Health and Safety Essentials

Lecture 9 – Physical & Chemical Hazards – An Introduction

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Date: 9th December 2024

Undergraduate Diploma in
Occupational Health and Safety

Recap last week's topic

Kahoot Quiz:

https://play.kahoot.it/v2/*?quizId=9a6cdc51-7672-45fe-82c6-c4046bfb2388

Learning Objectives

By the end of this lecture, participants will:

1. Define physical and chemical hazards.
2. Recognise their impact on health and safety.
3. Familiarise with the applicable Regulations and Directives.
4. Apply EU and UK (HSE) standards for physical and chemical hazard control.
5. Conduct basic risk assessments and recommend controls.

Definitions

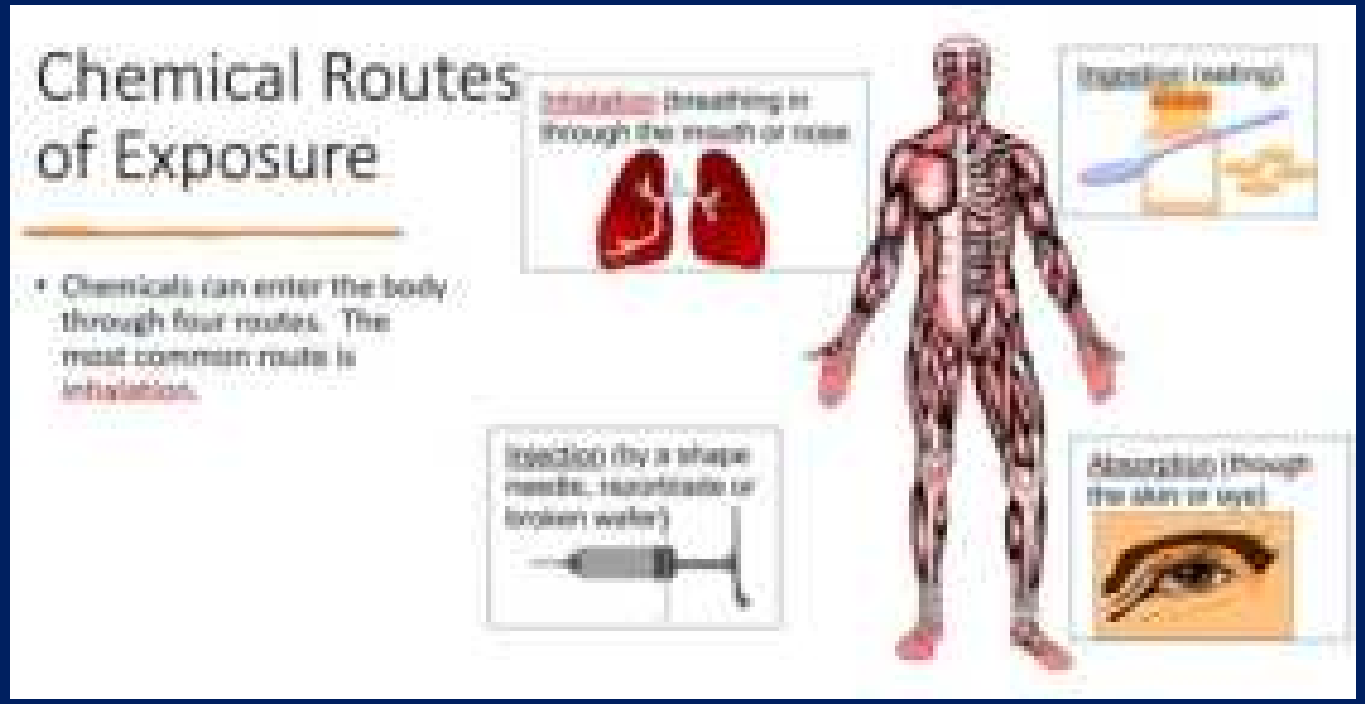
- **Content:**
- **Physical Hazards:** Environmental factors causing harm (e.g., noise, vibration, radiation, temperature, also…tripping hazards, height etc …).
- **Chemical Hazards:** Harmful substances due to toxicity, reactivity, or flammability.
- **Overlap:** For example, a chemical spill creating slip hazards and vapour inhalation risks.

