (Cause of disease, for example, high noise level at the workplace, etc.) ...............

I have been suffering from the above disease for the last ........... (Period for which disease has been diagnosed) ...............

I have ........... (Percentage of disability) ........... percent disability.

My monthly salary is ........... (Salary amount) ...............

My age is ........... (Age in years, months) ...............

Please pay me ........... (Amount of compensation) ........... as compensation.

OR

From ........... (Start date) ........... please pay me a fortnightly instalment of ........... (Amount of instalment) ........... as compensation.

............... (Your signature) ...............

............... (Your Name) ...............

............... (Date and Place) ...............
Notification applying to Both Acts in respect of Part C of Schedule III

Notification No.: WCA 1162/91031 LAB III 9-12-1961 NEW DELHI

Compensation can be claimed after working for a total period with one or more employers in the related industries or occupations as specified below:

<table>
<thead>
<tr>
<th>Disease</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Silicosis</td>
<td>Five years</td>
</tr>
<tr>
<td>2) Pneumoconiosis affecting coal miners</td>
<td>Seven years</td>
</tr>
<tr>
<td>3) Asbestosis</td>
<td>Three years</td>
</tr>
<tr>
<td>4) Bagassosis</td>
<td>Three years</td>
</tr>
</tbody>
</table>

EMPLOYEES' STATE INSURANCE CORPORATION
Form 16-A

Report from Employer in respect of Occupational Disease (Reg. 68)

1) Name of Employer .........................................................
2) Code No. .................................................................
3) Nature of industry or business .....................
4) a) Name of insured person ............................................
     b) Insurance No. ....................................................
5) Address of the insured person .....................
6) a) Sex .................................................................
     b) Age (at last birthday) ...........................................
7) Name of occupational disease or its nature ..........
8) Date of commencement of occupational disease ........
9) Date of employment in factory of the insured person  

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10) Specific employment in which employed and its nature

11) Date from which the insured person was continuously working in the employment at Col. 10 above which caused the occupational disease

12) The exact period of continuous employment as at Col. 10 above before the commencement of the spell of occupational disease

13) Date of issue of medical certificate in respect of occupational disease

14) Name of disease as given on medical certificate

15) i) Whether the insured person has abstained from work, if so, from what date

ii) Whether insured person has returned to work, if so, from what date

16) a) Physician/Dispensary/Doctor from whom or where the insured person received or is the treatment

b) Name of the dispensary/panel doctor selected by the insured person

17) a) Has the insured person died?

b) If so, date of death

I certify that to the best of my knowledge and belief the above particulars are correct in every respects.

Date of despatch of report

(Signature of the Occupier)
Threshold Limit Values (TLV)

"We could not bear the smell initially, but now we are used to it," was the common refrain of many workers in chemical plants. "We lose our sensation of smell. We get used to lingering foul smells." In the beginning, the natural response of the body and mind is, "Get out of this foul atmosphere." Later this response of the body for self-preservation gets blunted. Yet the action of the chemicals on the human body does not stop, it continues.

Smell is deceitful. If the gas hydrogen sulphide is above a certain proportion in the air, then the nerve which is associated with the sensation of smell gets affected and we are unable to smell the gas. But the gas continues to remain in the air, that too in proportions dangerous to our health. Many toxic chemicals do not have a distinct smell.

If a child has fever, we use a thermometer to measure the temperature. By touch, we can roughly make out if the child has fever. But if a person having fever himself tries to do so, he would not feel the fever of another person. And that is why we have meters -- relatively 'objective' indicators -- to measure the temperature. Similarly, if there are no meters, we cannot ascertain if a chemical is present in excess of the harmful quantity. If there are fumes of two drops of sulphuric acid in a large room, it may not be dangerous. But what if fumes of half a litre of the acid are present in a small room? What proportion of this acid in the air is harmful -- in smaller or larger quantities, for shorter or longer periods? To facilitate the answering of these questions, Threshold Limit Values (TLVs) are assigned to certain chemicals.

Threshold Limit Values (TLVs)

TLVs refer to the concentration of chemicals in the air. Workers are exposed to chemicals every day, say eight hours in a day and continuously day after day. It is believed that for every chemical there is an average limit to its concentration which will not affect workers daily exposed to it. There are various types of TLVs. When only TLV is mentioned, it is the average limit. This is expressed in parts per million (ppm) or milligrams per cubic metre of air (mg/cu.m). Values given in ppm refer to the concentration of the chemical expressed in parts (by volume) of the chemical per million parts of air. The mg/cu.m. value is a straightforward concentration in terms of weight.

There are three types of TLVs: 1) TLV-TWA, or TLV as time weighted average, 2) TLV-STEL or TLV as short term exposure limit and 3) TLV-C or ceiling values.

TLV-TWA: Time Weighted Average

TLV-TWA is a time weighted average. It is applicable for an exposure of 40 hours a week (8 hours per day, 5 days a week). The TLV limits as prescribed in the Western countries are for an exposure of 40 hours a week. In India we have a six-day week or a 48-hour week. While applying TLVs given by Western Institutes, the TLV should be reduced proportionately in India. The method of reduction is clear and is explained below.

For example, if the exposure every day is for 10 hours, the limit should be proportionately reduced. The eight-hour TLV-TWA for acetic acid is 10 ppm. So, for a ten-hour shift, the TLV-TWA for a ten-hour shift would become

$$\frac{10 \times 8}{10} = 8 \text{ ppm}$$

And if persons are working overtime and are continuously exposed to double shifts, the TLV-TWA will get reduced to half its value and will become 5 ppm for acetic acid. The reason is that TWA controls the total amount of chemical a person may inhale in a working week. If a person works for 10 hours then the average has to be reduced for the simple reason that the person inhales more air (and so, more of the chemical contaminant in the air) in 10 hours than in 8 hours.

The TWA gives only an average limit. For acetic acid, the TLV-TWA is 10 ppm. It means that acetic acid can be more than 10 ppm for some periods. (It can be, say, 20 ppm for 5 minutes.) Such periods in which its concentration rises above the limit have to be compensated by periods when acetic acid is present in concentrations lower than the TWA, say, only 1 ppm for one hour, so that the average for 8 hours should remain at or below 10 ppm.

If there are no meters in your unit or plant, all this becomes less meaningful. The management has to install meters to measure the amount of chemicals in the air. Very few managements will do this on their own. If there is enough pressure from the workers, only then will there be meters and we may know the amount of chemicals attacking our health.
If there are no meters, you can lodge a complaint with the Factory Inspector. The Factory Inspector is legally bound to keep your name confidential.

**TLV-STEEL: Short Term Exposure Limit**

The TLV-STEEL shows the limit for the amount of chemical one can safely breathe in a span of fifteen minutes. For example, for acetic acid, the STEEL is 15 ppm. If any worker is exposed to air containing more than 15 ppm for 15 minutes, this will be harmful for the worker. STEEL is not an average as the TLV-STEEL gives an upper limit for exposure of 15 minutes.

**TLV-C: Ceiling value**

The TLV-C gives the upper limit of exposure to a given chemical at any given point of time. This limit should never be crossed at any time. If it is crossed it is harmful, the TLV-C is not prescribed for all chemicals. There are only around 500 chemicals for which TLV is prescribed. For thousands of chemicals, TLV has not been prescribed at all.

**TLV is a compromise**

The fact of fixing a TLV is itself a compromise. The ingredients of TLV are:

a) normal conditions;

b) an average healthy worker;

c) affected by a single chemical; and

d) an average limit which will not cause harm.

None of these ingredients are satisfactory. In a process plant or engineering factory using chemicals, normal conditions do not exist. High temperatures, noise, humidity are present. TLVs are not given for such conditions. Heat, high noise reduce the capability of the body to resist the attack of chemicals.

Recently, TLVs have been prescribed by the Factories Act for some chemicals and TLVs for those chemicals have now become legally binding. We reproduce some of the relevant TLVs in the table below.

<table>
<thead>
<tr>
<th>Substance</th>
<th>Exposure Limits</th>
<th>Reference Sheet No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Time Weighted Average Concentration (8 hours)</td>
<td>Short Term Exposure Limit (15 minutes)</td>
</tr>
<tr>
<td></td>
<td>ppm</td>
<td>mg/m³</td>
</tr>
<tr>
<td>1) Lead, inorganic compounds, fumes and dusts (as concentration of lead)</td>
<td>—</td>
<td>0.15</td>
</tr>
<tr>
<td>2) Nitric oxide</td>
<td>25</td>
<td>30</td>
</tr>
<tr>
<td>3) Malathion</td>
<td>—</td>
<td>10</td>
</tr>
<tr>
<td>4) Phosphorus (yellow)</td>
<td>—</td>
<td>0.1</td>
</tr>
<tr>
<td>5) Phosphorus pentachloride</td>
<td>0.1</td>
<td>1</td>
</tr>
<tr>
<td>6) Phosphorus trichloride</td>
<td>0.2</td>
<td>1.5</td>
</tr>
<tr>
<td>7) Phosphine</td>
<td>0.3</td>
<td>0.4</td>
</tr>
<tr>
<td>8) Alkyl compounds of mercury (concentration of mercury)</td>
<td>—</td>
<td>0.01</td>
</tr>
<tr>
<td>No.</td>
<td>Substance</td>
<td>Exposure Limits</td>
</tr>
<tr>
<td>-----</td>
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<td>-----------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Time Weighted Average Concentration (8 hours)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ppm</td>
</tr>
<tr>
<td>9)</td>
<td>Benzene (s.c.)</td>
<td>10</td>
</tr>
<tr>
<td>10)</td>
<td>Toluene</td>
<td>100</td>
</tr>
<tr>
<td>11)</td>
<td>Dinitrobenzene (all isomers)</td>
<td>0.15</td>
</tr>
<tr>
<td>12)</td>
<td>Dinitrotoluene</td>
<td></td>
</tr>
<tr>
<td>13)</td>
<td>Chromic acid and chromates (concentration of chromium)</td>
<td></td>
</tr>
<tr>
<td>14)</td>
<td>Chromous salts (concentration of chromium)</td>
<td></td>
</tr>
<tr>
<td>15)</td>
<td>Arsenic and arsenic compounds (concentration of arsenic)</td>
<td></td>
</tr>
<tr>
<td>16)</td>
<td>Oil mist (mineral)</td>
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</tr>
<tr>
<td>17)</td>
<td>Carbon tetrachloride (s.c.)</td>
<td>5</td>
</tr>
<tr>
<td>18)</td>
<td>Monochlorobenzene</td>
<td>75</td>
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<tr>
<td>19)</td>
<td>Chloroform (s.c.)</td>
<td>10</td>
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<tr>
<td>20)</td>
<td>Vinyl chloride (h.c.)</td>
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<tr>
<td>21)</td>
<td>Trichloroethylene</td>
<td>50</td>
</tr>
<tr>
<td>22)</td>
<td>Carbon disulphide</td>
<td>10</td>
</tr>
<tr>
<td>23)</td>
<td>Manganese dusts and compounds (as manganese)</td>
<td></td>
</tr>
<tr>
<td>24)</td>
<td>Welding fumes</td>
<td></td>
</tr>
<tr>
<td>25)</td>
<td>Beryllium and compounds (as beryllium) (s.c.)</td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>Substance</td>
<td>Exposure Limits</td>
</tr>
<tr>
<td>-----</td>
<td>-----------------------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Time Weighted Average Concentration (8 hours)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ppm</td>
</tr>
<tr>
<td>26)</td>
<td>Cadmium dust and salts (concentration of cadmium)</td>
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<tr>
<td>27)</td>
<td>Fluorine</td>
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<tr>
<td>28)</td>
<td>Fluorides (concentration of fluorine)</td>
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<tr>
<td>29)</td>
<td>Hydrogen fluoride or hydrofluoric acid (concentration of fluorine)</td>
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</tr>
<tr>
<td>30)</td>
<td>Ethyl alcohol</td>
<td>1000</td>
</tr>
<tr>
<td>31)</td>
<td>Isoamyl alcohol</td>
<td>100</td>
</tr>
<tr>
<td>32)</td>
<td>Isobutyl alcohol</td>
<td>50</td>
</tr>
<tr>
<td>33)</td>
<td>Methyl alcohol (methanol)</td>
<td>200</td>
</tr>
<tr>
<td>34)</td>
<td>Acetone</td>
<td>750</td>
</tr>
<tr>
<td>35)</td>
<td>Methyl isobutyl ketone</td>
<td>50</td>
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<tr>
<td>36)</td>
<td>Carbon monoxide</td>
<td>50</td>
</tr>
<tr>
<td>37)</td>
<td>Carbonyl chloride</td>
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<tr>
<td>38)</td>
<td>Hydrogen sulphide</td>
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</tr>
<tr>
<td>39)</td>
<td>Acrylonitrile (s.c.)</td>
<td>2</td>
</tr>
<tr>
<td>40)</td>
<td>Cotton dust</td>
<td>-</td>
</tr>
</tbody>
</table>
Glossary

Note: Some of the words listed below can be spelt in two ways according to British or American conventions. For such words the optional letter is put in brackets the first time it is encountered, for example, An(a)emia indicates that the word may be spelt anaemia or anemia.

Abdomen: belly, part of the body between pelvis and diaphragm containing stomach, intestine, etc.
Abdominal: associated with abdomen.
Abrasion: scraping away of portion of skin.
Acute: sharp or severe or having rapid onset.
Alcohol: class of compounds of hydrogen, oxygen and carbon having (-OH) hydroxyl group; for example, ethyl alcohol (C₂H₅OH).
Alveolus: air-cell of lungs.
Alveoli: plural of alveolus.
Alveolitis: inflammation of alveoli.
An(a)emia: condition in which blood is deficient in red blood cells (RBCs), haemoglobin or total volume. Haemoglobin is less than 12 gm/100ml of blood.
Anaemia, aplastic: anaemia due to damage to bone marrow.
Angina pectoris: severe pain of heart caused by insufficient supply of blood to heart.
Aspiration-silicosis: disease of respiratory tract caused by silica and coal dusts together.
Asphyxia: suffocation, condition caused by insufficient intake of oxygen.
Asphyxiant: substance which causes asphyxia or suffocation.
Asplenospermia: condition in which sperms are or become weak.

Bagasse: part of sugar cane left over after juice has been extracted.
Bagassosis: a lung disease, namely, pneumoconiosis, caused by bagasse dust.
Blisters: raised or elevated patches of skin filled with watery substance, caused by burning or rubbing.
Broncho-pulmonary: associated with bronchi and lungs.
Bronchus: the windpipe, either of the two branches of the windpipe.
Bronchial: plural of bronchus.
Bronchialgia: small subdivision of the bronchi.
Bronchiitis: inflammation of mucous lining of bronchi and tubes branching from bronchi.

