

► Improving chemical safety in the world of work

A guide to the training modules

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► Introduction

Millions of workers continue to be at risk of hazardous chemical exposures

The sound management of chemicals and waste is directly linked to the world of work. The ILO has long recognized that the protection of workers from hazardous effects of chemicals is essential to ensuring healthy populations as well as sustainable environments. Nevertheless, workers continue to face disproportionately high exposures to hazardous chemicals, and exposure to hazardous substances claimed the lives of almost 1 million workers in 2015 alone.¹ The increase in the global production of chemicals will mean even more exposures for workers in the future.

The ILO and chemical safety

The ILO was founded on the concept of guaranteeing adequate protection for the life and health of workers in all occupations. In the last 100 years, the ILO has adopted more than 50 legal instruments on the protection of workers, but also the public and the environment, from chemical hazards. The ILO continues to be a major actor in international for a on chemical safety and waste management. Its large number of legally binding conventions creates a strong preventative and protective foundation in the area of chemicals and the world of work. With its unique tripartite structure, the ILO brings together governments as well as workers' and employers' organizations from around the world to negotiate and adopt international standards in a tripartite setting.

The ILO belongs to the Inter-Organization Programme for the Sound Management of Chemicals (IOMC), which has developed the IOMC toolbox, compiling chemical management resources from multiple UN agencies. The ILO is actively working to contribute to this online resource for constituents. The ILO offers many technical assistance programmes and provides training and guidance tools, with the goal of guaranteeing safe and healthy working conditions and minimizing chemical risks at work.

The development of chemical safety training modules

In order to support sound chemical management globally, there has been an identified need for the development of chemical safety training modules that can be utilized by representatives from governments, workers organizations, employers and all other parties with an interest in chemical safety. The modules were created with the aim of consolidating existing chemicals resources and information into a comprehensive training package for ILO constituents that can be used to improve chemicals management.

Aside from modules regarding general chemical safety, two additional areas of concern were identified: The environmental impact of chemicals use in the world of work, and chemicals and major industrial accidents (MIA). Two further training packages were therefore created to specifically cover these topics.

This project was funded and supported by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety.

¹ Hämäläinen et al, 2017. Global Estimates of Occupational Accidents and Work-related Illnesses 2017. Workplace Safety and Health Institute.

▶ An overview of the training packages

Training package 1: Chemical safety in the world of work training package

Workers around the world are facing a global health crisis due to occupational exposure to toxic chemicals. Every year more than 1 billion workers are exposed to hazardous substances, including pollutants, dusts, vapours and fumes in their working environments. Workers are exposed to hazardous chemicals throughout the entire supply chain: from production, to handling, to storage, to transport, to disposal and treatment of waste chemicals. Millions of workers are exposed in many different industries, from agriculture and mining to textiles and battery recycling.

Overall training objectives

- Identify the key chemical hazards faced by workers globally.
- Understand the health risks of different chemical exposures.
- Describe preventative measures for occupational chemical exposures at:
 - The policy level
 - The workplace level

Training modules:

This training package is laid out as 13 sessions, separated into two parts:

Part 1: Setting the scene and detailing the challenge.

- ▶ Session 1: Introduction to chemical safety in the world of work.
- ▶ Session 2: Routes of chemical exposure and health impacts.
- ▶ Session 3: State of the evidence - Results from the ILO Global Chemicals Review.
- ▶ Session 4: Chemicals hazards in the mining sector.
- ▶ Session 5: Chemicals hazards in the agricultural sector.
- ▶ Session 6: Spotlight on mercury in the world of work.

Part 2: Responding to chemical risks in the world of work - Preventative measures at different stages.

- ▶ Session 7: Chemical exposures in the world of work - Preventative measures at the policy level.
- ▶ Session 8: ILO international labour standards relating to chemical safety.
- ▶ Session 9: ILO guidelines on occupational safety and health management systems (OSH-MS).
- ▶ Session 10: Spotlight on the Globally Harmonized System of Classification and Labelling of Chemicals (GHS).
- ▶ Session 11: Chemical exposures in the world of work - Preventative measures at the workplace level.
- ▶ Session 12: International Chemical Safety Cards (ICSCs).
- ▶ Session 13: Preventative measures for key chemical hazards.

Training package 2: Chemical in the world of work and the environment

Climate change has profound impacts on and synergies with the world of work, especially regarding the sound management of chemicals. Many chemicals that are produced and utilized in the world of work can have impacts on the environment and climate, with climate change in turn impacting the ability to safely store, transport and use chemicals.

The global mismanagement of chemicals in the workplace continues to have damaging effects on human and environmental health. This training package was created to provide evidence-based education on chemicals and environmental considerations, including climate change and plastics exposures

Overall training objectives

- Understand how chemical use in the world of work contributes to climate change.
- Explain how climate change can influence occupational chemical use and therefore the health of workers.
- Describe priority actions for dealing with the impacts of climate change through the sound management of chemicals in the workplace.
- Recognize the specific effects of occupational plastics exposures on human health and the environment and the priority actions for dealing with these.