The Legal Framework - Chemicals

Malta Regulation	EU Directive
Protection of Workers from the Risks Related to Exposure to Asbestos at Work Regulations (LN 323 of 2006)	Directive 2009/148/EC on the Protection of Workers from the Risks Related to Exposure to Asbestos
Protection of the Health and Safety of Workers from the Risks Related to Chemical Agents at Work Regulations (LN 227 of 2003)	Directive 98/24/EC on the Protection of Workers from the Risks Related to Chemical Agents
Protection of Workers from the Risks Related to Exposure to Carcinogens, Mutagens, or Reprotoxic Substances at Work Regulations (LN 228 of 2003)	Directive 2004/37/EC on the Protection of Workers from the Risks Related to Carcinogens or Mutagens
Control of Major Accident Hazards Regulations (LN 179 of 2015)	Directive 2012/18/EU (Seveso III Directive) on the Control of Major Accident Hazards

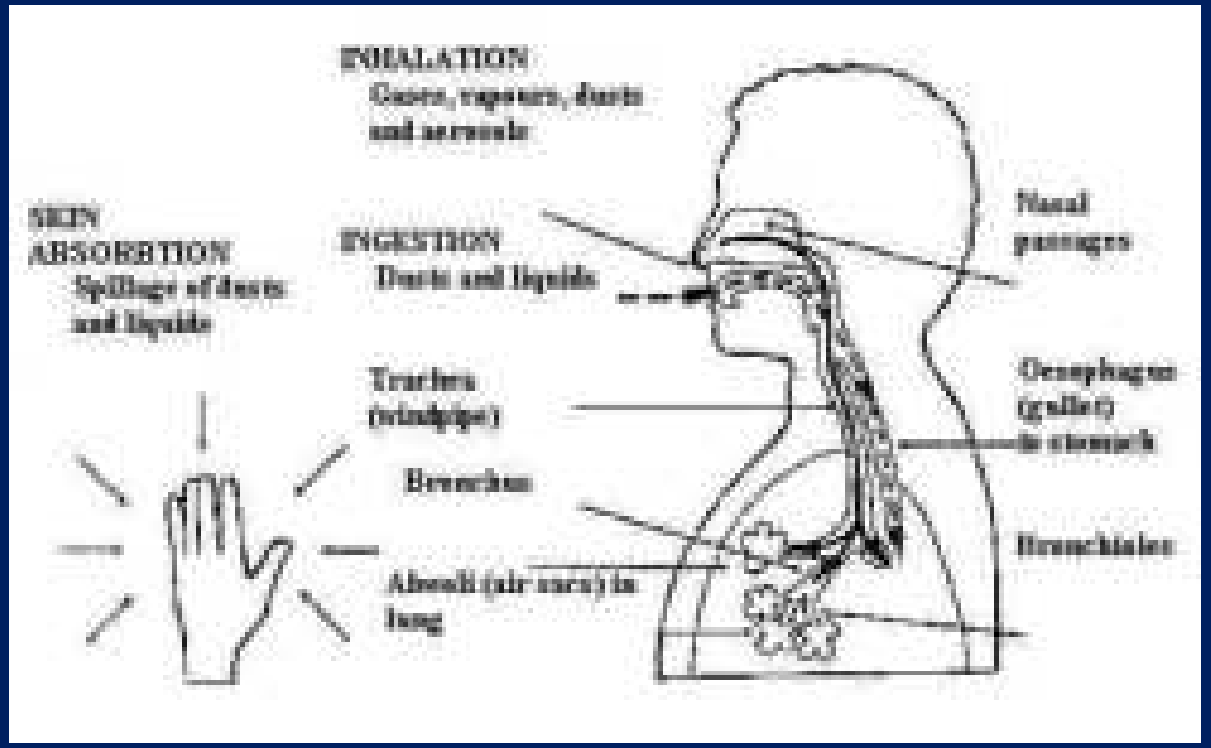
Chemical Hazards Overview

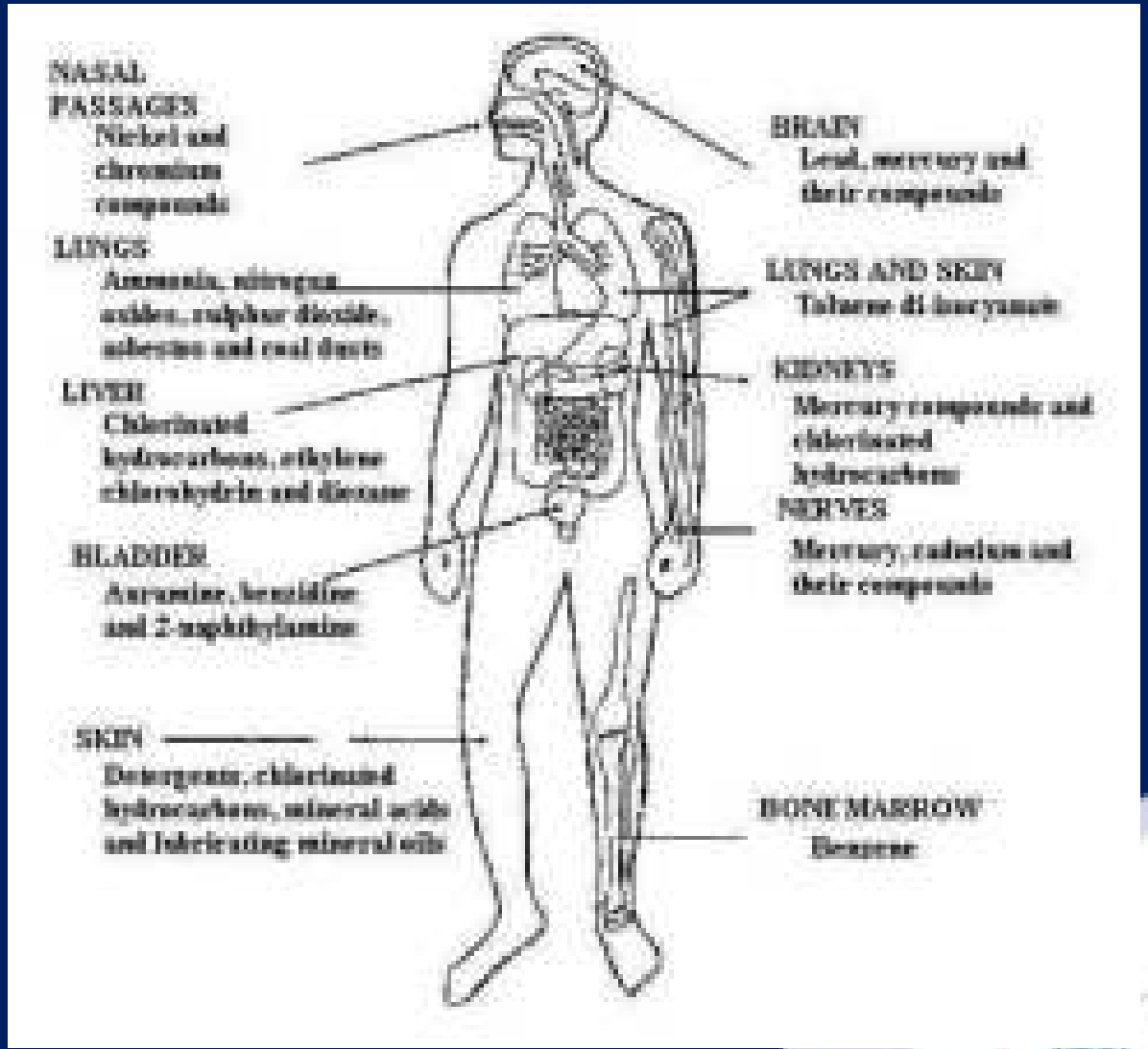
- **Exposure Routes:**
  - Inhalation,
  - skin absorption,
  - Ingestion,
  - also Injection or intravenous



- **Short-term Effects:** Burns, poisoning.
- **Long-term Effects:** Cancer, organ damage.
- Potential Instant fatalities

Impact on Human





Chemical Hazards Overview

- **Sources of Chemical Hazards:**
  - Cleaning products, solvents.
  - Pesticides, herbicides.
  - Fuels (e.g., petrol, diesel).
  - Manufacturing chemicals (e.g., acids, alkalis).
  - Dust from wood, silica, or asbestos.
- **Health Effects:**
  - Acute: Burns, poisoning.
  - Chronic: Cancer, respiratory disorders.
- **Carcinogens and Mutagens:**
  - Asbestos, benzene, formaldehyde.
  - Reprotoxic substances (e.g., lead compounds).

- **Control Measures:**

1. **Engineering:** Ventilation, closed systems.
2. **Administrative:** SDS reviews, training.
3. **PPE:** Gloves, respirators, chemical-resistant clothing.

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Choose all that are considered Route of Entry

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Protection of the Health and Safety of Workers from the Risks Related to Chemical Agents at Work Regulations (LN 227 of 2003)

- **Scenario:** Use of caustic soda (sodium hydroxide) for cleaning tanks poses risks of chemical burns and splashes.