Cancer: tumour or new growth resisting treatment; it is a potentially life-threatening condition.
Cancerous: affected by cancer; similar to cancer.
Carcinogen: any substance that causes cancer.
Cataract: condition in which lens of eye or capsule of the lens becomes opaque.
Central nervous system: nervous system is made up of all the nerves in the body; of these, central nervous system includes brain, medulla and spinal chord.
Cholinesterase: an enzyme which catalyses the hydrolysis of choline esters.
Chronic effects: those lasting for a long time or those due to exposure to a substance for a long time in small doses.
Clinical signs: observable signs as distinguished from data obtained from laboratory tests.
Clubbing: condition that affects fingers and/or toes in many diseases; nails become curved and the soft tissue under them enlarges giving them shiny and bulb-like appearance.
Colon: part of the large intestine about 1.5 metres in length; it extends from c(a)ecum (pouch at the beginning of the large intestine) to rectum.

Complicated involvement: condition in which a disease is superimposed upon another disease and affects progress of the first disease.

Conjunctiva: transparent mucous membrane lining inner surface of eyelids and covering front of eye balls (eyes) excepting cornea.

Conjunctivitis: inflammation of the conjunctiva.

Contortions: violent distortion or twisting.

Convulsion: violent shaking, violent agitation, involuntary contraction of muscles, fit-like violent condition.

Convulsive: having convulsion; similar to convulsion.

Cornea: transparent outer coat of eye ball covering the pupil and iris.

Coronary: associated with arteries supplying blood to the heart muscles.

Cyanosis: bluish coloration of the skin and mucous membranes due to lack of oxygen in blood.

Depression: decrease in activity, lowered intensity; when referring to mental state, lowering of mental responses.

Derivatives: chemical substances derived from another chemical by means of a substitution of one or more chemical groups; for example, C_2H_4 is ethane, C_2H_4Cl is ethyl chloride, a halogen derivative of ethane obtained by replacing one -H (hydrogen) with one -Cl (Chlorine).

Dermatitis: inflammation of skin giving rise to itching, redness and patches.

Disease: illness, departure from health, or destructive process in an organ.

Eardrum: membrane in between external ear and middle ear which vibrates due to sound.

Emphysema: abnormal expansion or stretching out of alveoli.

Enzymes: substances in the body, which speed up, or inhibit specific chemical reactions in the body.

Eosinophils: a type of white blood cell; these are normally found in circulating blood in lower concentration and increase abnormally in some infections and allergies.

Epidermis: outer layer of skin.

Epilepsy: chronic disease of nervous system characterised by convulsions, unconsciousness.

Epileptic: associated with epilepsy; person suffering from epilepsy.

Epithelium: associated with epithelium or composed of epithelium.

Epithelioma: malignant tumor originating in epidermis of skin or mucous membranes.

Epithelomatous: affected by epithelioma.

Epithelium: cellular tissues covering surfaces, forming glands and lining most cavities of the body.

Erythrocyte sedimentation: settling of red blood cells; the sedimentation rate increases in cancer, pregnancy, possibly in case of liver disease, anemia, and some infections.

Euphoria: in psychiatry, exaggerated feeling of well being, mild elation.

Expectoration: phlegm, mucus or mucus with pus from the lungs spitted out with cough.

Extrinsic allergic alveolitis: lung disease characterised by allergic reaction of lung tissues several hours after inhalation of organic dusts.

Finger clubbing: see Clubbing.

Fibrous tissues: tissues consisting of fibres, mostly connective tissues.

Gait: manner of walking.

Gingiva: gums; firm flesh surrounding the base of teeth.
Gingival: associated with gums.

Gland: any organ that secretes or separates from blood certain substances in a form suitable for use in the body or for throwing out of the body (for example, thyroid, pancreas, adrenals).

Gullet: food pipe; the passage for food from back of tongue to stomach also called as (o)esophagus.

H(a)ematuria: condition in which blood is passed in urine.

H(a)emoglobin: iron-containing pigment of red blood cells that carries oxygen.

H(a)emoptysis: spitting of blood coming from some part of respiratory tract.

Hallucination: illusion, apparent perception of external object not actually present.

Halogen: the chemical elements — fluorine, chlorine, bromine, iodine, astatine.

Hard metal: metal carbides, compounds of metals with carbon.

Hydrocarbons: chemical compounds containing carbon and hydrogen only, for example, ethane (C₂H₆), benzene (C₆H₆).

Hyporegenerative anemia: anemia due to lower capacity of the bone marrow to regenerate red blood cells.

Hypospermia: condition in which the number of sperms becomes or is less than normal.

Infectious: material capable of producing disease due to contact with micro-organisms such as bacteria, virus, fungi, etc., in the host; associated with infection.

Inflammation: condition in which some part of the body is characterised by redness, pain, heat or swelling in reaction to injury or infection.

Inorganic: chemical agent or compound which is not organic.

Insomnia: prolonged inability to obtain adequate sleep.

Iris: an adjustable diaphragm with a pinpointed hole in the centre situated behind cornea and in front of the lens in the eye.

Irritation: annoyance; formation of sores.

Irritating: annoying; causing irritation.

Ketones: organic compounds containing carbonyl (= CO) group, for example acetone ((CH₃)₂=CO).

kg/sq cm: unit of pressure — kilograms per square centimetre.

Larynx: organ of voice, located at the upper end of the windpipe; a structure of muscles and soft but firm tissue attached to bones; it contains vocal chords.

Lassitude: feeling of tiredness, listlessness, weariness.

Leucocyte: white blood corpuscles; they are important in defence against infections.

Leucopenia: abnormal decrease of white blood corpuscles; usually to levels below 5000 per cubic centimetre of blood.

Lurid: causing horror or revulsion.

Lymph: alkaline fluid found in lymphatic vessels.

Lymphatic system: system including all structures involved in conveyance of lymph from tissues to blood stream includes lymph capillaries, lymph nodes, etc.

Lymphocyte: small, nucleated cell; they constitute 20 to 30 percent of white blood cells in normal human blood.

Lymphocytosis: excess of lymphocytes in blood.

Malformed offspring: child with irregular formation of body or a part of the body.

Malignant: progressive tumor resisting treatment; cancerous.
Maniacal: mentally deranged condition marked by excitement, violence and hallucination.

Membrane: thin, soft, pliable layer of animal tissues; such tissues may be lining an organ or part of an organ.

Meningitis: inflammation of meninges (membranes covering brain).

Menstrual: associated with menstruation.

Menstruation: periodic discharge of a body fluid from uterus occurring at more or less regular intervals, known as periods in common language.

Methaemoglobin: a form of haemoglobin (also produced due to effects of chemicals such as aniline dyes) formed in red blood cells due to oxidation of ferrous to ferric salts which cannot carry oxygen.

mg/cu.m: milligrams per cubic metre.

Micrometre: one millionth part of a metre; ten lakh micrometres are equal to one metre.

Morphology: branch of science dealing with structures and forms of animal and plant organs and tissues.

Morphological: associated with morphology.

Mucus: slimy secretion that moistens and protects (mucous) membranes.

Mucous: associated with mucus.

Myalgia: tenderness or pain in muscles.

mg/l: milligrams per litre; one thousand milligrams are equal to one gram.

Narcotic: anything having a dulling effect on consciousness or wakeful, alert state.

Neoplasm: new and abnormal formation of tissues (for example, a tumor or a growth) that serves no purpose, may be cancerous.

Nephritis: disease of kidneys characterised by inflammation.

Nervous system: all the nerve cells, nerve tissues in the body including brain, spinal chord and other nerves make up the nervous system.

Occupational diseases: diseases which affect persons due to their work.

Oedema: abnormal accumulation of fluid in tissues or cavities in body causing swelling.

(O)esophagus: foodpipe; see Gullet.

Optic nerves: nerves associated with vision, eyesight.

Organic compounds: compounds of carbon; mainly with hydrogen, oxygen and other elements.

Palate: roof of the mouth consisting of a hard bony part in front.

Papule: red elevated area on skin which is solid and circumscribed.

Paralysis: partial or complete loss of power of motion or sensation, especially voluntary motion; this can affect the whole body or part of it.

Parasites: organisms which live on or in other organisms (hosts) at the expense of hosts, for example, worms in intestines.

Peripheral nervous system: all the nerves in the body except the central nervous system.

Pharynx: cavity leading from mouth and passage of nose to organ of voice and foodpipe.

Placenta: organ within uterus connected by umbilical chord to fetus and supplying nourishment.

Pleura: thin membrane lining each half of chest cavity and covering lung.

Pleurisy: inflammation of pleura characterised by painful breathing.

Pneumoconiosis: disease of respiratory tract caused by inhalation of dust.

Pneumoconioses: plural of pneumoconiosis.

Pneumonia: inflammation or infection of alveoli in lungs.
Poison: substance causing illness or death.
Poisoning: effect of poison; illness, death caused due to exposure to poison.
ppm: parts per million parts, a unit of measuring concentration of chemicals in air.
Prostrate: partly muscular gland at the base of urinary bladder in males.
Pulmonary: associated with lungs.

Radioactive: giving of radiant energy in particles or rays by disintegration of nuclei of atoms; examples of radioactive substances are uranium-235, radium.
Radiograph: X-ray photographs.
Reproductive organs: parts of body having special function of reproduction.
Reproductive system: group of related organs or structures involved in function of reproduction.
Resorption: action of being absorbed again.
RBC: red blood cells containing haemoglobin present in blood; they carry oxygen to tissues, also called erythrocytes.

Sclerogenic: mineral dusts causing hardening of tissues.
Sclerosis: abnormal hardening of body tissues especially of nervous system and walls of arteries.
Sinus: air cavity in skull opening into cavity of nose.
Spasm: convulsive or involuntary contraction of a muscle or group of muscles.
Spasmodic: characterised by spasms or sudden, violent, fitful contracting movement.
Spinal chord: nerve tissue extending from brain through backbone.
Spleen: large organ with vessels in upper left part of abdomen which modifies blood structure.
Stimulus: any action or agent which causes or changes an activity in an organism, for example, hot touch is stimulus for withdrawing hand.
Stimuli: plural of stimulus.
Stupor: partially or completely unconscious state in which mind and senses are so dulled that one can barely think, act, feel, etc.; serious mental dullness.
Still-birth: birth of already dead infant or fetus.

Teratospermia: condition in which sperms become or are abnormal.
Tissues: group or collection of similar cells and substance in between them which act together in performance of a function.
Toxic: acting as toxin or poison.
Toxin: any substance which when taken into the body by mouth, inhalation, injection, absorption, etc., interferes with normal functions.
Tumor: an abnormal growth of tissue in some part of the body; may be cancerous.
TB: infectious diseases caused by tubercle bacillus (a bacteria); it commonly affects lungs but can also affect nervous system, bones, digestive system, skin, etc.

Ulcer: open sore on skin or on mucus membrane; pus is formed in the sore and tissues are damaged.
Ulceration: process of formation of ulcers.
Upper respiratory tract: air passage in nose, larynx, pharynx and bronchi.
## SCHEDULE III

See Section 3 of the Workmen's Compensation Act (1923) and Section 52 of the Employees' State Insurance Act (1948)

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Occupational disease</th>
<th>Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td>1.</td>
<td>Infectious and parasitic diseases contracted in an occupation where there is a particular risk of contamination</td>
<td>(a) All work involving exposure to health or laboratory work; (b) All work involving exposure to veterinary work; (c) Work related to handling of animals, animal carcasses, part of such carcasses or merchandise which may have been contaminated by animals or animal carcasses; (d) Other work carrying a particular risk of contamination.</td>
</tr>
<tr>
<td>2.</td>
<td>Diseases caused by work in compressed air.</td>
<td>All work involving exposure to the risk concerned.</td>
</tr>
<tr>
<td>3.</td>
<td>Diseases caused by lead or its toxic compounds.</td>
<td>All work involving exposure to the risk concerned.</td>
</tr>
<tr>
<td>4.</td>
<td>Poisoning by nitrous fumes.</td>
<td>All work involving exposure to the risk concerned.</td>
</tr>
<tr>
<td>5.</td>
<td>Poisoning by organo phosphorus compounds.</td>
<td>All work involving exposure to the risk concerned.</td>
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## PART A

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Occupational disease</th>
<th>Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td>1.</td>
<td>Diseases caused by phosphorus or its toxic compounds.</td>
<td>All work involving exposure to the risk concerned.</td>
</tr>
<tr>
<td>2.</td>
<td>Diseases caused by mercury or its toxic compounds.</td>
<td>All work involving exposure to the risk concerned.</td>
</tr>
<tr>
<td>3.</td>
<td>Diseases caused by benzene or its toxic compounds.</td>
<td>All work involving exposure to the risk concerned.</td>
</tr>
<tr>
<td>4.</td>
<td>Diseases caused by nitro or amido toxic derivatives of benzene or its homologues.</td>
<td>All work involving exposure to the risk concerned.</td>
</tr>
<tr>
<td>5.</td>
<td>Diseases caused by chromium or its toxic compounds.</td>
<td>All work involving exposure to the risk concerned.</td>
</tr>
<tr>
<td>6.</td>
<td>Diseases caused by arsenic or its toxic compounds.</td>
<td>All work involving exposure to the risk concerned.</td>
</tr>
<tr>
<td>7.</td>
<td>Diseases caused by radioactive substances and ionising radiations.</td>
<td>All work involving exposure to the risk concerned.</td>
</tr>
<tr>
<td>8.</td>
<td>Primary epitheliomatous cancer of the skin caused by tar, pitch, bitumen, mineral oil, anthracene, or the compounds, products or residues of these substances.</td>
<td>All work involving exposure to the risk concerned.</td>
</tr>
<tr>
<td>9.</td>
<td>Diseases caused by the toxic halogen derivatives of hydrocarbons (of the aliphatic and aromatic series).</td>
<td>All work involving exposure to the risk concerned.</td>
</tr>
<tr>
<td></td>
<td>Diseases caused by carbon disulphide.</td>
<td>All work involving exposure to the risk concerned.</td>
</tr>
<tr>
<td>---</td>
<td>-------------------------------------</td>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>11.</td>
<td>Occasional cataract due to infrared radiations.</td>
<td>All work involving exposure to the risk concerned.</td>
</tr>
<tr>
<td>12.</td>
<td>Diseases caused by manganese or its toxic compounds.</td>
<td>All work involving exposure to the risk concerned.</td>
</tr>
<tr>
<td>13.</td>
<td>Skin diseases caused by physical, chemical or biological agents not included in other items.</td>
<td>All work involving exposure to the risk concerned.</td>
</tr>
<tr>
<td>14.</td>
<td>Hearing impairment caused by noise.</td>
<td>All work involving exposure to the risk concerned.</td>
</tr>
<tr>
<td>15.</td>
<td>Poisoning by dinitrophenol or a homologue or by substituted dinitrophenol or by the salts of such substances.</td>
<td>All work involving exposure to the risk concerned.</td>
</tr>
<tr>
<td>16.</td>
<td>Diseases caused by beryllium or its toxic compounds.</td>
<td>All work involving exposure to the risk concerned.</td>
</tr>
<tr>
<td>17.</td>
<td>Diseases caused by cadmium or its toxic compounds.</td>
<td>All work involving exposure to the risk concerned.</td>
</tr>
<tr>
<td>18.</td>
<td>Occupational asthma caused by recognised sensitising agents inherent to the work process.</td>
<td>All work involving exposure to the risk concerned.</td>
</tr>
<tr>
<td>19.</td>
<td>Diseases caused by fluorine or its toxic compounds.</td>
<td>All work involving exposure to the risk concerned.</td>
</tr>
<tr>
<td>20.</td>
<td>Diseases caused by nitroglycerine or other nitroacid esters.</td>
<td>All work involving exposure to the risk concerned.</td>
</tr>
<tr>
<td>21.</td>
<td>Diseases caused by alcohols and ketones.</td>
<td>All work involving exposure to the risk concerned.</td>
</tr>
<tr>
<td>22.</td>
<td>Diseases caused by asphyxiants: carbon monoxide and its toxic derivatives, hydrogen sulphide.</td>
<td>All work involving exposure to the risk concerned.</td>
</tr>
<tr>
<td>23.</td>
<td>Lung cancer and mesotheliomas caused by asbestos.</td>
<td>All work involving exposure to the risk concerned.</td>
</tr>
<tr>
<td>24.</td>
<td>Primary neoplasm of the epithelial lining of the urinary bladder or the kidney or the ureter.</td>
<td>All work involving exposure to the risk concerned.</td>
</tr>
</tbody>
</table>