Training modules:

This training package is laid out as 3 sessions:

- Session 1: Introduction to chemicals in the world of work and the environment.
- Session 2: Mitigating the risks of climate change on the sound management of chemicals in the world of work.
- Session 3: Plastics and the world of work.

▶ Training methodology

These training packages ~~was~~ were created to support sound chemical management globally. They can be utilized by representatives from governments, workers organizations, employers and all other parties with an interest in chemical safety. They were designed to be used by both ILO trainers in the field or by those doing self-directed learning.

Modern adult learning builds on cooperation and experience sharing. The training modules should be an opportunity of active expression and exchange of ideas inspired by a set of general principles. They aim to be a 'learning together' process using participatory methods such as group discussions, brainstorming, experience sharing, activities, case studies and role playing. They aim to provide specific tools that will help participants to take their learning from the classroom on to the job.

Each module will contain the following:

- A list of training objectives
- Opportunities for discussion and applying your learning practically
- Real world case studies
- Evidence-based learning using recent research
- End of session activities, including quizzes and role-playing tasks
- Links to key ILO resources for further reading

Session 2 objectives

At the end of the session, you will be able to:

1. Understand the difference between climate change mitigation and adaptation and how they related to the world of work.
2. Identify the ILO international labour standards related to chemical safety and climate change.
3. Suggest other policy level actions.
4. Describe ILO initiatives for decent work in a changing climate.
5. Recognize the key multilateral environmental agreements on climate change and chemical safety.
6. Suggest priority actions at the workplace level.
7. Know the rights and responsibilities of governments, employers and workers.
8. Show how climate change can create jobs and protect workers and income.

Question:
Can you explain the difference between climate change mitigation and climate change adaptation?

Case study: The Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) in India

- MGNREGA is aimed at:
 - Providing social protection and economic security for rural people in poverty (strengthening through-growth and flood management)
 - Empowering marginalized communities
- Through the MGNREGA, each rural household is entitled to 100 days of employment a year.
- People are employed in **unskilled manual work** e.g. construction or improvement of community infrastructure, or the generation of ecosystem services that protect environmental resources.
- According to the Ministry of Rural Development, 80% of the work-hours provided through the programme in 2012 involved water conservation and 12% were related to the provision of irrigation facilities (ILO 2015).
- The programme also **increased female labour participation** and women's **autonomy in household decision-making** by providing them with higher wages than other rural jobs (ILO 2017).

Spotlight on textiles

- Women constitute more than 80% of the workforce in the textiles, clothing, leather and footwear industry (ILO 2016).
- Many of these are **young women** and therefore concerns exist regarding the potential impact on current and future pregnancies (ILO 2016).
- Work in textiles has been associated with bladder and lung cancer, dermatitis, COPD and increased mortality from diabetes and ischaemic heart disease.
- **Phasing out the most hazardous chemicals** is considered a priority action for the textile industry.
- The EU has restricted the use of 33 substances classified as carcinogenic, mutagenic or toxic for reproduction (CMR) in the textile/garment sector (EU-Commission 2016).

Name some workplace measures to protect these workers from a) Hazardous chemical exposures b) Heat stress

- Construction workers**
- Tannery workers**
- Underground miners**

Key ILO resources

- Exposed to hazardous chemicals at work and resulting health impacts: A global review (2021)
- The GHS in the world of work: Mapping synergies between ILO Instruments and the Globally Harmonized System of Classification and Labelling of Chemicals (2021)
- ILO Instruments on Chemical Safety - Analysis and synergies with other international frameworks on the sound management of chemicals (2021)
- The Sound Management of Chemicals and Risks in the World of Work (2019)
- All You Need to Know: Chemicals (No. 12)
- Guidelines on occupational safety and health management systems (2021)
- Make hazard control a practical manual (2021)
- Safety in the use of chemicals at work: code of practice (2011)
- Overview of occupational assessment: code of practice (2011)
- ILO initiatives of progress in implementation, BIRCH (2021)

► Training package 1: Chemical safety in the world of work training modules

Chemical safety in the world of work: A training package - Introduction

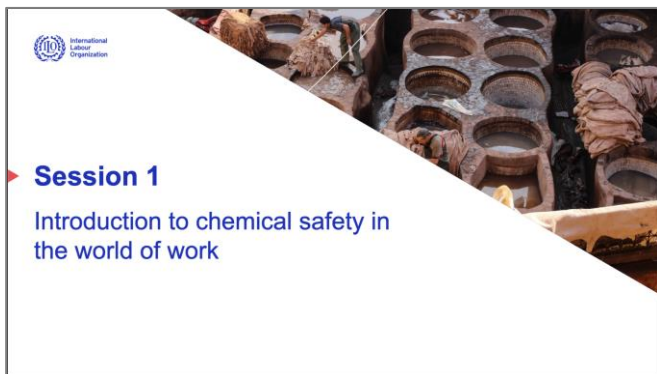


Purpose:

Introduces the training package, including overall objectives and methodology and an outline of sessions.

