

Mutagenic chemical agents

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Introduction

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Identification

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Routes

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Replacement

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Preventive measures

In general, **mutagenic chemical agents can only be marketed if authorised.**

1

Objective:

To identify mutagenic chemical agents, learn the routes into the body, and find out how to protect yourself when handling them.

2

Area of application: laboratories and workshops in which mutagenic chemical agents are handled.

3

What is a mutagenic chemical agent?

It is a substance or mixture of substances that **can cause mutations** (a permanent change in the amount or structure of the genetic material in a cell) **in human stem cells** that can be transmitted to descendants.

4

Classifications:

Category 1A

Substances that **are known** to be mutagens, based on the existence of **human evidence**.

Category 1B

Substances that **are known** to be mutagens for humans, based on the existence of **animal evidence**.

Category 2

Substances that **are suspected** of being mutagens for humans.

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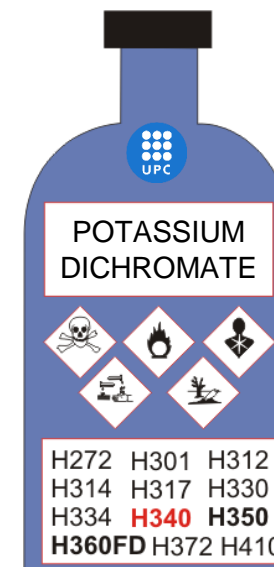


Preventive measures

To identify mutagenic chemical agents, **consult the label and/or the safety data sheet (SDS)**

Consult point 2 on the identification of hazards in the corresponding safety data sheet (SDS), which provides the information required to identify a mutagenic chemical agent.

Category	Pictogram	Signal word	Indications of hazards	H-phrase	R*-phrase
1A or 1B		Danger	May cause genetic defects	H340	R46
2		Warning	Suspected of causing genetic defects	H341	R68



* Special risks attributed to hazardous substances and preparations, according to RD363/1995 and RD255/2003

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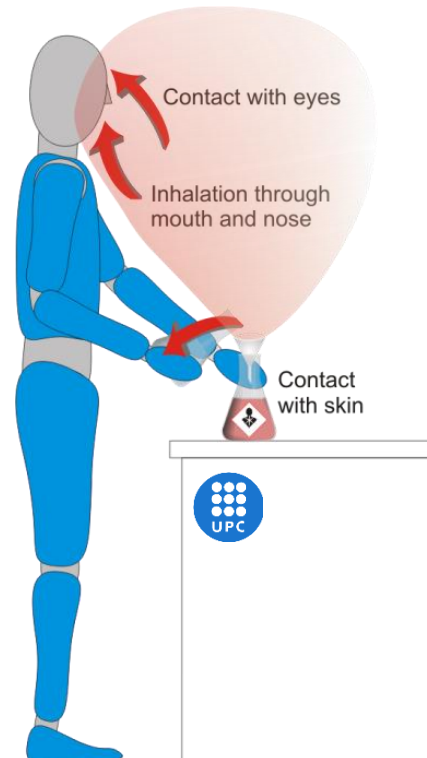
Routes are the ways chemical agents enter the organism. The main route is **respiratory**.

RESPIRATORY ROUTE

The route into the body for any chemical agent that is in the air in the form of a gas, vapour, fumes, powder, fibre, etc. that is taken into the lungs when the individual breathes in – **inhales the surrounding air through the nose or mouth**. Depending on the volume and shape of the particles, they will reach different distances along their passage through the respiratory system.

DIGESTIVE ROUTE

The route for chemical agents, which involves their **ingestion**, generally due to an involuntary **action** that is almost always associated with unhygienic practices and habits.



DERMAL ROUTE

The route for chemical agents that, when they come into **contact with the skin**, can cross it and reach the blood. The blood then distributes the chemicals around the body. Contact with eyes (irritation, etc.) is part of this route.

PARENTERAL ROUTE

The route for chemical agents **through injuries to the skin** or direct inoculation with the toxin.

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If the mutagenic agent is replaced by another chemical agent, the risk of exposure is eliminated.

Generally, chemical agents that are **mutagenic do not have a universal replacement**, but can be substituted in certain applications by other chemical agents that are not mutagenic, or by alternative processes.