1. **Substitution:** Replace caustic soda with less hazardous chemicals, such as **sodium carbonate** (washing soda), where feasible.
2. **Engineering Controls:** Use **enclosed systems**, **automated dispensing**, or **pumps** to prevent splashes and spills.
3. **Administrative Controls:** Train workers on safe handling (e.g., add caustic soda to water slowly), ensure clear labels, and restrict access to authorized personnel.
4. **PPE:** Provide chemical-resistant gloves, goggles, face shields, aprons, and boots.
5. **First Aid:** Install emergency eyewash stations and showers nearby for immediate response.

Protection of Workers from the Risks Related to Exposure to Asbestos at Work Regulations (LN 323 of 2006)

- **Example:** A construction company is tasked with refurbishing an old school building that contains asbestos insulation panels.
- **Risk Assessment:** The employer identifies the presence of asbestos-containing materials (ACMs) through a survey conducted by a certified asbestos specialist.
- **Work Plan:** Workers are trained on handling asbestos safely. The company seals off the affected area to prevent asbestos fiber release and ensures the use of negative pressure units to minimise contamination.
- **PPE and Tools:** Workers are equipped with disposable protective suits, P3-rated respirators, and gloves. Non-destructive tools (e.g., manual screwdrivers) are used to minimize fiber release.
- **Waste Management:** Asbestos waste is double-bagged, labeled, and disposed of at a licensed hazardous waste facility in compliance with local regulations.
- **Notification:** Authorities are informed of the planned work, and exposure records are maintained.

Protection of Workers from the Risks Related to Exposure to Carcinogens, Mutagens, or Reprotoxic Substances at Work Regulations (LN 228 of 2003)

- **Example:** A laboratory uses benzene as a solvent in certain chemical tests, posing a cancer risk.
- **Substitution:** The lab replaces benzene with **toluene**, which is less toxic and has lower carcinogenic potential, for compatible processes.
- **Engineering Controls:** Fume hoods and explosion-proof ventilation systems are installed to prevent inhalation exposure.
- **Administrative Controls:** Exposure time is minimized by optimizing workflows to limit the time workers spend handling carcinogens.
- **PPE and Monitoring:** Workers wear nitrile gloves and lab coats and undergo regular health surveillance for early detection of adverse effects.

Control of Major Accident Hazards Regulations (LN 179 of 2015)

- **Example:** A chemical manufacturing plant stores significant quantities of ammonia and chlorine gas, which are toxic and pose a risk of a major accident.
- **Safety Report:** The plant submits a detailed report to the Occupational Health and Safety Authority (OHSA), including risk assessments and potential accident scenarios.
- **Preventive Measures:** Double-walled storage tanks are installed for ammonia, and chlorine gas cylinders are equipped with automatic leak detection systems.
- **Emergency Planning:** The company develops a detailed emergency response plan that includes:
  - Evacuation procedures.
  - Installation of gas scrubbers to neutralize leaks.
  - Regular training for workers and local emergency services.
- **Regular Drills:** Mock drills simulate a chlorine gas release, testing the response time of workers and external emergency teams.

Chemical Hazards – REACH Regulation

- **What is REACH?**
  - An EU regulation aimed at improving the protection of human health and the environment from risks posed by chemicals.
  - Enforced under **Regulation (EC) No 1907/2006**.
- **Key Principles:**
  - **Registration:** Manufacturers and importers must register substances produced or imported in volumes of 1 tonne or more per year.
  - **Evaluation:** ECHA (European Chemicals Agency) evaluates information in registrations to ensure compliance.
  - **Authorisation:** Substances of very high concern (SVHCs) require authorisation for specific uses.
  - **Restriction:** Limits or bans on the manufacture, sale, or use of hazardous substances.
- **Applicability to Workplaces:**
  - REACH ensures detailed safety information is available (via **Safety Data Sheets**).
  - Employers are required to assess risks from chemicals and implement controls.

Transport of Hazardous Chemicals – IMDG Code

- **What is the IMDG Code?**
  - The **International Maritime Dangerous Goods (IMDG) Code** is a set of guidelines for the safe transport of dangerous goods by sea, developed by the International Maritime Organisation (IMO).
  - Ensures the protection of crew, ships, and the environment during the transport of hazardous goods.
- **Key Principles:**
  - **Classification of Dangerous Goods:** Chemicals and substances are categorised into classes (e.g., flammable liquids, toxic gases).
  - **Packaging and Labelling Requirements:** Ensures safe handling and proper identification (e.g., UN numbers, hazard symbols).
  - **Stowage and Segregation Rules:** Guidelines for where and how goods are stored on ships.
  - **Emergency Response:** Procedures for dealing with spills, leaks, or accidents at sea.
- **Relevance to Workplace Safety:**
  - Employers shipping hazardous materials must ensure compliance with IMDG.
  - Workers involved in shipping or logistics must be trained in IMDG handling and emergency response protocols.
- **Link to REACH:**
  - Safety Data Sheets (SDS) include transport information relevant for IMDG compliance.