**PART C**

<table>
<thead>
<tr>
<th></th>
<th>Pneumoconioses caused by sclerogenic mineral dust (siliosis, anthraco-silicosis, asbestosis) and silico-tuberculosis provided that silicosis is an essential factor in causing the resulting incapacity or death.</th>
<th>All work involving exposure to the risk concerned.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>Bagassosis.</td>
<td>All work involving exposure to the risk concerned.</td>
</tr>
<tr>
<td>3.</td>
<td>Bronchopulmonary diseases caused by cotton, flax, hemp and sisal dust (Byssinosis).</td>
<td>All work involving exposure to the risk concerned.</td>
</tr>
<tr>
<td>4.</td>
<td>Extrinsic allergic alveolitis caused by the inhalation of organic dusts.</td>
<td>All work involving exposure to the risk concerned.</td>
</tr>
<tr>
<td>5.</td>
<td>Bronchopulmonary diseases caused by hard metals.</td>
<td>All work involving exposure to the risk concerned.</td>
</tr>
</tbody>
</table>
A-1: Infectious and parasitic diseases contracted in an occupation where there is particular risk of contamination.

A-2: Diseases caused by work in compressed air.

A-3: Diseases caused by lead or its toxic compounds.

A-4: Poisoning by nitrous fumes.

A-5: Poisoning by organo phosphorus compounds.
The Trunk (schematic diagram)
Infectious and parasitic diseases contracted in an occupation where there is particular risk of contamination

Of the many such diseases, only those recorded in India are listed here.

For diagnosis and special tests about above diseases refer to Shah, Shantilal J. (Ed.), 'API Text Book of Medicine', Association of Physicians of India, Bombay, 1986.

a) Diseases caused by contact with domestic, laboratory and wild animals

Domestic, laboratory and wild animals are three categories of animal sources which can cause infection. These categories are not rigid and have no biological basis since infections pass from one group to another and certain animals may fit into more than one category.

Anthrax is a serious form of illness involving mainly cattle and sheep. Workers in occupations related with ivory, hair processing, etc., may also be affected.

<table>
<thead>
<tr>
<th>Industrial occurrence and occupations</th>
<th>Disease, signs and symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abattoirs;</td>
<td>Anthrax</td>
</tr>
<tr>
<td></td>
<td>Red spot at the place of infection, develops into papules, oedema. Anthrax of lungs develops suddenly, severe pneumonia and death are possible.</td>
</tr>
<tr>
<td>Agriculture;</td>
<td></td>
</tr>
<tr>
<td>Animal attendants;</td>
<td>Brucellosis</td>
</tr>
<tr>
<td>Bone and bone meal processing;</td>
<td>Swelling of the joints and spleen, excessive perspiration, weakness, anaemia.</td>
</tr>
<tr>
<td>Butchers;</td>
<td></td>
</tr>
<tr>
<td>Dairy;</td>
<td>Catarrh</td>
</tr>
<tr>
<td>Forestry;</td>
<td>Inflammation of the mucous membranes of the throat.</td>
</tr>
<tr>
<td>Game wardens</td>
<td></td>
</tr>
<tr>
<td>Hair, bristle processing;</td>
<td>Erysipeloid</td>
</tr>
<tr>
<td></td>
<td>Dermatitis, usually on hands.</td>
</tr>
<tr>
<td>Ivory, horn processing;</td>
<td>Herpes virus infections</td>
</tr>
<tr>
<td></td>
<td>Small eruptions with bladder-like shape with thin walls are formed on the skin. Herpes virus may cause meningitis.</td>
</tr>
<tr>
<td>Laboratories, animal;</td>
<td>Infectious hepatitis</td>
</tr>
<tr>
<td></td>
<td>Jaundice, fever, malaise, pain in the liver area of the abdomen, upset stomach, muscle pain, loss of appetite, loss of weight.</td>
</tr>
<tr>
<td>Meat packers;</td>
<td></td>
</tr>
</tbody>
</table>

... contd.
<table>
<thead>
<tr>
<th>Poultries;</th>
<th>Leishmaniasis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Skin (pigmentation around malar bones on face), cavities of nose, pharynx are</td>
</tr>
<tr>
<td></td>
<td>affected. Fever, chronic ill health, lassitude, protuberant abdomen with</td>
</tr>
<tr>
<td></td>
<td>massive enlargement of spleen and liver.</td>
</tr>
<tr>
<td>Sewerage workers;</td>
<td>Leptospirosis</td>
</tr>
<tr>
<td></td>
<td>Muscular pain, fever, jaundice.</td>
</tr>
<tr>
<td>Stock farming;</td>
<td>Lymphocytic choriomeningitis</td>
</tr>
<tr>
<td>Tanneries;</td>
<td>Fever, headache, contracted pupils, delirium, coma, possibly death.</td>
</tr>
<tr>
<td>Veterinary work;</td>
<td>Mice infections</td>
</tr>
<tr>
<td>Wild life management;</td>
<td></td>
</tr>
<tr>
<td>Wood industry.</td>
<td>Q fever</td>
</tr>
<tr>
<td></td>
<td>Headache, fever, loss of appetite, dry cough.</td>
</tr>
<tr>
<td></td>
<td>Rabies (commonly known as dog bite, hydrophobia)</td>
</tr>
<tr>
<td>All occupations</td>
<td>Problem in breathing, fever, depression or aggressiveness, vomiting, unusual</td>
</tr>
<tr>
<td>connected with</td>
<td>salivation, usually fatal.</td>
</tr>
<tr>
<td>animals, e.g.,</td>
<td>Rat bite fever</td>
</tr>
<tr>
<td>transport of</td>
<td>Headache, vomiting, back pain, joint pain, rash, recurring fever.</td>
</tr>
<tr>
<td>animals.)</td>
<td>Ringworm</td>
</tr>
<tr>
<td></td>
<td>Red ringed patches on the skin, itching, pain.</td>
</tr>
<tr>
<td></td>
<td>Salmonellosis</td>
</tr>
<tr>
<td></td>
<td>Three types possible: typhoid; septicaemia, i.e., presence of bacteria in</td>
</tr>
<tr>
<td></td>
<td>blood, chills, fever, possibly death; acute gastro-enteritis.</td>
</tr>
<tr>
<td></td>
<td>Toxoplasmosis</td>
</tr>
<tr>
<td></td>
<td>Muscle pain, fever, rashes, pneumonia-like symptoms.</td>
</tr>
<tr>
<td></td>
<td>Tuberculosis (TB)</td>
</tr>
<tr>
<td></td>
<td>Well known symptoms of TB. It may affect many other parts of the body beside</td>
</tr>
<tr>
<td></td>
<td>lungs.</td>
</tr>
</tbody>
</table>

If laws are inadequate, the laws need to be changed!!
b) Infectious skin diseases caused by biological agents

Bacterial, fungal, parasitic and viral infections of skin are possible in any occupation. The list of occupations affected more often is given below:

<table>
<thead>
<tr>
<th>Bacterial skin infections</th>
<th>Fungal skin infections</th>
<th>Parasitic skin infections</th>
<th>Viral skin infections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal breeders;</td>
<td>Bakers;</td>
<td>Agriculture;</td>
<td>Dairy workers;</td>
</tr>
<tr>
<td>Animal handlers;</td>
<td>Bartenders;</td>
<td>Grain handlers;</td>
<td>Dental practitioners;</td>
</tr>
<tr>
<td>Farmers;</td>
<td>Cannery workers;</td>
<td>Harvesters;</td>
<td>Livestock handlers;</td>
</tr>
<tr>
<td>Fishermen;</td>
<td>Cooks;</td>
<td>Livestock workers;</td>
<td>Medical practitioners.</td>
</tr>
<tr>
<td>Food Processors;</td>
<td>Dish-washers;</td>
<td>Longshoremen;</td>
<td></td>
</tr>
<tr>
<td>Hide handlers;</td>
<td>Domestic workers;</td>
<td>Silo workers.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Food processors.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Signs and symptoms

Diffuse redness or discoloration of skin, glandular tumor or growth on skin is possible due to above infections. In fungal infections, yellow disks around hair or all parts of the body, swollen patches in between fingers or folds of fingers are possible. In case of herpes, eruptions with bladder-like shape and thin walls develop on skin. Herpes virus may also cause meningitis.
c) Infectious diseases affecting nurses, other hospital attendants, doctors, laboratory workers

who are in contact with patients having infectious diseases or with infected samples of blood, urine, stools, etc., and face the risk of contracting infectious diseases affecting the patients they help to get cured. Some diseases such as tuberculosis are known to be more common among these occupations.

Hepatitis — The percentage of affected doctors, medical workers is known to be 15 to 40 times more than the general population. The signs are jaundice, fever, mustard yellow coloured urine, upset stomach, pain in the abdomen, muscle pain, loss of appetite, loss of weight.

d) Infectious lung diseases affecting workers associated with asbestos, silica, coal and haematite, mainly TB

The Industrial occurrence and Signs and Symptoms of diseases caused by asbestos, silica, etc., are given in Reference Sheets, Part C.

It is your right to know !!
### Diseases caused by work in compressed air; decompression sickness

<table>
<thead>
<tr>
<th>Industrial occurrence</th>
<th>Signs and symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>In industries associated with</td>
<td></td>
</tr>
<tr>
<td>Construction of foundations of bridges or piers;</td>
<td>Acute pain in ears or sinuses if there is prior infection in upper respiratory tract, dizziness, nausea, disorientation if decompression is too rapid.</td>
</tr>
<tr>
<td>Deep sea diving for construction and maintenance of: barrages, cables, cooling water systems for power stations, effluent outfalls, harbours, immersed tube tunnels, ports, submarine pipelines;</td>
<td>Swelling or mass of blood formed in the ear drum (due to break in blood vessels). The drum may rupture. The passage to sinuses may be blocked.</td>
</tr>
<tr>
<td>Tunneling under water; Undersea houses and bases.</td>
<td>Skin reactions to acid or alkaline material in the ground may occur when digging through industrial waste.</td>
</tr>
<tr>
<td></td>
<td>Acute decompression sickness —</td>
</tr>
<tr>
<td></td>
<td>Type I: mild to severe limb pain, skin has discoloured areas and irritation.</td>
</tr>
<tr>
<td></td>
<td>Type II: vomiting with or without pain in the region above pit of the stomach, laboured breathing, headache, fits (epileptic in form), flashes of light and blind gaps felt in visual field, and symptoms suggesting coronary dysfunction – irregular pulse, collapse, coma, even death.</td>
</tr>
<tr>
<td></td>
<td>Chronic decompression sickness — death of areas of bones associated with work in compressed air or diving may occur. This may be disabling. Frequently affected parts are the joint in the body.</td>
</tr>
</tbody>
</table>

### Diagnosis, special tests

1. Occupational history of working under pressures more than 1 kg/sq.cm.
2. Alcoholics, obese persons with chronic ailments of the respiratory tract and of the cardio-vascular system are more prone to be affected.
3. Radiographs of the shoulder, hip and knee joints should be repeated once in an year up to two years after stopping work in compressed air.
4. Regular medical examination for respiratory and cardio-vascular problems.

---

Ask for information about the hazardous substances and factors at your workplace!!
Diseases caused by lead and its toxic compounds

(Examples: Inorganic Compounds: Almosite or lead silicate; Anglesite or lead sulphate; Galena or lead sulphide; Lead peroxide; Litharge or lead monoxide; Red lead or triplumbic tetroxide; White lead or lead carbonate; etc. Organic Compounds: Sugar of lead or lead acetate; tetra-ethyl lead; etc.)

a) Lead and its inorganic compounds

<table>
<thead>
<tr>
<th>Industrial occurrence</th>
<th>Signs and symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>In industries associated with</td>
<td></td>
</tr>
<tr>
<td>Alloys:</td>
<td></td>
</tr>
<tr>
<td>Ammunition;</td>
<td></td>
</tr>
<tr>
<td>Ceramics;</td>
<td></td>
</tr>
<tr>
<td>Inks</td>
<td></td>
</tr>
<tr>
<td>Insecticides;</td>
<td></td>
</tr>
<tr>
<td>Lead lining;</td>
<td></td>
</tr>
<tr>
<td>Plumbing;</td>
<td></td>
</tr>
<tr>
<td>Printing Presses;</td>
<td></td>
</tr>
<tr>
<td>Rubber;</td>
<td></td>
</tr>
<tr>
<td>Smelting;</td>
<td></td>
</tr>
<tr>
<td>Storage batteries.</td>
<td></td>
</tr>
</tbody>
</table>

- Non-specific symptoms — weakness, inability to sleep, restlessness, forgetfulness; face and eyes become pale; weight loss.

- If exposure to lead and its compounds continues even after the appearance of the above signs, it leads to: abdominal discomfort, colic (spasm of the colon muscles). Many cases of colic due to lead are liable to be wrongly diagnosed as surgical diseases.

- Another sign — bluish lead line on gingival tissues (gums).

- Further signs — weakness in movements including paralysis of muscles of wrists and possibly ankles. Muscles become sensitive to pain upon pressure and afterwards signs and symptoms of disease of the nerves develop.

- Reproductive organs are affected, fertility impaired, and stillbirths may take place. In males, diseases such as hyposperma, asthenosperma, teratosperma are possible. Chronic nephritis, that is, inflammation of the kidneys is also possible.

**Diagnosis, special tests**

1) Occupational history and haemopoietic changes, e.g., anaemia, basophilic stippling over RBCs etc., are prime elements in diagnosis.