Part 1: Setting the scene and detailing the challenge

Session_1: Introduction to chemical safety in the world of work.



Purpose:

This session introduces the topic of chemical safety in the world of work and explains the chemical exposure risks workers face on a daily basis.

Chemicals are part of our daily lives and are essential for economic development and well-being. They provide numerous benefits, including preventing diseases and increasing agricultural productivity. The chemical industry is the second largest manufacturing industry in the world, with more and more chemicals produced every year. However, many have hazardous properties and can adversely impact human health. Workers can be exposed to chemicals along the whole supply chain, including manufacturing, handling and use, and disposal.

Objectives:

- Understand why workers are particularly at risk of chemical exposures.
- Recognize the different chemical forms, including vapours, liquids and dusts.
- Describe the global chemicals industry.

- ▶ Identify ways in which workers may be exposed.
- ▶ Distinguish the impact of occupational chemicals on the environment.
- ▶ Know key ILO activities in the field of chemical safety.

Includes:

- Case studies: Health impacts of asbestos exposure, 1984 Bhopal Disaster in India, 2000 Baia Mare cyanide spill in Romania.
- End of session activity: *Quiz and Fill in the blanks.*

Session 2: Routes of chemical exposure and health impacts.**Purpose:**

This session focuses on how chemicals enter the human body and the adverse health impacts they can cause in workers.

Workers exposed to hazardous chemicals lose their lives to fatal diseases, such as cancers and poisonings, or suffer fatal injuries following fires or explosions. Non-fatal injuries result in disability, debilitating chronic diseases, and other health sequela, that unfortunately in many cases remain invisible. All of these deaths, injuries and illnesses are entirely preventable.

Objectives:

- ▶ Describe how chemicals can enter the human body.
- ▶ Know the processes that occur when chemicals enter the body.
- ▶ Name factors which impact the severity of health impacts.
- ▶ Categorize the different types of harm chemicals can cause.
- ▶ Understand the relationships between chemicals and various diseases.
- ▶ Identify population groups that may be especially vulnerable to chemical exposures.

Includes:

- Case studies: Mercury and malaria in artisanal and small-scale gold mining (ASGM).
- End of session activity: *Quiz.*

Session 3: State of the evidence - Results from the ILO Global Chemicals Review.



Purpose:

This session presents results from the ILO Global Chemicals Review (2021).

The ILO Global Chemicals Review was a scoping review undertaken in 2021 to provide a sound evidence base towards policy efforts. It is a comprehensive analysis of recent trends and priorities when it comes to protecting the health and safety of workers from occupational chemical exposures. Chemical exposures were considered for inclusion if they were well-known or >1 million workers were exposed worldwide. Global burden of disease (GBD) and mortality figures were also considered. The ten key chemicals/chemical groups identified for inclusion are: Asbestos, silica, heavy metals, solvents, dyes, manufactured nanomaterials (MNMs), perfluorinated chemicals (PFAS), endocrine-disrupting chemicals (EDCs), pesticides and air pollution.

Objectives:

- ▶ Suggest why the ILO Global Chemicals review was conducted.
- ▶ Pinpoint the main findings of the review.
- ▶ List the ten key chemical types identified as priorities.
- ▶ Describe how workers are exposed to each of the chemical types.
- ▶ Identify prevalent health impacts for workers.
- ▶ Illustrate health impacts using examples from case studies.

Includes:

- Case studies include: An asbestos-cement factory in Colombia, Artificial stone workers in Australia, Child labour in the cobalt mines of the Democratic Republic of Congo, French CONSTANCES study on solvent exposure, Hairdresser dyes, Garment factory workers in Bangladesh, MNM biomarkers in US workers, PFAS in firefighting foams, Phthalate exposure in sales clerks, Pesticide exposure in cotton farmers in Pakistan, Air pollution and London commuters,
- End of session activities: *Quiz and Match the chemicals with the chemical type.*

Session 4: Chemicals hazards in the mining sector.



Purpose:

This session focuses on the health of workers in the mining sector, who are regularly exposed to hazardous chemicals, including mercury, cyanide, sulfuric acid and explosives.