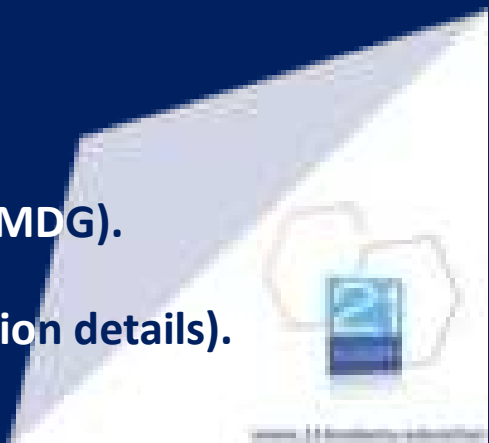
CLP Regulation (Classification, Labelling, and Packaging)

- **What is CLP?**
  - EU Regulation (EC) No 1272/2008 aligning with the **Globally Harmonised System (GHS)** for the classification, labelling, and packaging of substances and mixtures.
- **Purpose:**
  - Ensures clear hazard communication to protect workers, consumers, and the environment.
- **Key Components:**
  - **Hazard Classification:** Substances and mixtures are categorised based on physical, health, and environmental risks (e.g., flammability, toxicity, aquatic hazard).
  - **Labelling Requirements:**
    - **Pictograms:** Standard hazard symbols (e.g., flammable, corrosive).
    - **Signal Words:** "Danger" or "Warning" to indicate severity.
    - **Hazard and Precautionary Statements:** Clear descriptions of risks and safety measures.
  - **Packaging:** Safe, secure, and compliant with hazard handling requirements.

Safety Data Sheets (SDS)

- **What is an SDS?**
  - A document providing detailed information on a hazardous substance or mixture, required under both CLP and REACH regulations.
- **Purpose:**
  - Supports workplace risk assessment and safe handling of hazardous chemicals.

- **Key Sections in an SDS:**
  1. **Identification of the substance/mixture and company.**
  2. **Hazard identification:** Aligns with CLP classification.
  3. **Composition/information on ingredients.**
  4. **First-aid measures.**
  5. **Firefighting measures.**
  6. **Accidental release measures (spill control).**
  7. **Handling and storage requirements.**
  8. **Exposure controls/PPE recommendations.**
  9. **Physical and chemical properties.**
  10. **Stability and reactivity.**
  11. **Toxicological information.**
  12. **Ecological information.**
  13. **Disposal considerations.**
  14. **Transport information (e.g., IMDG).**
  15. **Regulatory information.**
  16. **Other information (e.g., revision details).**



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Which of the following is an example of a carcinogen?

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Benzene SDS

SAFETY DATA SHEET

Airgas

Benzene

Section 1. Identification

GHS product identifier : Benzene

Chemical name : benzene

Other means of identification : benzene; pyrobenzol; cyclohexatriene; phenyl hydride; phene; coal naphtha; pyrobenzol

Product type : Liquid

Product use : Synthetic/Analytical chemistry

Synonym : benzene; pyrobenzol; cyclohexatriene; phenyl hydride; phene; coal naphtha; pyrobenzol

SDS # : 001082

Supplier's details : Airgas USA, LLC and its affiliates
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

24 hour telephone : 1-866-734-3438

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : FLAMMABLE LIQUIDS - Category 2
SKIN IRRITATION - Category 2
EYE IRRITATION - Category 2A
GERM CELL MUTAGENICITY - Category 1B
CARCINOGENICITY - Category 1A
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 1

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : Highly flammable liquid and vapor.
Causes skin irritation.
Causes serious eye irritation.
May cause genetic defects.
May cause cancer.
Causes damage to organs through prolonged or repeated exposure.
May form explosive mixtures with air.

Precautionary statements

General : Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand.

Prevention : Obtain special instructions before use. Wear protective gloves. Wear protective clothing. Wear eye or face protection. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Use explosion-proof electrical, ventilating or lighting equipment. Use non-sparking tools. Take action to prevent static discharges. Keep container tightly closed. Do not breathe vapor. Do not eat, drink or smoke when using this product. Wash thoroughly after handling.