2) For workers in fertile age, lead levels in blood should not exceed 30 micro-gm/100 ml; for others, it should not exceed 40 micro-gm/100 ml. If lead in blood is found in excess, then stoppage of exposure should be recommended (WHO 1980).

3) Lead in urine should not exceed 65 micro-gm/l. Samples should be collected at the end of the work-shift. ALA in urine greater than 10 mg/l, coproporphyrin in urine greater than 30 micro-gm/l diagnostic.

4) Zinc-protoporphyrin level should not exceed 3 micro-gm/gm Hb.

.... contd.
b) Organic compounds of lead

Organic compounds of lead are absorbed through skin. Refer to relevant literature about particular compound in question. Information about one compound lead tetra-ethyl is given below.

Diseases caused by lead tetra-ethyl

<table>
<thead>
<tr>
<th>Industrial occurrence</th>
<th>Signs and symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>In industries associated with</em></td>
<td></td>
</tr>
<tr>
<td>Gasoline fuel for internal combustion engines, (as 'anti-knock' agent);</td>
<td></td>
</tr>
<tr>
<td>Refineries.</td>
<td></td>
</tr>
<tr>
<td>Mild manifestations -- Insomnia, lassitude, nervous excitation, lurid dreams in association with tremors and spasmodic muscular contractions.</td>
<td></td>
</tr>
<tr>
<td>More severe responses -- Complete disorientation with hallucinations, facial contortions, episodes of hallucinations may be converted into maniacal or violent convulsive seizures which may terminate in coma or death.</td>
<td></td>
</tr>
</tbody>
</table>

**Diagnosis, special tests**

1) Valid history of occupational exposure with increased level of lead in urine (more than 350 micro-gm/l) associated with lead in blood less than 50 micro-gm/100 ml.

![Tooth (schematic diagram)]
Diseases caused by nitrous fumes

(Examples: Di-nitrogen trioxide; Laughing gas or nitrous oxide; Nitric oxide; Di-nitrogen pentoxide; etc.)

Industrial occurrence

In industries associated with

- Bleaching of rayon (as stabiliser);
- Nitric acid manufacture.

(* and as by-product and intermediate product in many industries)

Signs and symptoms

Nitrous fumes are powerful lung irritants. High concentrations may cause sudden death. Death may be caused by delayed oedema (accumulation of fluids and swelling) of the lungs. Initial signs on exposure may be no more than moderate irritation of the eyes and the respiratory tract. Possibility of death, sometimes even several weeks after exposure and may be associated with inflammation and blocking of the bronchioles (bronchitis fibrosa obliterans).

Chronic effects – drowsiness, dizziness and vomiting associated with the presence of methaemoglobin in blood; lung function may be affected.

Nitrous oxide in anaesthetic combinations may affect reproductive organs and impair reproductive function.

Diagnosis, special tests

1) Occupational history.
2) Chest X-rays for basal scars.
3) Blood test for methaemoglobin.

Protect your health, it is not for sale; but ...
Diseases caused by organo-phosphorus compound

(Examples: Alkron; Chlorpyrifos; DDVP; Diazinon; Diomethoate; DNTP; DPP; Ethion; Glyphosate; Gusathion; Malathion; Monotrophos; Phos-kil; Phosphamidon; Sumithion; Thiophos or parathion; Trichlorphon; and similar pesticides.)

<table>
<thead>
<tr>
<th>Industrial occurrence</th>
<th>Signs and symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>In industries associated with</strong></td>
<td>These compounds are absorbed fast through respiratory system, skin and mucous membranes of digestive tract.</td>
</tr>
<tr>
<td>Agriculture -- use of above pesticides;</td>
<td>Acute effects --</td>
</tr>
<tr>
<td>Organo-phosphorus pesticides production;</td>
<td></td>
</tr>
<tr>
<td>Pest control.</td>
<td></td>
</tr>
</tbody>
</table>

- In case of moderate poisoning: sleeplessness or sleepiness, headache, impairment of sensitivity, confusion, irregularity of muscle coordination.

- In case of severe poisoning: convulsions, paralysis.

  **First stage:** anxiety, nausea, salivation, vomiting, diarrhoea, blurred vision, dizziness.

  **Second and third stage:** attack of convulsions with tension in muscles and alternate relaxation. Convulsions alternate with coma. Blood pressure initially increases, drops before death. Oedema of lungs develops.

Chronic effects -- headache, weakness, feeling of heaviness and fatigue, disturbed sleep, loss of orientation. Psychic disorders, constant involuntary cyclical movements of the eyeball (nystagmus), trembling of hands, other nervous system disorders. Occasionally diseases of nerves, paralysis.

**Diagnosis, special tests**

1) Occupational history.

2) Pronounced decrease by 50-60% or more of the blood cholinesterase activity. Serum cholinesterase can be completely depressed in serious cases. Changes in blood picture (leucocyte count and leucocyte formula) with (most often) a shift to the left.

3) Increased secretion of saliva, sweat, tears and mucus.

... DO claim compensation if your health is damaged!!
The Central and Peripheral Nervous System (schematic diagram)
B-1 Diseases caused by phosphorus and its toxic compounds.
B-2 Diseases caused by mercury and its toxic compounds.
B-3 Diseases caused by benzene and its toxic homologues.
B-4 Diseases caused by nitro and amido toxic derivatives of benzene or its homologues.
B-5 Diseases caused by chromium and its toxic compounds.
B-6 Diseases caused by arsenic and its toxic compounds.
B-7 Diseases caused by radioactive substances and ionising radiations (X-rays, etc.).
B-8 Primary epitheliomatous cancer of the skin caused by tar, pitch, bitumen, mineral oil, anthracene of their compounds, products or residues.
B-9 Diseases caused by halogen derivatives of hydrocarbons.
B-10 Diseases caused by carbon disulphide.
B-11 Occupational cataract due to infrared radiations.
B-12 Diseases caused by manganese and its toxic compounds.
B-13 Skin diseases caused by physical, chemical or biological agents not included in other items.
B-14 Hearing impairment caused by noise.
B-15 Diseases caused by dinitrophenol, or a homologue, or substituted dinitrophenols or their salts.
B-16 Diseases caused by beryllium and its toxic compounds.
B-17 Diseases caused by cadmium and its toxic compounds.
B-18 Occupational asthma.
B-19 Diseases caused by flourine and its toxic compounds.
B-20 Diseases caused by nitroglycerine or other nitroacid esters.
B-21 Diseases caused by alcohols and ketones.
B-22 Diseases caused by asphyxiants.
B-23 Lung cancer and mesotheliomas caused by asbestos.
B-24 Primary neoplasm of the epithelial lining of the urinary bladder or the kidney or the ureter.
# Diseases caused by phosphorus and its toxic compounds

(Examples: Calcium superphosphate; Orthophosphoric acid or phosphoric acid; Phosphine, hydrogen phosphide or phosphorated hydrogen; Phosphorus pentachloride; Superphosphates and phosphates; Tetra-phosphorus trisulphide; Zinc phosphide; etc.)

## a) Diseases caused by phosphorus

<table>
<thead>
<tr>
<th>Industrial occurrence</th>
<th>Signs and symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>In industries associated with</strong></td>
<td>Irritation of respiratory tract, toothache, excessive salivation followed by pain and swelling of jaw and inflammation of the jawbone (especially of bone marrow), known as 'phossy jaw', facial distortion.</td>
</tr>
<tr>
<td>Chemicals;</td>
<td></td>
</tr>
<tr>
<td>Detergents;</td>
<td></td>
</tr>
<tr>
<td>Explosives;</td>
<td></td>
</tr>
<tr>
<td>Fertilisers;</td>
<td></td>
</tr>
<tr>
<td>Fireworks;</td>
<td></td>
</tr>
<tr>
<td>Ignition compounds;</td>
<td></td>
</tr>
<tr>
<td>Incendiaries;</td>
<td></td>
</tr>
<tr>
<td>Insecticides;</td>
<td></td>
</tr>
<tr>
<td>Iridescent metallic deposits;</td>
<td></td>
</tr>
<tr>
<td>Phosphorus bronze;</td>
<td></td>
</tr>
<tr>
<td>Rodenticides;</td>
<td></td>
</tr>
<tr>
<td>Rust-proofing of metals;</td>
<td></td>
</tr>
<tr>
<td>Safety matches.</td>
<td></td>
</tr>
</tbody>
</table>

**Diagnosis, special tests**

1. Occupational history.
2. Regular X-rays of teeth.
3. After suspicion of jaw injury, further exposure should be stopped.
4. Pulmonary oedema may occur in case of exposure to phosphorus pentachloride.

---

The right to know is an important right!!
b) Diseases caused by compounds of phosphorus

**Industrial occurrence**

*In industries associated with*
- Fertiliser use and production;
- Fumigation of grain (phosphine is produced in action of aluminium phosphide with water);
- Mining and processing of phosphates;
- Phosphoric acid production.

**Signs and symptoms**

**Phosphine**
Phosphine (PH₃) is highly toxic, causes depression of central nervous system, restlessness, tremors, fatigue, headache, severe gastric pains, oedema of lungs.

In chronic poisoning symptoms appear after continued exposure even to low concentrations — anaemia, bronchitis, disturbance in vision and speech and also in muscle movements.

**Phosphates and other compounds**
Metaphosphates may be highly toxic causing discharge of blood and damage to liver and kidney.

Phosphates and superphosphates are hazardous due to presence of fluorides in the dust and fumes of phosphates. Fluorides cause fluorosis (speckled teeth, loss of tooth enamel) and may cause damage to bones. Phosphate dust may cause pneumoconiosis (disease of respiratory system caused by dusts).

Phosphates are generally found in mines, especially in sedimentary deposits. They are often associated with higher uranium content. In fact, in the USA and in Belgium phosphate mines are used to recover uranium. Uranium-235 is radioactive, and radioactivity may cause cancer, may affect reproductive organs and may give rise to malformed offspring (for effects of radioactivity refer to sheet B 7).

Get the phosphates your plant may be using tested for its uranium content. Also get the level of radioactivity of the phosphates measured. Remember that phosphates may cause lung disease, especially when associated with grinding processes.

**Diagnosis, special tests**
Fluoride excretion should not exceed 2 mg/l in urine samples collected at the end of the workshift. Fertiliser workers are exposed to particles of fluorides as well as gaseous fluorides and the above test is necessary.

---

**ORGANISE to protect your occupational health!!**
Diseases caused by mercury and its toxic compounds

(Examples: Inorganic compounds: Mercuric azide; Mercuric chloride; Mercuric oxide; Mercuric sulphide; Mercurous azide; Mercurum; Mercury cyanate; Mercury fulminates; Organic compounds: MEMC or methoxy ethyl mercuric chloride; Ethyl mercuric chloride; Methyl mercuric chloride; PMA or phenyl mercuric acetate; etc.)

Industrial occurrence

In industries associated with
- Acetaldehyde and acetylene;
- Acetic acid;
- Agricultural and industrial poisons;
- Amalgams manufacture;
- Antifouling paint;
- Artificial silk;
- Barometers;
- Chlorine;
- Electrical apparatus;
- Incandescent bulbs;
- Mercury vapour tubes;
- Rectifier batteries;
- Silver ores;
- Textiles;
- Thermometers;
- Treatment of gold;
- Vacuum Pumps;
- X-ray tubes.

Signs and symptoms

(of diseases caused by mercury)

Most common: Inflammation of the gums characterised by redness, swelling and tendency to bleed, metallic or bitter taste in mouth, bluish line on gums, slate grey pigmentation on inner side of gums or on the palate or inside of the cheeks, inflammation of the stomach characterised by vomiting, nausea (i.e. gastritis), inflammation of the lungs. Psychic signs – mild elation, exaggerated feeling of well being or excessive excitement, irritation to stimuli.

Nervous system involvement is along two lines:

a) Involuntary movement of part or parts of the body (tremor) when attempting coordinated movements (intention tremor). This sign resembles the tremors in multiple sclerosis, a slowly progressive and chronic disease of the nervous system.

b) Tremors begin at rest and function of nerves and muscles is reduced; this may occur without gastro-intestinal symptoms. Unsteady staggering gait, expressionless appearance of face, eyebrows are raised, wrinkles on face are smoothed and muscles of face are immobile. Absence of balance recovery reflexes. Tremors begin with subtle trembling of fingers. Eyes — reddish gray, discoloration of crystalline lens of eyes.

(of diseases caused by inorganic mercury compounds)

Inflammation of mouth, tremors, psychic disturbances, excessive salivation, pain while chewing in severe cases, inflammation of gums, loosening of teeth as in case of mercury poisoning. In slow poisoning, salivation may be absent and complaints of dryness in mouth, throat, loss of memory, insomnia, lack of confidence, irritability.

Fulminates of mercury, can be absorbed through skin, cause dermatitis, forming small discrete ulcers on the exposed parts, conjunctivitis, inflammation of mucous membranes of nose and throat.

(of diseases caused by organic mercury compounds)

Alkyl mercurials can be fatal and can cause permanent brain damage. Phenyl mercurials are as toxic as metallic mercury.

Diagnosis, special tests

1) Occupational history.
2) Examination for presence of tremors at rest or with movement.
3) Mercury in urine exceeding 50 micro-grm/l indicates harmful exposure.
# Diseases caused by benzene and its toxic homologues

*(Examples: Toluene; Xylene; etc.)*

<table>
<thead>
<tr>
<th>Industrial occurrence</th>
<th>Signs and symptoms</th>
</tr>
</thead>
</table>
| *In industries associated with* Chemical syntheses  
  (widely used as fuel, chemical reagent, solvent, additive in motor fuel, and raw material, especially for organic chemicals)  
  (manufacture of) Artificial manure; Cyclohexane; detergents; Glue; Paint removers; Pesticide; Phenol; Shoes; Styrene. | Acute poisoning: produces stupor or sleep, a local irritant effect on the skin and mucous membranes, central nervous system depression.  
Chronic poisoning: damages blood-forming tissues and results in (hyporegenerative) anaemia. The ultimate injury may be potentially incurable.  
Early symptoms: vague complaints of fatigue, loss of appetite, headache, dizziness and an anaemic appearance.  
Continued exposure: may cause euphoria, nausea, a staggering gait and coma. Inhalation of concentrations in the range of 250 to 500 ppm produces vertigo, drowsiness, headache and nausea.  
It often causes irreversible injury to the bone marrow. This may develop into (true aplastic) anaemia leading to total or partial destruction of all elements of the bone marrow. Abnormal decrease in the number of blood corpuscles (to below 5000 per cubic millimetre), reduction in all cellular elements of blood and abnormal decrease in number of blood platelets may be caused.  
A clear relationship between exposure to benzene and large incidence of leukemia has been established.  
In case of homologues such as toluene, anaemia, leucopenia has been noticed in some cases and damage to bone marrow has been reported. |

**Diagnosis, special tests**

1. Tests for phenol levels in urine have been used as an index of benzene exposure. Concentrations of over 200 mg/l or higher indicate harmful exposure.
2. If signs, symptoms of central nervous system depression occur, obtain blood glucose and rectal temperature values; perform a complete neurological examination.
3. A complete blood count is necessary (anaemia is severe and is normochromic and normocytic; platelets are reduced in number; aspirated bone marrow is usually acellular).
Diseases caused by nitro and amido toxic derivatives of benzene or its homologues

(Examples: Nitro-aniline; Nitrobenzene; Nitrotoluene; o-amino phenol; o-chloro aniline; o-nitro-chlorobenzene; o-toluened anisidine; p-amino phenol; Toluedine; etc.)