Mining is one of the most hazardous jobs in the world. Hazards include explosions, toxic gases and vapours, rockfalls, flooding and extreme temperatures. Although the industry only employs one per cent of the global workforce, it is responsible for about eight per cent of fatal accidents at work.² Toxic chemicals pose a major risk to the health of miners globally. The hazardous chemicals used in mines can severely impact body systems and organs, leading to disability, life-long illness and even death. Mine workers in Low- and Middle-Income Countries (LMICs) and in informal settings are particularly at risk. Health effects are often undiagnosed or misattributed, unrecorded and unaddressed.

Objectives:

Describe the global agricultural sector and its relevance to the world of work.

- ▶ Understand how workers in small-scale agricultural operations are most at risk.
- ▶ Know how agricultural workers are exposed to chemicals.
- ▶ Identify population groups who are most vulnerable to hazardous agrochemicals.
- ▶ Provide details of the main agrochemicals and how they impact health.
- ▶ Explain the key priority actions to protect workers.
- ▶ Suggest practical ways to safely store, handle and dispose of agrochemicals.

Includes:

- Case studies include: Brumadinho Dam disaster in Brazil, Garpenberg Mine in Sweden, Children in cobalt mines in the Democratic Republic of Congo, Children in ASGM in Uganda, ASGM communities in Colombia, Children in ASGM in Indonesia and Zimbabwe, Cyanide use in Burkina Faso, Silicosis in South African goldminers, Burkina Faso mine explosion.
- End of session activities: *Quiz and Identify the chemical exposure from the health symptoms.*

² ILO. 2015. Mining: a hazardous work. Available at: https://www.ilo.org/safework/areasofwork/hazardous-work/WCMS_356567/lang--en/index.htm.

Session 5: Chemicals hazards in the agricultural sector.



Purpose:

This session looks at the chemicals used in the agriculture sector, which is estimated to employ 883 million workers worldwide or half of the world's labour force.³ It also looks at priority actions to protect workers in the industry.

Much agricultural work is, by its nature, physically demanding. Large numbers of workers in the agricultural sector are casual or temporary, and therefore often have limited rights and protections. Working conditions are frequently extremely hazardous, especially in small-scale farms. According to ILO estimates, at least 170,000 agricultural workers are killed each year.⁴ Millions more are seriously injured in workplace accidents involving agricultural machinery or poisoned by pesticides and other agrochemicals. Vulnerable workers are found in family subsistence agriculture, in plantations as daily paid labourers, seasonal or migrant workers and child labourers.

Objectives:

- ▶ Describe the global agricultural sector and its relevance to the world of work.
- ▶ Understand how workers in small-scale agricultural operations are most at risk.
- ▶ Know how agricultural workers are exposed to chemicals.
- ▶ Identify population groups who are most vulnerable to hazardous agrochemicals.
- ▶ Provide details of the main agrochemicals and how they impact health.
- ▶ Explain the key priority actions to protect workers.
- ▶ Suggest practical ways to safely store, handle and dispose of agrochemicals.

Includes:

- Case studies include: Women and pesticides in Kyrgyzstan, Pesticide exposure in cotton farmers in Pakistan, Chronic kidney disease in Sri Lanka, Fertilizer use among chilli farmers in Thailand, Education to reduce pesticide exposure in the USA.
- End of session activities: *Group work: Use the Hierarchy of Controls to design an intervention to protection workers from highly hazardous pesticides (HHPs) in a cocoa plantation, Photo task: Identify the modes of entry into the body for the pesticide sprayer and Match the agrochemical with its use.*

³ ILO. 2021. Exposure to hazardous chemicals at work and resulting health impacts – A global review.

⁴ ILO. n.d. Agriculture a hazardous work. https://www.ilo.org/safework/areasofwork/hazardous-work/WCMS_110188/lang--en/index.htm.

Session 6: Spotlight on mercury in the world of work.



Purpose:

This session describes the impact of mercury exposures on the health of numerous workers around the world. It also looks at key priority actions to protect workers from this hazardous heavy metal.

Occupational exposure to mercury poses a significant risk to the health of workers around the world. Mercury is toxic to the nervous, digestive and immune systems, as well as specific organs, such as the liver, heart, brain and skin. Even low levels of chronic exposure can result in severe disability and debilitating chronic conditions, impacting long-term health and well-being. Workers in many different industries are exposed, including mining, vinyl chloride monomer (VCM) production, healthcare, waste recycling and textiles.

Objectives:

- ▶ Understand the history of human and environmental mercury exposures.
- ▶ Describe the different forms of mercury.
- ▶ Explain how workers may be exposed to mercury.
- ▶ Identify the main sources of supply and demand of the global mercury trade.
- ▶ Recognize the key sectors of exposure.
- ▶ Know the exposure pathways for different mercury types.
- ▶ Name the main health impacts of mercury exposure.
- ▶ Provide priority actions for mercury at both policy and workplace levels.
- ▶ Apply the knowledge you have gained to different workplace settings.