Date of issue/Date of revision 8/1/2020 Date of previous issue No previous validation Version 1 1/10

Breakout Room Scenario 1: Chemical Hazards

- **Objective:** Identify and mitigate risks from a single chemical hazard.
- **Instructions:**
  - Work in groups (3–5 participants per room).
  - Read the scenario carefully.
- Complete the following tasks:
  - Identify the main hazards associated with the chemical.
  - Recommend two control measures.
  - Suggest one emergency response action for an accident involving the chemical.

Scenario Details

Scenario:
Your team is assessing a workplace using **sodium hydroxide (caustic soda)** for cleaning metal parts.

- **Key Information:**
  - Workers manually mix sodium hydroxide with water in open containers.
  - The chemical is highly corrosive, causing burns on skin and eyes.
  - No proper signage or training has been provided to the workers.
- **Tasks:**

1. Identify the **main hazard** associated with this chemical.
2. Recommend two specific control measures:
   1. Choose from substitution, engineering, administrative, or PPE.
   2. Example: Replace manual handling with a pump dispenser.
3. Propose one **emergency response action** in case of a splash incident.

Deliverables

1. Hazard identified.
2. Two practical control measures.
3. One emergency response action

Break

The Legal Framework - Physical

Malta Regulation	EU Directive
Protection of Workers from the Risks Related to Exposure to Noise at Work Regulations (LN 158 of 2006)	Directive 2003/10/EC on the Minimum Health and Safety Requirements Regarding Exposure to Noise
Protection of Workers from the Risks Related to Exposure to Vibration at Work Regulations (LN 371 of 2005)	Directive 2002/44/EC on the Minimum Health and Safety Requirements Regarding Exposure to Vibration
Protection of Workers from the Risks Related to Exposure to Electromagnetic Fields Regulations (LN 257 of 2016)	Directive 2013/35/EU on the Minimum Health and Safety Requirements Regarding Exposure to Electromagnetic Fields
Protection of Workers from the Risks Related to Exposure to Optical Radiation at Work Regulations (LN 250 of 2010)	Directive 2006/25/EC on the Minimum Health and Safety Requirements Regarding Exposure to Optical Radiation
Basic Safety Standards for Ionising Radiation Regulations (LN 210 of 2018)* Not OHSA	Directive 2013/59/Euratom (Basic Safety Standards Directive)

Protection of Workers from the Risks Related to Exposure to Noise at Work Regulations (LN 158 of 2006)

- **Sources of Noise:**
  - Machinery (e.g., compressors, drills, saws).
  - Transportation (e.g., heavy vehicles, airplanes).
  - Construction activities (e.g., pile driving, demolition).
  - Manufacturing (e.g., metal pressing, assembly lines).
  - Recreational (e.g., concerts, events).
- **Health Effects:**
  - Hearing loss (temporary or permanent).
  - Tinnitus.
  - Stress, fatigue, reduced productivity.
- **Legal Exposure Limits:**
  - Lower action value: 80 dB(A).
  - Upper action value: 85 dB(A).
  - Peak sound level: 137 dB(C).
- **Control Measures:**

1. **Engineering:** Soundproofing, quieter machinery.
2. **Administrative:** Rotating workers, scheduling quiet times.
3. **PPE:** Earplugs, earmuffs.

Protection of Workers from the Risks Related to Exposure to Noise at Work Regulations (LN 158 of 2006)

- **Scenario:** A metalworking facility uses loud machinery such as presses and grinders, with noise levels exceeding 90 dB.

1. **Engineering Controls:** Install noise-dampening panels around machines and use quieter machinery where possible.
2. **Administrative Controls:** Rotate workers to limit their exposure time to high noise areas.
3. **PPE:** Provide hearing protection, such as earmuffs or earplugs, to all workers exposed to noise levels above 85 dB.
4. **Health Surveillance:** Regular audiometric testing is conducted to monitor workers' hearing.

Protection of Workers from the Risks Related to Exposure to Vibration at Work Regulations (LN 371 of 2005)

- **Sources of Vibration:**
  - Hand tools (e.g., jackhammers, grinders, drills).
  - Heavy machinery (e.g., bulldozers, forklifts).
  - Transportation (e.g., trucks, trains, boats).
  - Manufacturing (e.g., vibrating conveyor systems).
- **Health Effects:**
  - Hand-Arm Vibration Syndrome (HAVS).
  - Musculoskeletal disorders.
  - Circulatory and nerve damage.