Industrial occurrence

In industries associated with
Antioxidants;
Dyes;
Elastomers;
Explosives;
Fuel additives;
Insecticides;
Pharmaceuticals;
Pigments;
Plastics;
Resins;
Resins;
Rubber accelerators;
Solvents;
Textiles.

Signs and symptoms

Acute effect — cyanosis.

Chronic effects — anaemia, perhaps headache, fatigue, nausea, chest pain, numbness, nervousness, difficulty in breathing.

Skin irritation in case of nitro-chloro-benzenes; dermatitis in case of slight contact with di-nitro-chloro-benzene.

2-4-di-nitro-toluene affects liver.

Some nitro compounds are suspected carcinogens.

Diagnosis, special tests

1) Blood, urine analysis.

2) Methaemoglobin concentration of 5-10% is significant; above 10% indicates excessive exposure.

3) Bi-monthly blood analysis for detecting onset of anaemia. Haemoglobin level should not be below 13g/100 ml.

4) Tests according to the particular chemical indicated by occupational history.

If laws are inadequate, the laws need to be changed!!
Diseases caused by chromium and its toxic compounds

(Examples: Crocoite/lead chromate; Chromates; Chrome yellow; Chromic acid/chromium trioxide; Chromium carbide; Chromium hydride; Chromium sulphate; Potassium dichromate/bichromate, Red potassium chromate; Sodium dichromate, acid chromate; etc.)

Industrial occurrence
In industries associated with
- Chromium plating;
- Chromium salts;
- Leather tanning;
- Metallurgy;
- Photomechanical processing;
- Refractory bricks.

Signs and symptoms
Open sore or patch or wound (sometimes even perforation) of the nasal septum (wall dividing the two nasal cavities), also fingers. Irritation of the mucous membrane lining the inner surface of eyelids and covering front of the eyeball. Irritation of the pharynx and larynx. Possibility of asthmatic bronchitis.

Frontal headaches; breathing with whistling sound, difficulty in breathing and pain on intake of air.

Possibility of jaundice.

Lung cancer is associated with chromium compounds.

Diagnosis, special tests
1) Diagnostic studies should include electrocardiogram, sputum gram stain and culture, differential blood cell count, and arterial blood gas analysis.

2) Increased levels of chromium in the urine are indicative of occupational exposure but should be interpreted with caution.

To change laws, we need to know them well!!
Diseases caused by arsenic and its toxic compounds

(Examples: Aminophenyl arsine acid; Antoxylic acid or arsenalic acid; Arsenic sulphide; Arsenic trichloride; Arsin; Calcium arsenite; Copper arsenite; Lead arsenite; Schill's mineral or cupric arsenite; White arsenic or arsenic trioxide; etc.)

Industrial occurrence

In industries associated with

- Drugs manufacture (indigenous as well as other systems of medicine);
- Fungicides;
- Glass;
- Insecticides; Metallurgy, in hardening of copper, lead and other alloys;
- Pigment production;
- Preservation of hides, skin, fur, wood, etc.;
- Rodent poison;
- Smelting of copper ores (as by-product).

Signs and symptoms

Conjunctivitis, visual disturbances; ulceration and perforation of the nasal septum; inflammation of the pharynx, irritation of the lungs, diseases of the peripheral nerves (outside of the brain and the spinal chord); increase in skin pigmentation, horny growth on the palms and the soles, dermatitis, skin cancer; may cause cancer of the lung, larynx, lymphatic system or abdominal organs.

Impairment of circulation in the periphery of the body, resulting in gangrene of the fingers and toes. Liver damage has been observed in animals.

After a spill of arsenic trichloride, fatality has been reported. Some organic arsenicals, such as arszenilates, have a selective effect on the optic nerves and can cause blindness. Excess lung cancer mortality has been observed.

Acute intoxication with arsenic compounds is usually accompanied by anaemia and an abnormal decrease in white blood cells (below 5000 per cubic millimetre). This effect also occurs in cases of chronic arsenic poisoning. Skin disorders may take place.

It has been reported that workers working in an environment of arsenic smelting have given birth to malformed offspring or resorption has taken place.

Diagnosis, special tests

1) The diagnosis depends upon analysis of urine for arsenic.

Urinary levels of arsenic above 0.2 mg/l indicate exposure and above 0.7 to 1.0 mg/l in exposed individuals may indicate harmful exposure, but dietary factors must first be ruled out.

2) A determination of arsenic in hair and nails may be useful, although its value has been questioned in industrial exposures because of the difficulty in removing all external contamination.

Inform your union activist of the health problems caused by your work!!
Diseases cause by radioactive substances and ionising radiations (X-rays, etc.)

<table>
<thead>
<tr>
<th>Industrial occurrence</th>
<th>Signs and symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>In industries associated with</td>
<td>Exposure of the entire body or large portion of the body to doses of radiation in excess of 1 Gray (Gy) results in nausea, vomiting, perhaps diarrhoea, within hours of exposure. This is the first phase. Symptoms relating to stomach and intestines improve in a day after which second phase starts — a period of relative well being that may last up to one week. The third phase is characterised by recurrence of intestinal symptoms, open sores in mouth and throat, possible loss of hair, and possibly gross bleeding in gastro-intestinal tract.</td>
</tr>
<tr>
<td>Aerosol fire detectors;</td>
<td>Acute effects - drop in lymphocyte count; in case of localised exposure abnormal formation of fibrous tissues may take place in spaces within organs or tissues.</td>
</tr>
<tr>
<td>Gas chromatography;</td>
<td>Exposure to high doses and also to repeated small doses may lead to cataract after a latent period of usually six months to two years but in rare cases it may extend even up to twelve years.</td>
</tr>
<tr>
<td>Industrial radiography;</td>
<td>Late effects — leukaemia and other forms of cancer.</td>
</tr>
<tr>
<td>Nuclear reactors;</td>
<td>If embryo is exposed — morphological abnormalities in development of nervous system or even death of embryo or fetus is possible depending upon the dose and duration of exposure.</td>
</tr>
<tr>
<td>Radioactive tracers;</td>
<td>Diagnosis, special tests</td>
</tr>
<tr>
<td>Radium dial painting;</td>
<td>1) Drop in the lymphocyte count followed by slower and biphasic fall in granulocyte and platelet counts. Possible gradual fall in red blood cell count.</td>
</tr>
<tr>
<td>Uranium mining;</td>
<td>2) In intestines, ulceration of mucous membranes is possible.</td>
</tr>
<tr>
<td>Use, analysis, or manufacture of radioactive materials;</td>
<td></td>
</tr>
<tr>
<td>X-ray clinics.</td>
<td></td>
</tr>
</tbody>
</table>

Ask for information about the hazardous substances or factors at your workplace!!
Primary epitheliomatous cancer of the skin caused by tar, pitch, bitumen, mineral oil, anthracene, or their compounds, products or residues

<table>
<thead>
<tr>
<th>Industrial occurrence</th>
<th>Signs and symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>In industries associated with</td>
<td>Scale-like growth or malignant tumor appears as a small but firm aggregation of</td>
</tr>
<tr>
<td>Anthracene (used in dyes, and radiation</td>
<td>cells (a small node) having diffused redness.</td>
</tr>
<tr>
<td>Asphalt;</td>
<td></td>
</tr>
<tr>
<td>Coal;</td>
<td>Diagnosis, special tests</td>
</tr>
<tr>
<td>Gas works;</td>
<td>1) Skin cancer takes many years to develop. Early stages readily detectable by</td>
</tr>
<tr>
<td>Mineral oils (i.e., oils found in rock</td>
<td>visual inspection.</td>
</tr>
<tr>
<td>strata, e.g., petroleum).</td>
<td>2) Occupational history indicates regular checking for skin cancer.</td>
</tr>
</tbody>
</table>

It is your right to know!!
Diseases caused by halogen derivatives of hydrocarbons

(Examples: Bromo benzene; Bromo methane; Carbon tetrachloride; Chloro methane or methyl chloride; Chlorofom; Chloromethane; Chloroprene or Chlor-butadiene, 2-chloro-1-3-butadiene; Dibromo benzene; Freon 12 or dichloro-difluoro methane; Freon-11 or trichlorofluoro methane or fluoro-trichloro methane; Vinyl chloride; etc.)

Industrial occurrence

In industries associated with

Chemicals (as solvents, refrigerants, anaesthetics, fumigants, etc.);

Gauge fluids;

Plastic intermediates.

Signs and symptoms

These chemicals are lung irritants. The severity of effect depends on the particular chemical in question and its concentration.

They cause injury to eyes and repeated exposure to fumes may result in irreversible damage.

Affected skin becomes dry and cracked, chapped on repeated contact.

Vinyl chloride causes numbness and coldness of fingers, damage to fingertips (stubby fingers), and cancer of liver.

Effects on the nervous system — intoxication, excitation, death of areas of nerve tissues.

Death may result due to acute severe exposure.

Headache, nausea, convulsions, paralysis, visual disturbances, tremors, affected speech are evidence of complicated involvement of the central nervous system.

Harmful effects on kidneys, liver are reported.

Diagnosis, special tests

1) Occupational history.

2) Referring to literature on the particular chemical in question.

3) In case of central nervous system depression, blood glucose and rectal temperature values should be noted and complete neurological examination to be done.

4) X-ray of fingertips for acro-osteolytic changes in chronic exposure to vinyl chloride when stubby fingers are suspected.

5) Liver function tests, if liver injury is suspected.

To begin with, claim compensation !!
Diseases caused by carbon disulphide

<table>
<thead>
<tr>
<th>Industrial occurrence</th>
<th>Signs and symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>In industries associated with</td>
<td>Primarily, carbon disulphide adversely affects the nervous system. Symptoms indicating damage to central nervous system (brain and spinal cord) and peripheral nervous system (rest of the nervous system) are very important. In chronic poisoning, damage may be permanent.</td>
</tr>
<tr>
<td>Industrial solvent (widely used for alkalies, cellulose, fats, oils, resins and waxes).</td>
<td>In acute poisoning, central nervous system is excited as in alcoholic intoxication. This is commonly followed by depression, stupor, restlessness, vomiting.</td>
</tr>
<tr>
<td>(manufacture of) Artificial silk, by viscose process;</td>
<td>In chronic poisoning, inflammation of nerves and disturbance of vision are common. Changes in sensation such as crawling sensation in the skin, sensations of heaviness and coldness and defect in visually perceiving objects are noticed initially. Gradual loss of strength follows. Muscles shrink in physical bulk and lose strength. Chronic fatigue is very common.</td>
</tr>
<tr>
<td>Oil (by extraction);</td>
<td>In women, menstrual disturbances and more frequent abortions have been reported.</td>
</tr>
<tr>
<td>Optical glass;</td>
<td>Carbon disulphide passes through the placenta and may be present in the tissues of infants.</td>
</tr>
<tr>
<td>Pesticides (is itself also used as a pesticide).</td>
<td>Diagnosis, special tests</td>
</tr>
</tbody>
</table>

1) Carbon disulphide exposure can be measured by determining the amount in urine, blood or expired air. These are rough estimations.

A widely used test is iodine azide test based on a special test for urine.

2) Two or three medical examinations annually are usually advisable. A neurologist and a psychiatrist should participate in such examinations.

You have a right to your medical reports; get them, and preserve them carefully!!
Occupational cataract caused by infrared radiation

<table>
<thead>
<tr>
<th>Industrial occurrence</th>
<th>Signs and symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>In industries associated with</td>
<td>Lens of the eye or the capsule of the lens or both become opaque.</td>
</tr>
<tr>
<td>Arc processes;</td>
<td>Where eyes are exposed to processes hot enough to be luminous, the lens of the eye is more affected and the term 'glass workers' cataract' is often used for this type of cataract.</td>
</tr>
<tr>
<td>Hot furnaces;</td>
<td></td>
</tr>
<tr>
<td>Lasers;</td>
<td></td>
</tr>
<tr>
<td>Molten glass;</td>
<td></td>
</tr>
<tr>
<td>Molten metals;</td>
<td></td>
</tr>
<tr>
<td>Presence of infrared radiation.</td>
<td></td>
</tr>
</tbody>
</table>

**Diagnosis, special tests**

1) Occupational history.

2) Eye examination at regular intervals.

---

The Eye(schematic diagram)

- Crystalline lens
- Pupil of the iris
- Cornea
- Optic nerve
Diseases caused by manganese and its toxic compounds

(Examples: Manganate salts; MMT or methyl cyclopentadynil managanese-tricarbonyl; Permanganate salts; Potassium permanganate; Pyrolusite or manganese dioxide; etc.)