Includes:

- Case studies include: ASGM communities in Colombia, Ship industries in Pakistan, Gold plating of metal statues in Nepal, ILO-Caring Gold Mining Project in Ghana and the Philippines.
- End of session activities: *Group work: Use the Hierarchy of Controls to protect mine workers from hazardous mercury exposures, Group work: Advise a fluorescent bulb recycling plant about the best ways to protect workers from potential mercury exposures and a Quiz.*

Part 2: Responding to chemical risks in the world of work - Preventative measures at different stages

Session 7: Chemical exposures in the world of work - Preventative measures at the policy level.

**Purpose:**

This session will look at measures to prevent hazardous occupational chemical exposures at the policy level. This may include conventions, codes of practice and occupational exposure limits.

The central goal of the ILO response is to standardize and formalize chemical safety. Priority actions should be implemented at both policy and workplace levels, with a strong foundation of social dialogue throughout.

Objectives:

- ▶ Realize that preventative measures exist at both policy and workplace levels.
- ▶ Recognize the components of a national OSH system.
- ▶ Identify the key ILO international labour standards related to chemicals.
- ▶ Know that codes of practice related to chemicals also exist.
- ▶ Describe the Globally Harmonized System of Classification and Labelling of Chemicals (GHS).
- ▶ Understand occupational exposure limits (OELs).
- ▶ Provide examples of ILO engagement in the field of chemical safety.
- ▶ Deepen your knowledge about inter-agency cooperation.

Includes:

- Case studies include: Vocational training in the German chemical industry.
- End of session activities: *Group work: Discussing rights and responsibilities of employers and workers at a textiles factory and a Quiz.*

Session 8: ILO international labour standards relating to chemical safety.

**Purpose:**

This session will focus in more detail on the different ILO conventions and recommendations pertaining to chemical safety. It will go into each convention in turn, in order to provide a more in-depth understanding about the different international labour standards,

ILO instruments have their own range of applications and mainly operate in the areas of domestic policy. The ILO has over 40 instruments related to OSH. These include key OSH conventions, such as Occupational Health Services Convention (No. 161) and Recommendation (No. 171), 1985 and the main chemical safety conventions, Chemicals Convention (No. 170) and Recommendation (No. 177), 1990 and Major Industrial Accidents Convention (No. 174) and Recommendation (No. 181), 1993. Other relevant conventions and recommendations, include industry specific conventions, such as those related to agriculture and mining, as well as standards for individual chemicals, for example asbestos and benzene.

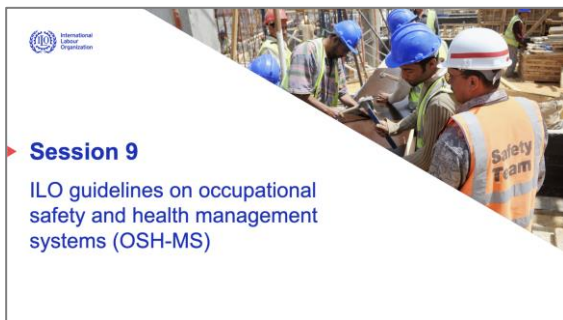
Objectives:

- ▶ Understand that the ILO has many different conventions and recommendations relating to chemical safety.
- ▶ Describe key ILO conventions in the area of occupational safety and health (OSH).
- ▶ Explain the two main ILO chemical conventions.
- ▶ List the important functions of other relevant ILO international labour standards, including conventions, recommendations and codes of practice.

Includes:

- End of session activities: *Quiz and ILO List of Occupational Diseases work search.*

Session 9: ILO guidelines on occupational safety and health management systems (OSH-MS).



Purpose:

This session will present the ILO guidelines on occupational safety and health management systems (OSH-MS).

We spend a third of our working life at the workplace, where we are exposed to multiple different risks. The risks for occupational accidents and diseases at work have to be managed by the employers and workers who are facing them. In order to ensure effective action, it is essential to establish OSH management systems at all workplaces for continual improvement of working environment and preventive measures. OSH-MS provide a systematic way to manage OSH activities in the organization and make OSH an integral part of the organization's value system. They reduce hazards and risks, accidents and disease and result in low absenteeism, higher productivity and greater job satisfaction.

Objectives:

- ▶ Understand why occupational safety and health management systems (OSH-MS) are needed.
- ▶ Explain the development of OSH-MS.
- ▶ Describe the components of an OSH-MS at the enterprise level.
- ▶ Identify the 6 steps for OSH-MS implementation.
- ▶ Provide examples of national frameworks.

Includes:

- End of session activity: *Group work: Design and establish a national framework to promote OSH Management systems in your country.*

Session 10: Spotlight on the Globally Harmonized System of Classification and Labelling of Chemicals (GHS).