- **Legal Exposure Limits:**
  - Hand-arm vibration: 2.5 m/s^2 (action level), 5 m/s^2 (limit).
  - Whole-body vibration: 0.5 m/s^2 (action level), 1.15 m/s^2 (limit).
- **Control Measures:**

1. **Engineering:** Anti-vibration mounts, dampeners.
2. **Administrative:** Rest breaks, job rotation.
3. **PPE:** Vibration-dampening gloves, padded seats.

Protection of Workers from the Risks Related to Exposure to Vibration at Work Regulations (LN 371 of 2005)

- **Scenario:** Workers use jackhammers and vibrating tools during road construction, leading to hand-arm vibration syndrome (HAVS) risks.

1. **Engineering Controls:** Use anti-vibration handles or newer equipment designed to reduce vibration exposure.
2. **Administrative Controls:** Implement a job rotation system to minimize daily exposure duration.
3. **PPE:** Provide vibration-dampening gloves to reduce the impact on hands.
4. **Health Surveillance:** Monitor workers for early symptoms of HAVS or musculoskeletal disorders.

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At what noise level (dB(A)) is hearing protection mandatory under LN 158 of 2006?

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Non-Ionising Radiation (NIR)

- **Definition:** Radiation that does not carry enough energy to ionise atoms or molecules (i.e., it does not remove tightly bound electrons from atoms).
- **Spectrum:** Covers the **entire range of electromagnetic radiation** except for ionising radiation.
- **Examples:**
  - **Electromagnetic Fields (EMFs):** Low-frequency part of the spectrum.
  - **Optical Radiation:** A specific high-frequency part of non-ionising radiation.
  - Radiofrequency (RF) radiation, microwaves, infrared (IR), and ultraviolet (UV).
- **Key Characteristics:** Non-ionising radiation is not energetic enough to damage DNA directly but can cause heating, burns, or long-term tissue damage depending on exposure levels.

Protection of Workers from the Risks Related to Exposure to Electromagnetic Fields Regulations (LN 257 of 2016)

- **Sources of Electromagnetic Fields (EMFs):**
  - Powerlines, electrical substations.
  - MRI machines, radiofrequency (RF) transmitters.
  - Industrial welding machines.
  - Communication equipment (e.g., mobile phone towers, radar systems).
  - Induction heating systems in manufacturing.
- **Health Effects:**
  - Low exposure: No proven long-term health effects.
  - High exposure: Nervous system disruption, tissue heating, electrical burns.

- **Control Measures:**

1.Engineering Controls:

1. Shielding (e.g., Faraday cages around RF sources).
2. Insulated cables and equipment.

2.Administrative Controls:

1. Restricting access to high-exposure areas.
2. Displaying warning signage in EMF zones.

3.Personal Protective Equipment (PPE):

1. Protective clothing (for very high-intensity fields in specialised environments).

Protection of Workers from the Risks Related to Exposure to Electromagnetic Fields Regulations (LN 257 of 2016)

- **Scenario:** Workers operate industrial welding equipment that generates high electromagnetic fields (EMFs).

1. **Engineering Controls:** Shield welding machines to reduce EMF emissions at the workstation.
2. **Administrative Controls:** Restrict access to high-EMF areas and ensure signage indicates potential risks.
3. **PPE:** Not typically required for EMF exposure but ensure workers maintain safe distances.
4. **Health Monitoring:** Workers with medical devices, like pacemakers, are assessed individually for risks.

Protection of Workers from the Risks Related to Exposure to Optical Radiation at Work Regulations (LN 250 of 2010)

- **Content:**
- **Sources of Optical Radiation:**
  - **Natural:** Bright sunlight (UV radiation exposure in outdoor work).
  - **Artificial:**
    - Welding arcs.
    - Lasers in medical, industrial, or construction settings.
    - UV lamps (e.g., in disinfection or tanning).
    - LED and halogen lighting (at high intensities).
- **Health Effects:**
  - Eyes: Corneal injuries (e.g., "arc eye" from welding), cataracts.
  - Skin: Burns, increased risk of skin cancer.

- **Control Measures:**

1.Engineering Controls:

1. Laser interlocks and beam shields.
2. Protective barriers for UV or welding setups.

2.Administrative Controls:

1. Training on safe laser operation.
2. Displaying appropriate hazard signage.

3.Personal Protective Equipment (PPE):

1. UV-blocking goggles and face shields.
2. Protective clothing (e.g., UV-resistant garments).

Protection of Workers from the Risks Related to Exposure to Optical Radiation at Work Regulations (LN 250 of 2010)

- **Scenario:** Welders are exposed to ultraviolet (UV) and infrared (IR) radiation from welding arcs.