<table>
<thead>
<tr>
<th>Industrial occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>In industries associated with</td>
</tr>
<tr>
<td>'Anti-knock' agent in petrol;</td>
</tr>
<tr>
<td>Ceramics;</td>
</tr>
<tr>
<td>Driers of linseed oil;</td>
</tr>
<tr>
<td>Dyeing and bleaching of textiles;</td>
</tr>
<tr>
<td>Electrode coating of welding rods;</td>
</tr>
<tr>
<td>Glass;</td>
</tr>
<tr>
<td>Inks;</td>
</tr>
<tr>
<td>Mining of manganese;</td>
</tr>
<tr>
<td>Paints and pesticides;</td>
</tr>
<tr>
<td>Tanning of leather.</td>
</tr>
<tr>
<td>(production of)</td>
</tr>
<tr>
<td>Aluminium alloys;</td>
</tr>
<tr>
<td>Copper alloys;</td>
</tr>
<tr>
<td>Dry cell batteries;</td>
</tr>
<tr>
<td>Fertilisers;</td>
</tr>
<tr>
<td>Manganese compounds;</td>
</tr>
<tr>
<td>Potassium permanganate;</td>
</tr>
<tr>
<td>Steel and alloy steels.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Signs and symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chills, fever, dryness in mouth, headache, influenza-like illness, weakness.</td>
</tr>
<tr>
<td>Poisoning of nervous system.</td>
</tr>
<tr>
<td>Initial symptoms are difficult to diagnose but it is important to take note of initial symptoms, because removal of the worker from exposure to manganese or its compounds at this stage may stop further bad effects.</td>
</tr>
<tr>
<td>Initial symptoms – weakness, indifference, insensitivity, lack of emotion, headache, dizziness, light-headedness, giddiness, bouts of excitability, unsteady gait, difficulty in co-ordinated movements, perhaps periods of sexual excitation followed by defects in structure of body followed by increasing Indifference.</td>
</tr>
<tr>
<td>Objective symptoms – voice becomes monotonous and sinks to whisper, speech becomes irregular; inability to run, fixed hilarious or dazed appearance of face; difficulty in walking backwards.</td>
</tr>
<tr>
<td>Further – disorders affecting gait become more pronounced, cannot walk backwards. Tremors (involuntary movements) in lower parts of the body.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Diagnosis, special tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Personal occupational history; for diagnosis, information should be collected from relatives, friends, colleagues.</td>
</tr>
<tr>
<td>2) Manganese content in hair is normally below 4 micro-gm/kg.</td>
</tr>
<tr>
<td>3) Manganese in urine of non-exposed persons is from 1 to 8 micro-gm/l but may be up to 21 micro-gm/l.</td>
</tr>
<tr>
<td>Manganese in faeces 60 micro-gm/kg or above suggests occupational exposure.</td>
</tr>
</tbody>
</table>
Skin diseases caused by physical, chemical or biological agents not included in other items

a) Skin diseases caused by physical factors

<table>
<thead>
<tr>
<th>Industrial occurrence</th>
<th>Signs and symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>In industries associated with</td>
<td>Contact with electrical short circuits or defective electrical apparatus causes burns and destruction of deeper tissues.</td>
</tr>
<tr>
<td>Cold;</td>
<td>Prolonged exposure to cold water or low temperature causes diffused redness over skin, blistering, ulceration or gangrene.</td>
</tr>
<tr>
<td>Contact with liquid tar; Dyes (those activated due to certain wavelengths of light);</td>
<td>High temperature and humidity at work in tropical environment can impair sweat mechanism and can cause sweat retention syndrome. Milder exposure to heat causes prickly heat, superficial dermatitis, softening of skin.</td>
</tr>
<tr>
<td>Electric furnaces;</td>
<td>Thermal burns are experienced by electric furnace operators, lead burners, welders, pipeline workers, road-repairmen, roofers, tar plant workers.</td>
</tr>
<tr>
<td>Electricity;</td>
<td>Artificial ultraviolet rays and artificial light present in welding, metal burning, glass blowing, electric furnace, tending, plasma torch burning, laser beam operation cause damage to skin.</td>
</tr>
<tr>
<td>Heat;</td>
<td>Certain dyes get activated due to light and can cause damage to the skin.</td>
</tr>
<tr>
<td>High energy sources such as X-rays;</td>
<td>Laser beams are injurious to human tissues.</td>
</tr>
<tr>
<td>Humidity;</td>
<td></td>
</tr>
<tr>
<td>Metal burning;</td>
<td></td>
</tr>
<tr>
<td>Mollen metal pouring;</td>
<td></td>
</tr>
<tr>
<td>Pipeline work;</td>
<td></td>
</tr>
<tr>
<td>Plasma torch burning;</td>
<td></td>
</tr>
<tr>
<td>Sunlight;</td>
<td></td>
</tr>
<tr>
<td>Ultraviolet rays (artificial);</td>
<td></td>
</tr>
<tr>
<td>Welding.</td>
<td></td>
</tr>
</tbody>
</table>

Diagnosis, special tests

Occupational history.
b) Skin diseases caused by chemicals

Chemicals causing skin diseases are classed as primary irritants and sensitizers. 'Primary irritant' is a chemical that injures skin with sufficient exposure. Some — such as concentrated acids and alkalis, metallic salts, some solvents and some gases — cause injury very rapidly; others may require several days of repeated contact to produce observable effect. 'Sensitizer' is a chemical that causes skin of a susceptible individual to react. Persons who are allergic to a particular sensitizer are affected by it. Even a very small amount of chemical, otherwise rated as harmless in that quantity for the general population, may sensitize susceptible individuals. Below is a list of the most common irritants and sensitizers and some related information.

<table>
<thead>
<tr>
<th>Primary irritants</th>
<th>Sensitizers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abrasives, acids, alkalis, cement, chlorinated diphenyls, detergents, disinfectants, dyes, gum, hardeners, inks, lime, nitro-paints, organic solvents, peroxides, pesticides, soaps, synthetic coolants, turpentine, weed-killers, etc.</td>
<td>Azo dyes, chromium, epoxy resins, formaldehyde, fungicides, mercury and cobalt salts, nickel, turpentine, etc.</td>
</tr>
</tbody>
</table>

Industrial occurrence

*In industries associated with*
- Bakeries;
- Chemicals production;
- Cleaners;
- Construction;
- Electroplating;
- Engineering;
- Leather;
- Metal;
- Paint;
- Pharmaceuticals;
- Plastics;
- Printing;
- Rubber;
- Textiles;

Signs and symptoms

Eczematous lesions.

Diagnosis, special tests

1) Occupational history.
2) Referring to detailed list of irritants, sensitisers.
3) Observing if many workers in identical situation develop cutaneous changes, patch tests.

... contd.
c) Skin diseases caused by biological agents

* Diseases of the skin caused by biological agents are covered in sheet A-1 describing infectious and parasitic diseases contracted in an occupation where there is a particular risk of contamination.
Hearing impairment caused by noise

Industrial occurrence

In industries associated with high noise levels
(in textiles, engineering, boilers, explosives, compressors, etc).

Signs and symptoms

Four phases of development of the chronic effect.

1) Ringing in the ears at the end of the workshift, slight headache, tiredness, dizziness.
2) Intermittent ringing in the ears.
3) Normal hearing is affected—if background noise is present, incapability of picking up components of a conversation, cannot hear ticking clock etc.
4) Feeling of hearing insufficiency is manifest. Reduction in hearing capacity is not only quantitative but also qualitative, that is, sounds are perceived in an abnormal manner.

Diagnosis, special tests

1) Monitoring noise at the work place.
2) Audiometric examination.

Tympanic membrane (eardrum)

The Ear (schematic diagram)
Diseases caused by dinitrophenol, or a homologue, or substituted dinitrophenols or their salts

(Examples: 2,3-dinitro phenol; 2,4-dinitro phenol; DNP; etc.)

**Industrial occurrence**

*In industries associated with*
- Chemical production;
- Dyes;
- Explosives;
- Wood preservatives.

**Signs and symptoms**

These substances are irritant to the skin and may cause dermatitis. If 2,4-dinitrophenol enters the body through mouth it may result in cataracts. Inhalation of dinitrophenols affects general functioning of the body may damage liver, kidneys and induce fever. Exposure may be fatal.

Dinitrophenols can be absorbed through skin. Skin becomes brilliant yellowish at the site of absorption.

More dangerous in hot work places. Heat increases absorption and because of this the lassitude and fatigue proneness are increased.

Simultaneous alcohol consumption also aids absorption.

**Diagnosis, special tests**

1) Occupational history.
2) Skin pigmentation may be present.
3) Presence of dinitrophenol or aminonitrophenol in urine (Derrien’s Test).

Protect your health, it is not for sale; but ...
Diseases caused by beryllium and its toxic compounds

(Examples: Beryllium chloride; Beryllium fluoride; Beryllium nitrate; Beryllium nitride; Beryllium oxide; Beryllium sulphate hydrate; etc.)

Industrial occurrence
In industries associated with
Alloys (as hardening agent);
Beryllium extraction;
Manufacture of fluorescent powders, lamps, and tubes;
Nuclear reactors (as moderators);
Steel making (as deoxidizer);
Use of beryllium ceramics.

Signs and symptoms
Acute effects – swollen mucous membranes, bleeding at various points, crack-like sores and ulcers. Severe pneumonia, oedema of lungs, may result in death.

Chronic effects – due to inhalation the symptoms begin with weakness, easy fatigue and weight loss without cough. Dry cough and shortness of breath is felt after an illness. Pain in joints. Damage to lungs and kidneys may take place. A delayed form of lung disease characterised by diffuse finely granular masses in lung tissues has been reported in workers engaged in manufacture of fluorescent powders, lamps and sign tubes, casting of beryllium alloys and in production of beryllium. Symptoms of this disease may start during exposure to beryllium or may be delayed up to 5 years after the exposure stops. Dermatitis may be severe and sensitization once established is permanent.

Skin injuries – exposed parts of the body affected by allergic dermatitis. If beryllium enters an abrasion (where skin is scraped), granulomatous, painless, non-tender swellings (upto 2.5 cm diameter) may develop.

Conjunctivitis, with oedema of periorbital tissue (covering the socket of eye) may result, with or without dermatitis.

Diagnosis, special tests
1) History of exposure.
2) Consistent clinical findings.
3) Tissue assays of beryllium. Concentration in lung tissue as high as 0.05 micro-gm per 100 gm is a strong indicator.
4) Differentiation from sarcoidosis is difficult; in beryllium disease lymph node and ocular involvement, hypercalcemia are absent. Radiographically 3 stages are described:
   a) A diffuse uniform granular shadowing extending throughout both lung field.
   b) A diffuse reticular pattern on the granular background.
   c) The appearance of distinct nodules scattered throughout the lungs with some enlargement and blurring of the hilar shadows. Intensity of the shadow is usually greater in the middle third of the lung field.

... DO claim compensation if your health is damaged !!
Diseases caused
by cadmium and its toxic compounds

(Examples: Cadmium chloride; Cadmium oxide; Cadmium stearate; Greenockite or cadmium sulphide; etc.)

<table>
<thead>
<tr>
<th>Industrial occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>In industries associated with</td>
</tr>
<tr>
<td>- Alloys for motor cars, aircraft, and marine engines;</td>
</tr>
<tr>
<td>- Cadmium-nickel batteries manufacture;</td>
</tr>
<tr>
<td>- Easily fusible alloys;</td>
</tr>
<tr>
<td>- Electroplating;</td>
</tr>
<tr>
<td>- Nickel plating;</td>
</tr>
<tr>
<td>- Process engraving;</td>
</tr>
<tr>
<td>- Solder for aluminium;</td>
</tr>
<tr>
<td>- Yellow, red, orange paints used in manufacture of ceramics, glass, leather, plastics, printing inks, rubbers, vitreous enamel, etc.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Signs and symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breathing in air with cadmium fumes of concentration 40 to 50 mg/cu.m. for one hour or 9mg/cu.m. for five hours may cause death. Concentration of 0.5 to 2.5 mg/cu.m may lead to pneumonitis (inflammation of lungs).</td>
</tr>
<tr>
<td>Initial symptoms — a period of four to ten hours without visible symptoms; afterwards chest tightness, irritation in nose and pharynx, cough, difficulty in breathing, possible headache, chills, muscle aches, nausea, vomiting and diarrhoea. Later, oedema of lungs possible.</td>
</tr>
<tr>
<td>Repeated exposure to lower levels of cadmium in air may result in irreversible injury to lung and kidney-tubules. Proteins with low molecular weight are passed through urine.</td>
</tr>
<tr>
<td>Possibility of dermatitis.</td>
</tr>
<tr>
<td>Anaemia, yellow discoloration of teeth, ulceration of wall dividing two nasal cavities, damage to the nerves for smelling.</td>
</tr>
<tr>
<td>Cadmium fumes can cause metal fume fever. Cancer of respiratory tract and prostate is reported to be associated with occupational exposure to cadmium.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Diagnosis, special tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Occupational history.</td>
</tr>
<tr>
<td>2) Cadmium level in blood above 5 micro-gm/l indicates exposure.</td>
</tr>
</tbody>
</table>

An unsafe workplace is an unhealthy workplace, ...
Occupational asthma

Industrial occurrence

In industries associated with
- Animals and their handling -- nails, hair, teeth, feathers;
- Animal debris;
- Cotton;
- Docks;
- Laboratories;
- Metals;
- Pharmaceuticals;
- Plastics;
- Wood;
- Substances in the list of known agents of occupational asthma.

Signs and symptoms

No different from the usual well-known symptoms associated with asthma.

Diagnosis, special tests

1) Two considerations are important:
   a) occupational exposures;
   b) individual factor.
2) History.
3) Clinical examination.
4) Lung function test.
5) Skin test.
6) Provocation test is key factor.
7) Test based on stoppage and restarting work.

... an unhealthy workplace is an unsafe workplace !!
Known agents of occupational asthma:

Abietic acid, acacia, acacia gum, acaridae, acrylic fibres, acrylic-precursors, actinomycetes, alicyclic amines, aliphatic aldehydes, aliphatic amines, alkaline persulphates, alkyl phosphates, ammonium chloroplatinate, ampicillin, anthraquinone dyestuffs, antibiotics, arabic gums, aromatic amines, arthropods, azo dyes;
Bacillus subtilis, barley, benzalkonium chloride, benzyl penicillin, betalactamines, bromelin;
Candida tropicalis (proteins), carbamates, castor oil, cats, chlorine, chlorella, chromium, cobalt, cockroaches, coffee green, colophony, cotton, cows;
D D V P, detergents enzymatic, diazinon, diazomethane, diethanolamine, diethylene diamine, diethylene triamine, dogs;
Enzymatic detergents, epoxy resins and hardeners, ethyl hexamine, exotic woods;
Flax, flour or meal, formaldehyde;
Grain dusts, gramminaceous pollens, green coffee, groundnuts, guinea pigs;
Hair, horns, feathers, etc., hamsters, henna, hexamethylenetetramine;
Industrial perfumes, insecticides, ipecacuanha;
Jute;
Karaya gum;
Laboratory animals, lead, liquorice, locusts;
Maleic anhydride, metampicillin, methylene bisphenyl isocyanate, methyl isocyanate, mercury (organic compounds), mice, mites, moulds;
Nickel, nitric oxide;
Oats, oil cake, oleandomycin, organic isocyanates, organo-phosphorus compounds;
p-dichlorobenzene, p-formaldehyde, p-phenyldiamine, panonychus ulmi, papain, penicillins, persulphates, pesticides, phenyl-formaldehyde resins, phenylglycine, phenylhydrazine, phenylmercuricnitropropionate, phosphoramines, phthalic acid, phtholic anhydride, piperazine, platinum salts, polyamides, polyesters, polyvinyl chloride, proteolytic enzymes, pyrethrum;
Quinine;
Rabbits, rats, red spiders, rice dusts, rye;
Sericin, silk, soya, spiramycin;
Textiles natural, textiles synthetic, thrombin, triethylene diamine, triethylene tetramine, trimellitic anhydrides, tungsten carbide;
Urea-formaldehyde resins;
Vanadium, vanillin, vegetables, viscose;
Wasp bite, water fleas, welding fumes, wood, wood pulp dust, wool.
Diseases caused by fluorine and its toxic compounds

(Examples: Aluminium fluoride; Cryolite or sodium-aluminium fluoride; Fluorite or fluorspar, calcium fluoride; Freon-11, Freon-12 and other fluorocarbons; Salts of hydrofluoric acid; Sodium fluoro aluminate; etc.)

