

Biological Monitoring for Isocyanates

Employees – What do your results mean?

What is the problem with isocyanates?

'Isocyanates' occur in many 2-pack (2K) paints and other products (including foams, glues, coatings and flooring). Breathing in isocyanates is the top cause of work-related asthma in Britain. If you get asthma from isocyanates, you won't be able to work with them again.

When you spray isocyanate-containing paints you rely on your air-fed mask to protect you. But how do you know it is working properly? The simplest way is to look for traces of isocyanates in your urine (biological monitoring).

You probably see an occupational health doctor or nurse once a year to check your breathing etc. We also recommend a urine test to check for isocyanates. This is paid for by your employer, normally once a year, and collected on a day when you have been working with isocyanates.

Why analyse urine?

If you breathe in isocyanates, your body breaks them down and eliminates them in your urine. The more isocyanates you breathe in, the more breakdown products there will be. If controls are working correctly – e.g. your breathing apparatus is working and you are using it properly, you will not breathe in any isocyanates, and we will not find any breakdown products in your urine.



Who needs monitoring?

Everyone who may breathe in or have skin contact with isocyanates. Normally in the motor vehicle repair industry, this means paint sprayers, but it may also apply to other workers, especially in other industries (for example, use of adhesives, foam spraying or floor screeding).

Is it compulsory?

You have a right to refuse giving a sample. But if you do, your employer may have to move you to another job. A urine test is the only reliable way to be confident that your exposure control measures are working and are being used properly. It helps your employer to check that they are adequately fulfilling their responsibility to protect your health at work. Besides, it is in your interest to make sure that you breathe in as little isocyanate as possible.

Will anything else be measured? No. The laboratory will only analyse your sample for isocyanate breakdown products and a substance called creatinine. Creatinine is in everyone's urine, and it is measured to check the sample is urine (and not water) and to adjust the result for a weak or

strong sample (depends on how much water, tea etc. you have been drinking). The laboratory will not analyse your sample for drugs, alcohol, pregnancy, HIV or anything else.

Informed consent

It is important that you understand what sampling is being done and why, so you can give your informed consent. Your manager, or the person doing your health check, will explain to you that.

- They are checking that the isocyanate exposure controls in your workplace are adequate.
- They will ask you for a urine sample at the end of a session spraying isocyanate products. This will normally be done once a year unless there is a problem.
- The laboratory will only check for specific isocyanate breakdown products in your sample; it will never look for drugs, alcohol etc without your permission.
- They will ask you if they can see your results because if there is a problem you will need to work together to resolve it.

How to collect samples

- The laboratory will provide a 30ml plastic bottle containing a small amount of white powder as a preservative. This is citric acid and is non-hazardous.
- You should direct a sample of urine into the bottle at the end of a work session and close the bottle securely to prevent leaks.
- If the bottle provided has not already been labelled, add a unique identifier such as your initials.
- Return the bottle to your supervisor or whoever is managing the sampling process. Further instructions can be found [here](#).

How often do I give a sample?

It depends. Your employers may wish to take several samples, until they are confident about the controls.

- It is important to collect a sample on a day when you have been using products containing isocyanates, so that it accurately reflects your workplace exposure. The urine test will only tell us about your recent exposure (mostly that day).
- With results that fall at or below the guidance value, it is recommended that you give a sample once a year unless something changes.
- Where results are above the guidance value, your employer should investigate, make changes, and ask you to give another sample to check that any improvements have worked.

The laboratory will report your results something like this:

| Worker reference | TDI μmol/mol creatinine | HDI μmol/mol creatinine | IPDI μmol/mol creatinine | MDI μmol/mol creatinine |
|------------------|----------------------------|----------------------------|-----------------------------|----------------------------|
| Your reference | ND | 0.5 | ND | ND |
| Guidance value | 1 | 1 | 1 | 1 |

The columns show the breakdown products of different types of isocyanates.

- Toluenediisocyanate (TDI) breaks down to toluenediamine (TDA)
- Hexamethylenediisocyanate (HDI) breaks down to 1,6 hexamethyldiamine (HDA)
- Isophoronediiisocyanate (IPDI) breaks down to isophoronediamine (IPDA)
- Methylenediphenyl diisocyanate (MDI) breaks down to methylenedianiline (MDA)
- All the common isocyanates are shown here for illustrative purposes, but you should only get results for the ones that you use.

The levels are reported as “μmol/mol creatinine” (micromol/mol creatinine) Creatinine is in everyone’s urine, and it is measured to adjust the result for a weak or strong sample (depends on how much water, tea etc. you have been drinking).

ND means none–detected and indicates that there was no exposure to isocyanates. If the results are either ‘ND’, or not greater than the guidance value of 1, the controls you were using on the day of your sample were giving adequate protection. If something changes, or you think something is wrong, ask to send in another sample before the annual check is due.

What do I do if I have a result above the guidance value?

If the results are above the guidance value of 1, your controls may not be working properly. For example, your air-fed mask may be damaged; the air supply inadequate or you may be taking your mask off before the booth has cleared of invisible mist that contains isocyanate. Your employer needs to re-check that everything is working correctly and will ask you for another sample to confirm that the improvements have worked.

Your employer may need to ask you about any potential exposure outside of work. Occasionally, a side-job, DIY or hobbies can give an elevated result. But only activities during the previous day or two before providing your sample would be relevant.

A result above 1 does not mean you will get asthma it means that controls are not working properly.