Purpose:

This session will provide an in-depth explanation of the GHS, including its history, a guide to the different label elements and its synergies with ILO international labour standards,

The Globally Harmonized System of Classification and Labelling of Chemicals (or GHS) is an internationally agreed upon system to standardize chemical hazard classification and communication. It has been implemented in over 60 countries globally. While the GHS is a voluntary international instrument, implementation is typically done through legislation. All chemicals are included in the scope of the GHS, with few exceptions.

Objectives:

- ▶ Give examples of accidents which could have been prevented by the GHS.
- ▶ Define the GHS.
- ▶ Understand why the GHS is needed.
- ▶ Explain the history of the GHS.
- ▶ Identify the different label elements.
- ▶ Recognize the different GHS pictogram symbols.
- ▶ Describe the synergies between ILO international labour standards and the GHS.
- ▶ Provide areas for future action.

Includes:

- Case studies include: Agricultural works and pesticide labelling in Punjab, The GHS in the garment sector in Vietnam.
- End of session activities: *Match the pictograms with the chemicals.*

Session 11: Chemical exposures in the world of work - Preventative measures at the workplace level.



Purpose:

This session will look at preventative measures to protect workers from hazardous chemicals at the workplace level.

Workplace prevention efforts must be implemented to complement policy level actions. These include implementing a workplace programme and a workplace level strategy. The Hierarchy of Controls is a tool which can protect workers against hazardous chemical exposures. It has 5 specific steps to minimize risks, and they are organized in a hierarchy, based on the most effective (Elimination) to the least effective (personal protective equipment).

Objectives:

- ▶ Provide an overview of different workplace level actions.
- ▶ Describe the different components of a workplace programme.
- ▶ Understand how to implement a workplace strategy.
- ▶ Explain the Hierarchy of Controls.
- ▶ Illustrate how the Hierarchy of Controls can be applied for different chemicals.

Includes:

- Case studies include: Engineering controls for silica exposure in the USA, PPE and polycyclic aromatic hydrocarbon (PAH) exposure in coal liquefaction workers.
- End of session activities: *Group work: Use the Hierarchy of Controls to design an intervention to protect workers in zinc welding from metal fume fever.*

Session 12: International Chemical Safety Cards (ICSCs).



Purpose:

This session will provide information on ICSCs. These are data sheets which provide essential safety and health information on chemicals in a clear and concise format.

ICSCs are used at the shop floor level by workers and those responsible for OSH. They were developed in 1986 with the International Program on Chemical Safety (IPCS). The cards summarize essential OSH information on chemical substances in a simple and structured way. 1700 ICSCs are available free online (www.ilo.org/icsc) in English and 12 other languages: Chinese, Finnish, French, Hebrew, Hungarian, Italian, Japanese, Korean, Persian, Polish, Russian and Spanish.

Objectives:

- ▶ Understand the purpose of ICSCs.
- ▶ Know who is responsible for ICSCs.
- ▶ Describe the 12 categories of information provided on ICSCs.
- ▶ Realize how ICSCs are produced.
- ▶ List in which languages ICSCs are available.
- ▶ Explain how to access a specific ICSC.

Includes:

- End of session activities: *Quiz: Identify the chemical from ICSC pictures.*

Session 13: Preventative measures for key chemical hazards.



Purpose:

This session will describe preventative measures for the ten key chemical hazards outlined in the ILO Global Chemicals Review. These chemicals were introduced in Session 3: State of the evidence – Results from the ILO Global Chemicals Review.

It will include preventative measures for each chemical type at the policy level (for example conventions) and also at the workplace level (for example using the Hierarchy of Controls).

Objectives:

- ▶ Describe the main priority actions for the 10 key chemical groups identified in the ILO Global Chemicals Review (2021).
- ▶ Provide examples of preventative measures at both policy and workplace levels.

Includes:

- End of session activity: *Group work: How would you reduce pesticide poisoning incidents and improve worker safety at a large farm which regularly uses pesticides to treat the crops?*

► Training package 2: Chemical in the world of work and the environment

Chemicals in the world of work and the environment - Introduction



Purpose:

Introduces the training package, including overall objectives and methodology and an outline of sessions.

The sessions

Session 1: Introduction to chemicals in the world of work and the environment.



Purpose:

This session will explore the interlinkages between chemical exposures in the world of work and the impact on the environment. It will focus specifically on how chemicals contribute to climate change and on how climate change can impact occupational chemical exposures and worker health.

Many chemicals that are produced and utilized in the world of work can have impacts on the environment and climate, with climate change in turn impacting the ability to safely store, transport and use chemicals. Key impacts of climate change on worker health include heat stress, air pollution, ozone depletion, increased pesticide and fertilizer use, vector distribution and MIA. These are explained in detail in the training module.