Industrial occurrence

In industries associated with

Aircraft piston engines;

Conversion of uranium tetrafluoride to uranium hexafluoride;

Electrolytic refining and pickling of metals;

Electroplating;

Etching of glassware;

(manufacture of:)

Artificial cryolite, and certain other refrigerants;

High-octane petrol synthesis by alkylation(as hydrofluoric acid);

Insecticides;

Metallic aluminium (for aluminium fluoride intermediate).

Signs and symptoms

Absorption of even small fractions of a gram of fluorine can give rise to nausea, vomiting, abdominal pain, salivation, itching and diarrhoea.

Inhalation of high concentration causes involuntary contraction of larynx and bronchioles followed by delayed oedema of lungs, even respiratory paralysis and death.

Chronic inhalation of low concentrations may cause stomach pain and problems in digestion.

Diagnosis, special tests

1) Mucous membrane irritation may be similar to viral upper respiratory tract infection but latter may be characterised by fever, myalgia, and lymphocytosis.

2) Abnormal radiographs of bones particularly tibia and fibula bearing small bony spicules are characteristic of exposure.

3) Excretion of fluorides in mother’s milk and urine of exposed persons is characteristically high.

Get your doctor to record your nature of work and work environment !!
b) Diseases caused by fluoro-acetic acid and its compounds, sodium fluoro-acetate, etc.

<table>
<thead>
<tr>
<th>Industrial occurrence</th>
<th>Signs and symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>In industries associated with</em></td>
<td>Nausea, vomiting, excessive salivation, pain in stomach, twitching in muscles, apprehension, low blood pressure. After around 6 hours: convulsions, coma, depression. Death may result due to asphyxiation during coma, ventricular fibrillation and cardiac arrest is possible. Major toxic effects are on central nervous system and cardiovascular system.</td>
</tr>
<tr>
<td>Chemical weapons;</td>
<td></td>
</tr>
<tr>
<td>Insecticides;</td>
<td></td>
</tr>
<tr>
<td>Pesticides;</td>
<td></td>
</tr>
<tr>
<td>Rat poison.</td>
<td></td>
</tr>
</tbody>
</table>

**Diagnosis, special tests**

1) Occupational history.
2) Chemical analysis — organically bound fluorine in body is most reliable proof of poisoning.
3) Increase of citrate in kidneys.

---

**c) Diseases caused by hydrofluoric acid**

<table>
<thead>
<tr>
<th>Industrial occurrence</th>
<th>Signs and symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>In industries associated with</em></td>
<td>Severe eye, throat, nose irritation. Liquid and vapour cause severe burns. Burns from low concentrations are not immediately visible. Inhalation of vapour may cause oedema of lungs after 12 to 24 hours. Nosebleeds, sinus troubles are possible due to exposure to low concentrations of vapour.</td>
</tr>
<tr>
<td>Etching glass;</td>
<td></td>
</tr>
<tr>
<td>Fluorides;</td>
<td></td>
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<tr>
<td>Fluorocarbons;</td>
<td></td>
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<tr>
<td>Pottery;</td>
<td></td>
</tr>
<tr>
<td>Refining of metals.</td>
<td></td>
</tr>
</tbody>
</table>

**Diagnosis, special tests**

1) Occupational history.
2) Differential white blood cell count, electrocardiogram, sputum gram stain and culture.

---

ACT to make your workplace safe and healthy !!
Diseases caused by nitroglycerine or other nitroacid esters

(Examples: Nitroglycerine; nitrocellulose; nitrocellulose acetate; etc.)

**Industrial occurrence**

*In industries associated with*

- Cardiovascular drugs;
- Explosives.

**Signs and symptoms**

Headache, dullness, reduced blood pressure; may be followed by nausea, vomiting, fatigue, weight loss, cyanosis and disorders of the central nervous system, possibly acute mania. In cases of severe poisoning -- hallucinations. Alcoholic beverages increase effects of poisoning. Also digestive troubles, tremors, and sharp pain along nerves may be present.

In some cases, after interruption of exposure, heart problems and sudden death due to cardiac arrest has been reported.

It is skin sensitiser. Eruptions on palms or in between fingers, ulcers under nails have been observed.

**Diagnosis, special tests**

1) Occupational history.

2) Electrocardiogram if chest pain is reported.

To begin with, claim compensation!!
Diseases caused by alcohols and ketones

(Examples: 2-ethyl hexanol; Allyl alcohol; Amyl alcohol or 1-pentanone, primary amyl alcohol; Cyclohexanol; Ethyl alcohol or ethanol; Furfuryl alcohol or 2-furancarbinol, furfural alcohol; Isoamyl alcohol; Isobutyl alcohol or 2-butanol; Isopentyl alcohol; Isopropyl alcohol or 2-propanol; Methyl alcohol or methanol; n-butyl alcohol or 1-butanol; n-propyl alcohol or 1-propanol; etc.)

Alcohols are a class of organic compounds. Two important alcohols are ethyl alcohol and methyl alcohol and detailed information about them is given below. Ketones are another class of organic compounds. Acetone is one of the important ketones, and information about it is given separately below followed by general information for other ketones. For details about other alcohols and particular ketones please refer to relevant literature.

Industrial occurrence

In industries associated with
(production of)
Acetaldehyde;
Butadiene (used in plastic and synthetic rubber);
Chloroethane.
(aera solvent)
Cosmetics;
Drugs;
Lacquers;
Perfumes;
Plasticisers;
Plastics;
Polishes;
Rubber accelerators.

Signs and symptoms

Irritation of the eyes and mucous membranes, headache, drowsiness, fatigue. It depresses the central nervous system and the symptoms are lack of concentration, prolonged drowsiness, sleepiness. It dissolves fat in the skin, causes dermatitis.

Splash in the eyes causes immediate burning.

Should not be taken by mouth.

Workers with damaged liver are affected most.

Diagnosis, special tests

1) Occupational history.

2) Signs of central nervous system depression, and irritation of the eye and upper respiratory tract.

... contd.
b) Diseases caused by methyl alcohol (methanol)

Industrial occurrence

In industries associated with
(production of)
Antifreeze mixtures;
Cement;
Coated fabrics;
Dewaxing preparations;
Dyes;
Embalmimg fluids;
Ethylene glycol;
Formaldehyde;
Inks;
Methacrylates;
Methyl amines;
Methyl halides;
Paints;
Photographic films;
Plastics;
Textile soaps;
Unshatterable glass;
Waterproofing formulations.
(as solvent)

(production of)

Adhesives;
Dyes;

Signs and symptoms

It can enter the body through inhalation, be taken by mouth, and be absorbed through the skin. Death may occur even due to absorption through the skin. If swallowed, it can cause blindness.

Acute effects of inhalation — irritation of mucous membranes, headache, ringing in ears, fainting, vomiting, colic, insomnia, dilated pupils, the constant movement of eyeball (nystagmus) and skin injuries on hands, wrists, and forearms.

Chronic combined exposure to methyl alcohol and carbon monoxide has been reported as a causative factor of thickening of walls of arteries pertaining to the brain.

Diagnosis, special tests

1) Occupational history.

2) Disturbance in vision.

3) Presence of formic acid in urine. Also suggested is measurement of methyl alcohol in urine at the end of work shift. Methanol should be below 10 micro-gm/ml.
C) Diseases caused by acetone

Signs and symptoms
Irritation of skin and mucous membranes. Exposure to high concentration leads to stupor, difficulty in breathing and unconsciousness and collapse.
Possible kidney and liver damage.
Repeated exposure may lead to headache. General weakness accompanied by blood changes like increase of leucocyte and eosinophil count.
Prolonged contact with skin causes dryness and diffuse redness.

Diagnosis, special tests
1) Occupational history.
2) Albumin, and red and white blood cells in urine indicate damage to kidneys.
3) High levels of urobilin and bilirubin indicate damage to liver.
d) Diseases caused by other ketones

- Rubber;
- Silk (artificial);
- Varnish.

**Industrial occurrence**

*In industries associated with*

- (production of)
  - Artificial silk;
  - Cosmetics;
  - Explosives;
  - Perfumes;
  - Pharmaceuticals;
  - Plastics.
  - (as solvents)
  - Dyes;
  - Fats;
  - Gums;
  - Resins;

**Signs and symptoms**

Ketones are narcotic when inhaled in high concentrations. At lower concentrations they are irritating to eyes, skin and respiratory system. Excessive exposure to ketones gives rise to decrease in the level of functioning of the central nervous system. The nerves responsible for sensation and action are affected.

**Diagnosis, special tests**

1) Periodic medical examination with attention to nerve conduction velocity, the central nervous system and functioning of the respiratory system, eyes, kidneys and liver.

**ORGANISE to protect your occupational health!!**
Diseases cause by asphyxiants

Asphyxia and suffocation are used as synonymous terms meaning severe impairment or suspension of respiratory function.

There are two groups of asphyxiants — simple and chemical. Simple asphyxiants in general are not poisonous but they affect respiration by displacing oxygen. Carbon dioxide is not poisonous but it can cause suffocation if it is present in high concentration and as a result reduces available oxygen.

Chemical asphyxiants do not exclude oxygen, they are harmful even if lungs are getting sufficient oxygen. Carbon monoxide affects the haemoglobin and reduces the capacity of blood to carry oxygen to the cells.

We will list some asphyxiants and attempt to give detailed information about some of them. Even if a substance is not listed here, it may still be an asphyxiant. Refer to relevant literature to find out if you are working with an asphyxiant.

Simple asphyxiants
- Acetylene,
- Argon,
- Butane,
- Carbon dioxide,
- Dichloro-tetrafluoro-ethane,
- Ethane,
- Helium,
- Hydrogen,
- LPG,
- Methane,
- Neon,
- Nitrogen,
- Propane.

Chemical asphyxiants
- Acetonitrile,
- Acrylonitrile,
- Carbon disulphide,
- Carbon monoxide,
- Chloroform,
- Cyanides of alkalis,
- Ether,
- Narcotic and anaesthetic compounds.

Lung irritants
- Ammonia,
- Bromomethane,
- Chlorine,
- Hydrogen cyanide,
- Hydrogen sulphide,
- Nitrogen dioxide,
- Nitrous oxide,
- Phosgene.

If laws are inadequate, the laws need to be changed!!
a) Diseases caused by carbon monoxide

<table>
<thead>
<tr>
<th>Industrial occurrence</th>
<th>Signs and symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>In industries associated with</td>
<td>Headache, abnormal rapidity of respiration, nausea, weakness, dizziness, mental confusion, hallucinations, slightly bluish, grayish, slate-like or dark purple discoloration of the skin due to reduction in haemoglobin in blood, temporary loss of consciousness due to lack of blood supply to brain.</td>
</tr>
<tr>
<td>Blast furnaces;</td>
<td>Acute exposure may lead to death.</td>
</tr>
<tr>
<td>Boilers;</td>
<td>Even after signs of improvement mental damage may remain.</td>
</tr>
<tr>
<td>Garages;</td>
<td>Exposure to 50 ppm for 90 minutes may cause aggravation of angina pectoris.</td>
</tr>
<tr>
<td>Industrial gases;</td>
<td>Chronic combined exposure to methyl alcohol and carbon monoxide has been reported as a causative factor of thickening of walls of arteries pertaining to the brain.</td>
</tr>
<tr>
<td>Metallurgy (as reducing agent);</td>
<td>Diagnosis, special tests</td>
</tr>
<tr>
<td>Mines;</td>
<td>1) History of exposure.</td>
</tr>
<tr>
<td>Organic syntheses;</td>
<td>2) Blood cherry pink in colour.</td>
</tr>
<tr>
<td>Production of metal carbonyls;</td>
<td>3) Level of carboxyhaemoglobin above 40% — collapse, above 25% — headache, nausea.</td>
</tr>
<tr>
<td>Tunnel construction and maintenance.</td>
<td>4) Depression of the S-T segment in electrocardiographic tracings.</td>
</tr>
</tbody>
</table>

To change the laws, we need to know the laws well!!
b) Diseases caused by phosgene (toxic derivative of carbon monoxide)

Industrial occurrence

In Industries associated with
Insecticides production;
Metallurgy;
Pharmaceuticals.
(Industrial syntheses such as manufacture of)
Acid chlorides;
Carbonic acid esters;
Coal tar;
Dyestuffs;
Isocyanates and their derivatives;
Urea.

Signs and symptoms

Eye irritation, dryness or burning sensation of the throat, vomiting, pain in chest, cyanosis.
Severe skin or eye burns due to splashes of liquefied phosgene.
The symptoms of severe respiratory distress may be delayed by up to 72 hours.
Delayed onset of pulmonary oedema with cough and foamy sputum, severe cyanosis, may lead to pneumonia.
Death also possible due to cardiac failure.

Diagnosis, special tests

1) Occupational history.
2) Electrocardiogram, sputum gram stain and culture should be included.

Inform your union activist of the health problems caused by your work!!
c) Diseases caused by dimethylcarbamyl chloride (DMCC)

**Industrial occurrence**

*In industries associated with*

- Pesticide production (carbamates) -- used as intermediate;
- Pharmaceuticals.

**Signs and symptoms**

Irritation of eyes, liver disorders reported in workers. The US Environmental Protection Agency has listed DMCC as representing a cancer hazard, and the American Conference of Governmental Industrial Hygienists has listed it as a suspected carcinogen.

**Diagnosis, special tests**

Regular medical monitoring.

d) Diseases caused by Hydrogen sulphide

**Industrial occurrence**

*In industries associated with*

- Agriculture (as disinfectant);
- Organic sulphur compounds such as thiophene;
- Present around sewers, oil wells and where petroleum products are processed, stored or used;
- Production of inorganic sulphides;
- Sulphuric acid.

* By-product in many processes;
* Also results from natural decay of organic matter.

**Signs and symptoms**

Prolonged exposure to 500 ppm causes inflammation of nose, pharynx, bronchi and lungs.

Possibility of conjunctivitis with pain, watering of eyes, and photophobia (uneasiness caused by light). This can progress to blisters on cornea (white membrane in front of eyes).

Oedema of lungs is possible.

Working in 10 ppm for many days may cause headache, conjunctivitis, digestive disorders, weight loss, weakness and problems in breathing.

There are reports about nervous system disorders such as paralysis, meningitis, and psychological disorders.

**Diagnosis, special tests**

1) Occupational history.
2) Persons with eye and nerve disorders are more affected.
3) Periodic medical examination preferably at intervals of six months.
e) Diseases caused by acetonitrile

<table>
<thead>
<tr>
<th>Industrial occurrence</th>
<th>Signs and symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>In industries associated with</td>
<td>Suffocation, death is possible. Nausea, vomiting, chest pain, stupor, convulsions. May cause eye, skin irritation.</td>
</tr>
<tr>
<td>Extraction of vegetable and animal oils;</td>
<td></td>
</tr>
<tr>
<td>Solvents.</td>
<td></td>
</tr>
</tbody>
</table>

**Diagnosis, special tests**

1) Occupational history.
2) Measurement of blood pH, plasma bicarbonate and blood lactic acid.