1. **Engineering Controls:** Install welding curtains to shield bystanders from harmful radiation.
2. **Administrative Controls:** Train workers on safe welding practices and enforce the use of protective equipment.
3. **PPE:** Require welding helmets with proper filters to block UV and IR radiation.
4. **Health Surveillance:** Conduct periodic eye exams to detect any radiation-induced damage.

Basic Safety Standards for Ionising Radiation Regulations (LN 210 of 2018)

- **Content:**
- **Sources of Ionising Radiation:**
  - Medical imaging (X-rays, CT scans).
  - Nuclear reactors, power plants.
  - Industrial radiography (e.g., pipeline inspections).
  - Research facilities using radioactive materials.
- **Health Effects:**
  - Acute exposure: Radiation sickness.
  - Chronic exposure: Cancer, genetic mutations.

- **Control Measures:**

1. **Engineering:** Lead shielding, containment.
2. **Administrative:** Radiation dose monitoring, signage.
3. **PPE:** Lead aprons, thyroid shields.

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What health issue can result from prolonged use of vibrating tools?

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Basic Safety Standards for Ionising Radiation Regulations (LN 210 of 2018)

- **Scenario:** A medical imaging facility uses X-ray machines, exposing radiologists to ionising radiation.

1. **Engineering Controls:** Install lead shielding in walls and doors of the imaging room to contain radiation.
2. **Administrative Controls:** Schedule X-ray operations to limit individual exposure and post clear warning signs in restricted areas.
3. **PPE:** Provide lead aprons, thyroid collars, and lead-lined gloves to radiologists and technicians.
4. **Dosimetry:** Use personal dosimeters to monitor workers' cumulative radiation exposure.

Physical Hazards – Other examples

1. **Temperature Extremes:**
    1. Heat stress (e.g., industrial furnaces).
    2. Cold stress (e.g., outdoor winter work).
2. **Pressure Hazards:**
    1. High-pressure systems (e.g., gas cylinders).
    2. Vacuum environments (e.g., laboratory chambers).
3. **Confined Spaces:**
    1. Tanks, silos, and crawl spaces.
4. **Mechanical Hazards:**
    1. Moving machinery (e.g., rotating parts, conveyors).
5. **Ergonomic Hazards:**
    1. Repetitive motions, awkward postures.
6. **Slips, Trips, and Falls:**
    1. Uneven surfaces, working at heights.
7. **Electrical Hazards:**
    1. Shocks, burns, and arc flashes.
8. **Explosive Atmospheres:**
    1. Dust clouds, flammable gases.
9. **Fire and Thermal Hazards:**
    1. Open flames, flammable liquids.
10. **Weather-Related Hazards:**

- Storms, wind, and lightning.

Breakout Room Scenario 2: Physical Hazards

- **Objective:** Identify and address a single physical hazard effectively.
- **Instructions:**
- Work in groups (3–5 participants per room).
- Read the scenario carefully.
- Complete the following tasks:
  - Identify the primary physical hazard.
  - Recommend two control measures.
  - Suggest one health monitoring activity for affected workers.

Scenario Details

- **Scenario:**
  Your team is evaluating a construction site where workers use **jackhammers** for road repairs.
- **Key Information:**
  - The tools generate high levels of vibration.
  - Some workers complain of numbness in their fingers after prolonged use.
  - Vibration-dampening handles are not in use, and workers are not rotated between tasks.
- **Tasks:**

1. Identify the **primary physical hazard** related to the jackhammers.
2. Recommend two specific control measures:
3. Propose one **health monitoring activity** to ensure workers' long-term health.

Deliverables

- Hazard identified.
- Two practical control measures.
- One health monitoring recommendation

Recap

1.Chemical Hazards:

1. Key regulations: Chemical Agents, Asbestos, Carcinogenic…, REACH, CLP, IMDG Code.
2. Control measures:
    1. Substitution,
    2. Ventilation
    3. PPE.
3. SDS

2.Physical Hazards:

1. Key hazards: Noise, vibration, Non-Ionising & Ionising, heat stress, ergonomic risks.
2. Control measures: Engineering, administrative, PPE.
3. Regulations: LN 158 of 2006, LN 371 of 2005, LN 250 of 2010, LN 257 of 2016.

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