Example of a MUTAGENIC chemical agent	Category	Applications	Alternative/Substitute
Potassium dichromate	Carc. 1B Muta. 1B	Cleaning of laboratory material	- Aqua Regia (HCl/HNO ₃)
Benzene	Carc. 1A Muta. 1B	Laboratory analysis in industrial chemistry	- Anisole, cyclohexane, heptane, toluene
		Manufacture of other basic products in organic chemistry	- Toluene
Trichloroethyl	Carc. 1B Muta. 2	A general solvent for oils, wax, etc.	- Non-chlorinated organic solvents (hydrocarbons, alcohols, ketones, ethers and esters)
		Cleaning of electrical equipment	- A solvent composed mainly of methoxy-nonafluorobutane



For more information on potential substitutes, consult the **INFOCARQUIM (INFORMació sobre CARcinògens QUÍMics)** database on the **INSHT website**: <http://infocarquim.insht.es:86/Forms/About.aspx>



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Preventive measures (1/2)

If the mutagenic chemical cannot be replaced, observe the following preventive measures.

- ✓ Before handling the mutagenic chemical:
 - Check the **relevant information** (hazards, precautions, etc.) on the **safety data sheet (SDS) for the chemical**.
 - Read and follow the health and safety measures on the SDS for the chemical.
- ✓ **Work with sealed equipment** to prevent exposure to mutagenic chemicals due to accidental emissions at critical parts of the system (valves, joints, etc.).
- ✓ **Limit the amounts and concentrations** of the mutagenic chemical to reduce exposure.
- ✓ **Limit the number of workers** who handle mutagenic chemicals and reduce exposure time.
- ✓ **Delimit and signpost work areas** where mutagenic chemicals are handled.

Danger! Mutagenic chemicals in the work area



Chemical handled: potassium dichromate

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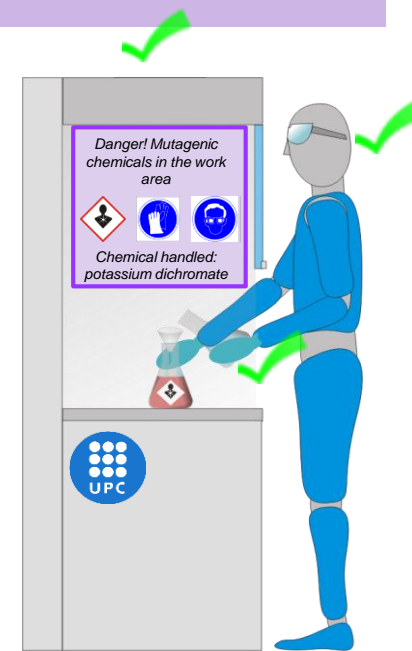
Preventive measures (2/2)

If the mutagenic chemical cannot be replaced, observe the following preventive measures.

- ✓ **Handle** mutagenic chemicals in the **fume cupboard** to prevent the inhalation of vapours and aerosols.
- ✓ **Use the following (minimum) personal protective equipment:**
 - **nitrile and/or neoprene chemical protection gloves** to protect the skin,
 - **safety goggles** to protect the eyes.

Consult the safety data sheet for the chemical to ensure the right PPE is used. If you have any queries, contact the manufacturer.
- ✓ **Wear appropriate clothes** (lab coat or similar) to prevent contaminating your street clothing. Do not wash work clothes at home. Use disposable lab coats or overalls as an alternative.
- ✓ **Store** mutagenic chemicals in a chemical storage cabinet with **access limited** to authorised personnel.
- ✓ **Health surveillance** is **compulsory** for workers exposed to mutagenic chemicals. Request a medical appointment by clicking on this link:

<https://www.upc.edu/prevencio/ca/salutupc>



Fume cupboard

US OBLIGATORI
DE GUANTS
DE PROTECCIÓUS OBLIGATORI
DE PROTECTORS
OCULARS

Compulsory personal protective equipment

For more information on chemicals, consult the chemicals section on the Occupational Health and Safety website:
<http://www.upc.edu/prevencio/ca/seguretat-higiene/productes-quimics>