---

f) Diseases caused by acrylonitrile

<table>
<thead>
<tr>
<th>Industrial occurrence</th>
<th>Signs and symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>In industries associated with</td>
<td>Death may occur if inhaled or even if absorbed through the skin. Eye irritation, sneezing, headache, vomiting, weakness, light-headedness. Splash on skin may result in affected skin resembling second degree burn. Large blister-like elevations after several hours. Repeated contact with skin causes dermatitis.</td>
</tr>
<tr>
<td>Acrylic fibres;</td>
<td></td>
</tr>
<tr>
<td>Organic synthesis;</td>
<td></td>
</tr>
<tr>
<td>Pesticide fumigant.</td>
<td></td>
</tr>
</tbody>
</table>

**Diagnosis, special tests**

1) Occupational history.
2) Measurement of blood pH, plasma bicarbonate and blood lactic acid.

---

Ask for information about the hazardous substances and factors at your workplace!!
Lung cancer and mesotheliomas caused by asbestos

** This head applies when effects of exposure lead to lung cancer and mesotheliomas.

* For description of general effect of exposure to asbestos and resulting disease, please refer to 'Asbestosis' in "Pneumoconioses' in Part C.

You have a right to your medical reports; get them, and preserve them carefully!!
Primary neoplasm of the epithelial lining of the urinary bladder or the kidney or the ureter

Neoplasm means new growth. This new growth in bladder, ureter or kidney, may or may not be cancerous; in both the cases, surgery may be necessary. Bladder tumor and bladder cancer are more common.

Industrial occurrence

In industries associated with

- Auramine;
- Benzidine;
- Dyes;
- Hair dyes;
- Herbicides;
- Magenta dyes (like fuscin, rosinline);
- Naphthylamine;
- Printing inks;
- Rubber;
- Textile dyeing;
- Textile production.

Signs and symptoms

Major sign is haematuria (passing of blood in urine). Haematuria may last for a few hours or a few days before it stops. After a few weeks or months, bleeding starts again. Intervals between two periods of haematuria become shorter, haematuria becomes severer and of longer duration.

In case of cancerous tumors, haematuria eventually becomes continuous. Urinating is painful.

Pain in frontal part of thighs. Colic is felt from back to front. Dragging pain in loins is a sign of tumor in kidneys.

Diagnosis, special tests

1) Occupational history.
2) Urine analysis.
3) Scan of kidney, ureter and bladder.

DO NOT HESITATE to inform your doctor about the problems at your workplace affecting your health !!
The Urinary system (schematic diagram)
Digestive system (schematic diagram)
C-1: Pneumocnioses caused by sclerogenic mineral dusts.
C-2: Bagassosis.
C-3: Byssinosis.
C-4: Extrinsic allergic alveolitis caused by the inhalation of organic dusts.
C-5: Broncho-pulmonary diseases caused by hard metals.
Pneumoconioses caused by sclerogenic mineral dusts (*)

(*) Pneumoconioses are the diseases of the respiratory tract caused by inhalation of dusts; those caused by mineral dusts causing hardening of tissues are covered here. For details of diagnosis refer ILO classification of pneumoconioses.

a) Silicosis and silico-tuberculosis

(Silicosis is pneumoconiosis caused by chronic inhalation of silica dust, and silico-tuberculosis is the consequent TB of silicotic lungs.)

Industrial occurrence

In industries associated with

Certain foundry
operations like sandblasting, etc.;

Cutting of quartzite, agate, gneiss, granite and slate;

Knife scissors sharpening with grinding stone;

Manufacture, handling and transport of cement;

Miners and quarries;

Sculpture, from stone;

Stripping and refining of steel furnaces;

(manufacture of)

Glass;

Porcelain;

Pottery;

Slate pencil.

Signs and symptoms

Initial stages of silicosis, there are no specific symptoms. It is revealed only by periodic X-rays.

The first symptom of silicosis is difficult and often painful breathing on exertion. As a rule there are no other subjective symptoms.

Three chief complications of silicosis, the most frequent causes of death, are: difficulty in breathing, acute infection of the lungs, and subsequent tuberculosis of the lungs (silico-tuberculosis).

The clinical signs and symptoms tend to increase with continued exposure to silica. Lung infections and failure of the heart to maintain adequate circulation increase the symptoms. Silicosis makes people vulnerable to tuberculosis of lungs. The symptoms include cough, difficult and often painful breathing and repeated nonspecific chest illnesses.

Diagnosis, special tests

1) The radiological feature is due to occurrence of "egg-shell" type calcification of the lymph glands in 2-4% of silicosis cases.

2) A detailed record of occupational history is necessary. This may include the duration and degree of exposure to dust, and the probable proportion of quartz or other forms of free crystalline silica in the dust.

3) A good chest X-ray together with the case history must form the basis for the diagnosis.

4) Some cases of silicosis are wrongly diagnosed as TB, and admitted to TB hospitals/wards. This increases the possibility of the patient actually contracting TB.

... contd.
b) Anthraco-silicosis

(Anthraco-silicosis is pneumoconiosis caused by coal dust and silica)

<table>
<thead>
<tr>
<th>Industrial occurrence</th>
<th>Signs and symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>In industries associated with Coal; Coal mines.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Breathlessness on exertion, cough, black-tinged sputum, possibility of wet cough. May lead to the deterioration of health. In small percentage, its course may be progressive, leading to progressive massive fibrosis of lungs, black sputum and death.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Diagnosis, special tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Occupational history.</td>
</tr>
<tr>
<td>2) Opacities in chest X-rays — small and linear or rounded, more frequently located in upper zones of lungs.</td>
</tr>
</tbody>
</table>

c) Asbestosis

<table>
<thead>
<tr>
<th>Industrial occurrence</th>
<th>Signs and symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>In industries associated with Brake linings; Cement; Filler for plastics; Fire smothering blankets; Mining of asbestos; Safety garments; Thermal and electrical insulation.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Increased breathlessness on exertion, aching or transient sharp pains in the chest; persistent dull chest pains; a cracking sound heard while breathing deeply and persisting after coughing; haemoptysis. Exposure to asbestos dust causes chronic and acute pleurisy (inflammation of membrane that covers lungs and is reflected upon thorax and diaphragm). Acute pleurisy is associated with pain in chest, fever, an increase in number of white blood corpuscles in the blood and raised erythrocyte sedimentation rate for blood. Greater vulnerability to cancer of lungs and pleura. Other symptoms include: localised thickening of the plural membrane enfolding the lungs, which may become opaque to X-rays through deposition of calcium; restricting in lung function; cracking sounds while breathing; difficult and painful breathing; discoloration of the skin due to lack of haemoglobin; dry cough and finger clubbing.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Diagnosis, special tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Detailed occupational history of exposure to asbestos is prime element in diagnosis.</td>
</tr>
<tr>
<td>2) The chest radiograph is important.</td>
</tr>
<tr>
<td>3) The pattern of lung function provides the important third component in diagnosis. The total lung function volume is reduced and especially the forced vital capacity (FVC), is reduced.</td>
</tr>
</tbody>
</table>
Bagassosis

Bagasse means the fibre of sugar-cane stalks. Inhalation of dried bagasse dust may cause 'bagassosis', a disease of the respiratory system. This disease occurs only in case of handling dry bagasse. Workers handling fresh moist bagasse in sugarcane industry are not affected.

<table>
<thead>
<tr>
<th>Industrial occurrence</th>
<th>Signs and symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>In industries associated with</strong></td>
<td><strong>Shortness of breath, cough, sputum with cough, fever, chills, chest pain, weakness, decreased appetite, loss of weight, blood may come out with cough (expectoration).</strong></td>
</tr>
<tr>
<td>Building materials (insulating wall board, fillers for veneered doors)</td>
<td>If contact with bagasse dust continues, permanent disability of lungs may take place.</td>
</tr>
<tr>
<td>Cardboard;</td>
<td></td>
</tr>
<tr>
<td>Chemically treated pressboards;</td>
<td></td>
</tr>
<tr>
<td>Explosives;</td>
<td></td>
</tr>
<tr>
<td>Fertiliser;</td>
<td></td>
</tr>
<tr>
<td>fuel;</td>
<td></td>
</tr>
<tr>
<td>Paper;</td>
<td></td>
</tr>
<tr>
<td>Poultry feed;</td>
<td></td>
</tr>
<tr>
<td>Refractory bricks.</td>
<td></td>
</tr>
</tbody>
</table>

**Diagnosis, special tests**

1) Occupational history.

2) Separation of patient from contact with bagasse dust results in gradual recovery after few weeks. Symptoms reappear after contact with bagasse dust is re-established.

3) Severity and duration of symptoms increases after further contact.

**ORANISE to protect your occupational health!!**
Byssinosis

<table>
<thead>
<tr>
<th>Industrial occurrence</th>
<th>Signs and symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>In industries associated with</em></td>
<td>Early stages — occasional chest tightness or respiratory irritation on the first day of the week.</td>
</tr>
<tr>
<td>Bale pressing plants;</td>
<td>As the disease progresses — chest tightness and/or shortness of breath extends to the other days of the week.</td>
</tr>
<tr>
<td>Cotton;</td>
<td>Eventually, the worker may become severely affected on every working day with permanent and severe effort intolerance.</td>
</tr>
<tr>
<td>Flax;</td>
<td></td>
</tr>
<tr>
<td>Gins;</td>
<td></td>
</tr>
<tr>
<td>Linen;</td>
<td></td>
</tr>
<tr>
<td>Mixing and card rooms;</td>
<td>1) Characteristic history of chest tightness.</td>
</tr>
<tr>
<td>Rope making;</td>
<td>2) Marked fall in ventilatory capacity during work.</td>
</tr>
<tr>
<td>Soft hemp;</td>
<td>3) Measurement of FEV₁ or airway resistance at the beginning and end of the work shift on the first day of the week may help not only to confirm the diagnosis, but also to identify workers who are susceptible to the dust without visible symptoms.</td>
</tr>
<tr>
<td>Textiles;</td>
<td>4) Diagnosis is made primarily from a history of exposure to dust in the dusty sections of mills where workers handle cotton, flax and hemp fibres, for example, bale opening rooms and carding sections.</td>
</tr>
<tr>
<td>Twine making.</td>
<td></td>
</tr>
</tbody>
</table>

The right to know is an important right!!
Extrinsic allergic alveolitis caused by inhalation of organic dusts

This is a lung disease characterised by allergic reaction of lung tissues several hours after the inhalation of organic dusts. Particles of size 2 to 5 micro-meter penetrate deep into respiratory airways and lung tissues. These particles contain proteins and enzymes originating from various birds, mammals such as rats, fish, insects and bacteria, and also from plants.

<table>
<thead>
<tr>
<th>Industrial occurrence</th>
<th>Signs and symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>In industries associated with animal and vegetable matter processing.</td>
<td>Breathlessness, dry cough, sometimes general weakness, fever, aches and pains in muscles after 4 to 10 hours following heavy exposure. Cracking sounds heard in chest. These symptoms generally persist for 12 to 24 hours. After repeated exposure, breathlessness becomes continuous. This breathlessness is different than that in asthma. In asthma whistling or sighing sound is present.</td>
</tr>
</tbody>
</table>

Diagnosis, special tests

Following criteria 1 to 4 or 1, 3, 5, are to be fulfilled for diagnosis.

1) Proof of exposure by its source i.e. occupational history or by detection of an antigen.

2) Respiratory or general symptoms after 4 to 10 hours following exposure.

3) Proof of sensitisation by antibodies.

4) Other causes not detected for the following X-ray changes:
   a) Fine nodular or reticulo-nodular shadows in most cases, either widespread or in mid-zones of lungs.
   
   b) In later stages fibrosis of upper lobes.

5) Disturbances in lung function or positive inhalation provocation test.

Ask for information about the hazardous substances and factors at your work!!
Broncho-pulmonary diseases caused by hard metals (i.e., metal carbides)

<table>
<thead>
<tr>
<th>Industrial occurrence</th>
<th>Signs and symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>In industries associated with</strong></td>
<td><strong>Dry or wet bronchitis with possibility of spasm of bronchi. Cobalt dust is more toxic; it causes acute inflammation, also oedema of lungs, and it can induce diseases of heart muscles. Spasm of bronchi is reported more by workers in production of cobalt carbide. Difficulty in breathing, hunger for air is common symptom, with coughing and possibly emphysema.</strong></td>
</tr>
<tr>
<td>Metal carbides, cemented or sintered -- mixing, screening, grinding or these.</td>
<td><strong>Diagnosis, special tests</strong></td>
</tr>
<tr>
<td></td>
<td>1) Occupational history.</td>
</tr>
<tr>
<td></td>
<td>2) X-ray changes:</td>
</tr>
<tr>
<td></td>
<td>a) In initial stages — diffused finely striated increased lung markings.</td>
</tr>
<tr>
<td></td>
<td>b) In advance stages — soft, patchy, nodular opacities extending all over lung fields. Also thickening of hilar shadows.</td>
</tr>
</tbody>
</table>

The Larynx (schematic diagram)
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<thead>
<tr>
<th>U</th>
<th>Uranium B 7</th>
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<tr>
<td>U</td>
<td>Uranium hexafluoride B 19-a</td>
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<td>Urea B 22-b</td>
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<td>V</td>
<td>Water proofing B 21-b</td>
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<td>V</td>
<td>Waxes B 10, 21-b, 21-d</td>
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<tr>
<td>V</td>
<td>Welding B 13-a</td>
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<td>V</td>
<td>Welding rods coating B 12</td>
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<td>V</td>
<td>Wild life managers A 1-a</td>
</tr>
<tr>
<td>V</td>
<td>Wood A 1-a; B 6, 15, 18</td>
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<tr>
<td>V</td>
<td>Wool B 6</td>
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<td>X</td>
<td>X-ray clinic B 7</td>
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<td>X-ray tubes B 2</td>
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V: Vacuum pumps B 2
Varnish B 21-c
Vegetable matter C 4
Veterinarians A 1-a
Vitamin C B 21-c
Veneer C 2
ABOUT PRIA

The Society for Participatory Research in Asia (PRIA), New Delhi is a non-profit, voluntary organisation registered under the Indian Societies Act.

Participatory Research is a methodology based on the belief that knowledge is power and therefore contributes towards the empowerment of the oppressed and the poor. It promotes the involvement of the poor and the oppressed and their organisations and representatives in creation and utilisation of knowledge in their own collective interests. Thus it attempts to challenge the monopoly over knowledge and its tools in the hands of the few.

PRIA works with local groups and activists involved in the education and organisation building efforts and struggles of the marginalised and underprivileged sections of society.

We provide support through research, training, evaluation and networking with groups on common issues and preparation and dissemination of learning materials.

We are a team of fifteen persons working with several partner groups all over India. The text of these reference sheets has been prepared by Vijay Kanhere. Dr. N. K. Mehrotra has provided his valuable comments in finalising this text.

These reference sheets are prepared in support of our involvement on the issue occupational health and safety.

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