



# **OCCUPATIONAL HEALTH AND SAFETY**

# CHEMICAL RISK FACTORS



LEGISLATION ON CHEMICAL RISK AGENTS IN OUR  
COUNTRY

(ÜLKEMİZDE KİMYASAL RİSK ETMENLERİ KONUSUNDAKİ  
MEVZUAT)

**1. Kimyasal Maddelerle Çalışmalarda Sağlık Ve Güvenlik Önlemleri Hakkında Yönetmelik**

Çalışma ve Sosyal Güvenlik Bakanlığı

Resmi Gazete: 28733 – 12.08.2013

**2. Kanserojen Ve Mutajen Maddelerle Çalışmalarda Sağlık Ve Güvenlik Önlemleri Hakkında Yönetmelik**

Çalışma ve Sosyal Güvenlik Bakanlığı

Resmi Gazete:28730 - 06.08.2013

**3. Asbestle Çalışmalarda Sağlık Ve Güvenlik Önlemleri Hakkında Yönetmelik**

Çalışma ve Sosyal Güvenlik Bakanlığı

Resmi Gazete: 28539- 25.01.2013

**4. Çalışanların Patlayıcı Ortamların Tehlikelerinden Korunması  
Hkk. Yön.**

Çalışma ve Sosyal Güvenlik Bakanlığı

Resmi Gazete: **28633 30 Nisan 2013**

**5. Parlayıcı, Patlayıcı, Tehlikeli Ve Zararlı Maddelerle Çalışılan  
İşyerlerinde Ve İşlerde Alınacak Tedbirler Hakkında Tüzük**

Çalışma ve Sosyal Güvenlik Bakanlığı

Resmi Gazete: 24.12.1973/14752

**6. Asbest sökümü ile ilgili eğitim programlarına ilişkin  
Çalışma ve Sosyal Güvenlik Bakanlığı**

Çalışma ve Sosyal Güvenlik Bakanlığı

Resmi Gazete: 28692 – 29.06.2013

**7. Muhtemel Patlayıcı Ortamda Kullanılan Teçhizat Ve Koruyucu Sistemler İle İlgili Yönetmelik**

Sanayi ve Ticaret Bakanlığı

Resmi Gazete: 26392 30.12.2006

**8. Tehlikeli Atıkların Kontrolü Yönetmeliği**

Çevre ve Orman Bakanlığı

Resmi Gazete Tarih Ve Sayısı :27 Ağustos 1995/ 22387

**9. Tehlikeli Maddelerin ve Müstahzarların Sınıflandırılması, Ambalajlanması ve Etiketlenmesi Hakkında Yönetmelik**

Resmi Gazete Tarih ve Sayı: 26/12/2008/ 27092 (mükerrer)

**10. Tehlikeli Maddeler Ve Müstahzarlara İlişkin Güvenlik Bilgi Formlarının Hazırlanması Ve Dağıtılması Hakkında Yönetmelik**

Resmi Gazete Tarih ve Sayı: 26/12/2008/ 27092 (mükerrer)

**11. Bazı Tehlikeli Maddelerin, Müstahzarların Ve Eşyaların Üretimine, Piyasaya Arzına Ve Kullanımına İlişkin Kısıtlamalar Hakkında Yönetmelik**

Resmi Gazete Tarih ve Sayı: 26/12/2008/ 27092 (mükerrer)

**12. Binaların Yangından Korunması Hakkında Yönetmelik**

Resmi Gazete Tarih Ve Sayı: 19/12/2007 / 26735 değişiklik  
09/09/ 2009 / 27344

-Chemicals are a part of life.

-While the production was 1 million tons 50 years ago, today at least 400 million tons of chemicals are produced every year in the world.

- At least 80.000-100.000 different types of chemicals are used in the world.

-Approximately 5,000-7,000 chemicals are known to be harmful, and 3000 of them are carcinogenic.

-Chemicals are used in all areas: mining, welding, machinery and factory, office, home etc.

- The main way to work safely with chemicals is to provide the necessary safe working environments by knowing the effects of these substances.

-There should be labels and warning information about the contents of the chemicals used.



Chemical hazards are the most serious risk for workers' health today.



# DEFINITIONS

**A chemical substance** is a form of matter having constant chemical composition and characteristic properties.



pharmaceutical preparation : is mix or solutions of at least two or more substances.



have you ever been to a pharmacy?  
sometimes the pharmacist mixes a few drugs and makes a new drug. That is the name of the Pharmaceutical preparation.



\* **A chemical substance** can be simple substances, chemical compounds.