Objectives:

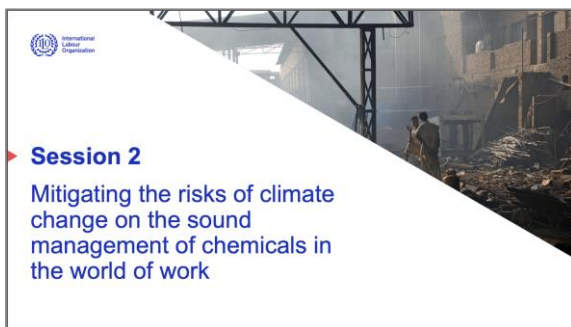
- Understand how occupational chemical emissions are impacting the environment.
- List the top ten polluting industries.

- ▶ Explain how chemicals are contributing to climate change.
- ▶ Identify the key impacts of climate change on worker health.
- ▶ Recognize how climate change is affecting chemical use in the world of work.
- ▶ Pinpoint the worker groups who will be most vulnerable to the impacts of climate change.

Includes:

- Case studies include: Chemical pollution and biodiversity loss, Leather tanning in Hazaribagh, Bangladesh, Heat stress as a driver of migration, Heat stress and heavy PPE, Chronic kidney Disease (CKD) in tropical countries, Airline pilots and UV exposure, Climate warming promotes pesticide resistance through expanding overwintering range of a global pest, Fertilizer use among chilli farmers in Thailand, Lyme disease in the USA, climate change and malaria, A natech caused by Hurricane Harvey in Texas, USA, Construction workers and asbestos, PFAS and female firefighters.
- End of session activities: *Quiz and Fill in the blanks with the numbers.*

Session 2: Mitigating the risks of climate change on the sound management of chemicals in the world of work.

**Purpose:**

This session will focus on the priority actions to protect workers from the impacts of climate change, as well as harmful chemical exposures.

Climate change-related events are already having a profound impact on planetary health, human health and the work of work. Addressing harmful chemical exposures in the workplace through effective occupational safety and health (OSH) measures are a top priority for advancing climate change agendas. Employment policies and appropriate climate change adaptation and mitigation measures are needed as a matter of urgency.

Objectives:

- ▶ Understand the difference between climate change mitigation and adaptation and how they related to the world of work.
- ▶ Identify the ILO international labour standards related to chemical safety and climate change.
- ▶ Suggest other policy level actions.
- ▶ Describe ILO initiatives for decent work in a changing climate.
- ▶ Recognize the key multilateral environmental agreements on climate change and chemical safety.
- ▶ Suggest priority actions at the workplace level.
- ▶ Know the rights and responsibilities of governments, employers and workers.
- ▶ Show how climate change can create jobs and protect workers and income.

Includes:

- Case studies include: South Africa's Working for Water (WfW) programme, The Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) in India, Green and conventional office environments, Community engagement and employment opportunities in the restoration of forest land in Indonesia, Adaptation to climate change in Argentina.
- End of session activities: *Quiz: Name some workplace measures to protect workers from a) Hazardous chemical exposures b) Heat stress.*

Session 3: Plastics and the world of work.



Purpose:

This session will focus on the harmful impact of plastics exposures in the workplace. It will also explore we will look at general approaches to reducing plastic production and consumption, as well as policy and workplace level measures to prevent harmful chemical exposures from plastics.

Plastics are found in all aspects of modern life, including the world of work. Their flexibility, durability and strength have made them indispensable components of billions of modern products, with an ever-widening range of applications. At current rates, plastic packaging volumes are expected to more than quadruple by 2050 to 318 million tonnes per year.⁵ However, plastics contain and leach hazardous chemicals, which have been linked with cancers, birth defects and impairments to the immune, endocrine and reproductive systems. This has serious implications for the world of work, where workers in numerous industries are exposed to plastics every day. In the plastics industry alone, millions of men and women work through its entire value chain, from production to transformation, collection and recycling. Many are in the informal economy, where occupational safety and health (OSH) regulations and social protections are extremely limited.

Objectives:

- ▶ Identify the properties and types of plastics.
- ▶ Understand the global plastics market.
- ▶ Recognize the environmental consequences of plastics.
- ▶ Describe how workers may be exposed to hazardous chemicals during all stages of plastic's lifecycle.
- ▶ Explain how chemical additives and microplastics can have an adverse effect on worker health.
- ▶ Suggest key priority actions at both policy and workplace levels to protect workers from harmful chemical exposures from plastics.

Includes:

- Case studies include: ExxonMobil refinery and chemical plant, Styrene exposure among workers in the plastics industry in India, Female breast cancer in workers in the plastics manufacturing industry in Canada, Urinary phthalate metabolite concentrations among workers in selected industries, Urinary bisphenol levels in plastic industry workers in Algeria, PBDE exposure in gymnastics studios in the USA, Interstitial lung disease in nylon

⁵ World Economic Forum. 2016. The New Plastics Economy - Rethinking the future of plastics. Available at: https://www3.weforum.org/docs/WEF_The_New_Plastics_Economy.pdf.

factory workers in Canada, Inclusion in public schemes - Union and cooperative alliance – SWaCH, Pune, India,
Access to services and social protection – MTE, Buenos Aires, Argentina,

- End of session activities: *Quiz*.

► Key ILO resources

General chemical safety

- [Exposure to hazardous chemicals at work and resulting health impacts: A global review \(2021\)](#).
- [The Sound Management of Chemicals and Waste in the World of Work \(2019\)](#).
- [ILO indicators of progress in implementing SAICM \(2021\)](#).
- [ILO A 5 step guide for employers, workers and their representatives on conducting workplace risk assessments](#).
- [International Chemical Safety Cards \(ICSCs\)](#).

International labour standards and frameworks relating to OSH and chemical safety

- [ILO Instruments on Chemical Safety – Analysis and synergies with other international frameworks on the sound management of chemicals \(2020\)](#).
- [The GHS in the world of work: Mapping synergies between ILO Instruments and the Globally Harmonized System of Classification and Labelling of Chemicals \(GHS\)](#).
- [All You Need to Know: Convention No. 170](#).
- [Guidelines on occupational safety and health management systems \(2001\)](#).
- [Safety in the use of chemicals at work: code of practice \(1991\)](#).
- [Diagnostic and exposure criteria for occupational diseases - Guidance notes for diagnosis and prevention of the diseases in the ILO List of Occupational Diseases \(revised 2010\) \(2022\)](#).
- [Occupational Safety and Health Convention, 1981 \(No.155\) and Recommendation, 1981 \(No. 164\)](#).
- [Promotional Framework for Occupational Safety and Health Convention, 2006 \(No. 187\)](#).
- [Occupational Health Services Convention, 1985 \(No. 161\)](#).
- [Chemicals Convention, 1990 \(No. 170\) and Recommendation, 1990 \(No. 177\)](#).
- [Working Environment Convention, 1977 \(No. 148\) and Recommendation, 1977 \(No. 156\)](#).
- [Radiation Protection Convention, 1960 \(No. 115\)](#).
- [Occupational Cancer Convention, 1974 \(No. 139\) and Recommendation, 1974 \(No. 147\)](#).
- [List of Occupational Diseases Recommendation, 2002 \(No. 194\)](#).

Industry-specific

- [Safety and Health in Mines Convention, 1995 \(No. 176\)](#).
- [Safety and Health in Mined Recommendation, 1995 \(No. 183\)](#).
- [Code of practice on safety and health in underground coalmines \(2006\)](#).
- [Code of practice on safety and health in opencast mines \(2018\)](#).
- [Safety and health in small-scale surface mines: A handbook \(2001\)](#).
- [Resource guide on the mining sector](#).
- [Occupational safety and health in the mining \(coal and other mining\) sector](#).
- [Safety and health in Agriculture Convention, 2001 \(No. 184\)](#).
- [Safety and Health in Agriculture Recommendation, 2001 \(No. 192\)](#).
- [Labour Inspection \(Agriculture\) Convention, 1969 \(No. 129\)](#).
- [Code of Practice on Occupational Safety and Health in Agriculture \(2010\)](#).
- [Conducting Occupational Safety and Health Inspections in Agricultural Undertakings - A guide for labour Inspectors \(2021\)](#).
- [Safety and health in the use of agrochemicals: A guide \(1991\)](#).

- [Decent Work in Agriculture \(2003\)](#).
- [Safety and health in textiles, clothing, leather and footwear \(2021\)](#).

Chemical-specific

- [Exposure to mercury in the world of work: A review of the evidence and key priority actions](#).
- [Interlinkages between the chemicals and waste multilateral environmental agreements and biodiversity: Key insights \(2021\), Minamata Convention on Mercury](#).
- [Asbestos Convention, 1986 \(No. 162\) and Recommendation, 1986 \(No. 172\)](#).
- [Benzene Convention, 1971 \(No. 136\) and Recommendation, 1971 \(No. 144\)](#).

Major industrial accidents

- [Prevention of major industrial accidents: code of practice \(1991\)](#).
- [Major hazard control: A practical manual \(1993\)](#).
- [Occupational safety and health in public health emergencies – WHO and ILO \(2018\)](#).
- [Prevention of Major Industrial Accidents Convention, 1993 \(No. 174\)](#).
- [Prevention of Major Industrial Accidents Recommendation, 1993 \(No. 181\)](#).

Environmental considerations

- [Working on a warmer planet: The effect of heat stress on productivity and decent work \(2019\)](#).
- [World Employment and Social Outlook: Greening with Jobs \(2018\)](#).
- [The employment impact of climate change adaptation: Input document for the G20 Climate Sustainability Working Group \(2018\)](#).
- [Guidelines for a just transition towards environmentally sustainable economies and societies for all \(2015\)](#).

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