\* It occurs naturally

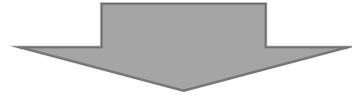
\* *It can be produced,*

\* *It can occur during any process,*

\* *It can be produced as waste*

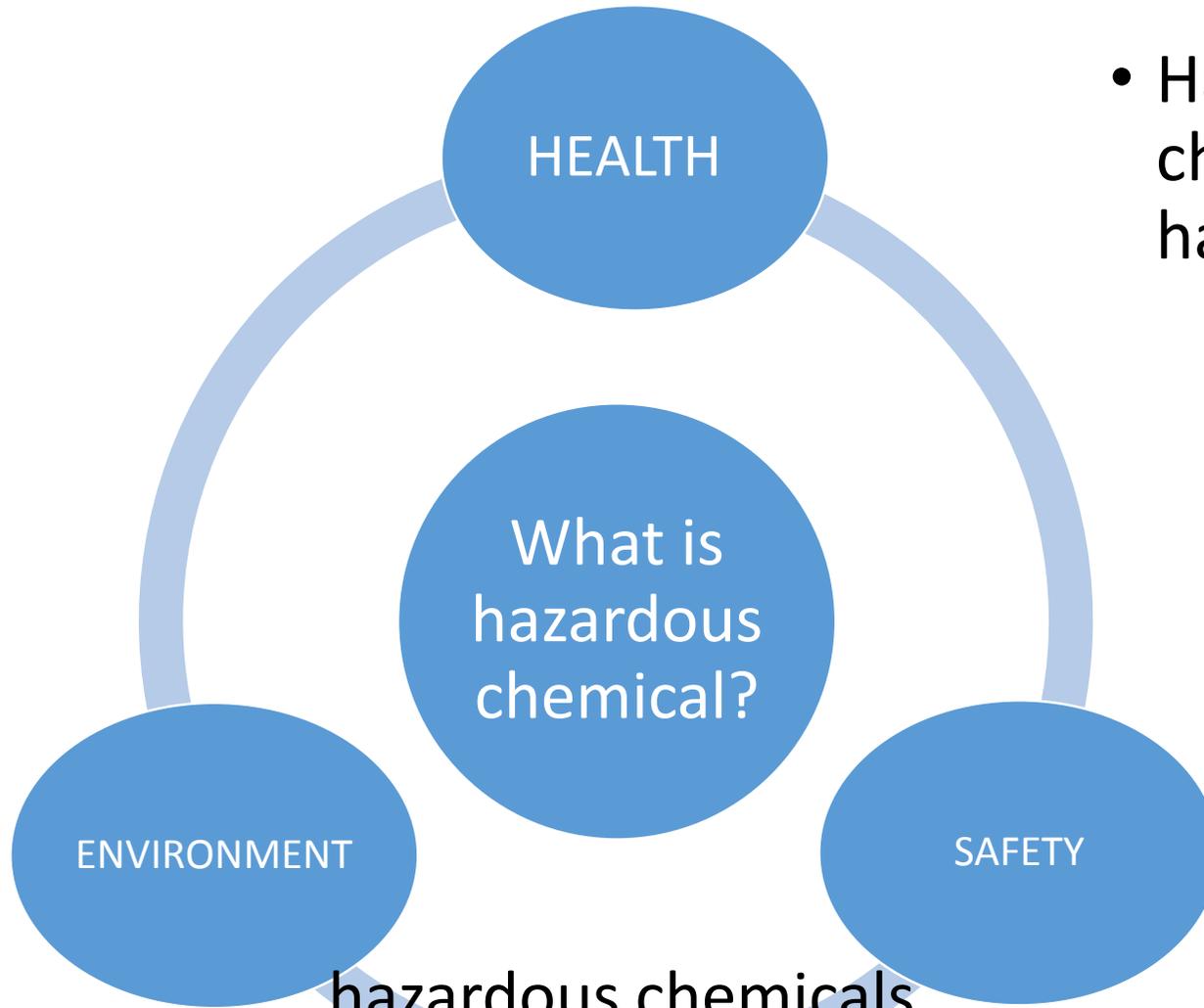
\* *It can be occurred accidentally*

## Hazardous Chemical Substances



Any toxic, harmful, corrosive, irritating or asphyxiant substance with  
a) a prescribed exposure limit.  
b) Or which have a detrimental effect on health.





- Hazardous chemicals can harm or damage.

hazardous chemicals they may create ecotoxic risks, fire risks and other physical risks.

*People who may be exposed to Hazardous Chemical Substances shall obey lawfull instructions regarding:*

- Prevention of HCS release
- Use of personal protective equipment (PPE)
- Biological tests
- Cleaning up and disposal od HCS containin materials
- Housekeeping, personal hygiene
- Application of information & training



**THE FACTORS WHICH  
DETERMINATE THE DAMAGES OF  
CHEMICALS**

**1-Physical and  
chemical  
properties**

**2-how exposed,  
how much  
exposed?**

**3- Characteristics  
of the exposed  
person**

**4- Environmental  
properties**

# (Exposure Limit Definitions)

**MAC Limit: (Müsaade edilen azami konsantrasyon):**

★ maximum permissible concentration of a chemical substance in the workplace air which generally does not have known adverse effects on the health of employees.

**TLV: (Ortalama Eşik değer- Treshold Limit Value):**

Çalışanlara zararlı etki göstermeden çalışılabilecek **ortalama** konsantrasyon.

TWA

TLV-TWA (zaman ağırlıklı ortalama- *Time Weighted Avarage*) : eight-hour time-weighted average (TWA).

This is the maximum amount or concentration of a chemical that a worker may be exposed for 8 hours.

STEL

**TLV-STEL (ShortTerm Exposure Level)** : time-weighted average concentration of a substance over a 15-minute **period** thought not to be injurious to health.

# ASBESTOS

★ Permissible Exposure Limit (PEL) for asbestos is **0.1 fiber per cubic centimeter** of air as an eight-hour time-weighted average (TWA). ★

## Sınır Değer

İşveren, işçilerin maruz kaldığı havadaki asbest konsantrasyonunun, sekiz saatlik zaman ağırlıklı ortalama (twa) değerinin 0,1 lif/cm<sup>3</sup>'ü geçmemesini sağlayacaktır.



What is the limit value that should not be exceeded in terms of chemical environment factors?

- a) MAC
- b) STEL
- c) TWA
- d) MSDS

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- b) STEL
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Which of the following is a substitution study for protection from hazards?

- a) local ventilation to a welding bench
- b) use of safety belts in scaffolding
- c) use of gloves to protect against the effects of a chemical
- d) replacing a harmful chemical with a less harmful chemical

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Let's remember the «control hierarchy»



1) Elimination



2) Substitution



3) Engineering Controls



4) Administrative Controls



5) Personal Protection Equipment



According to 6331 ISG law, what does STEL mean?

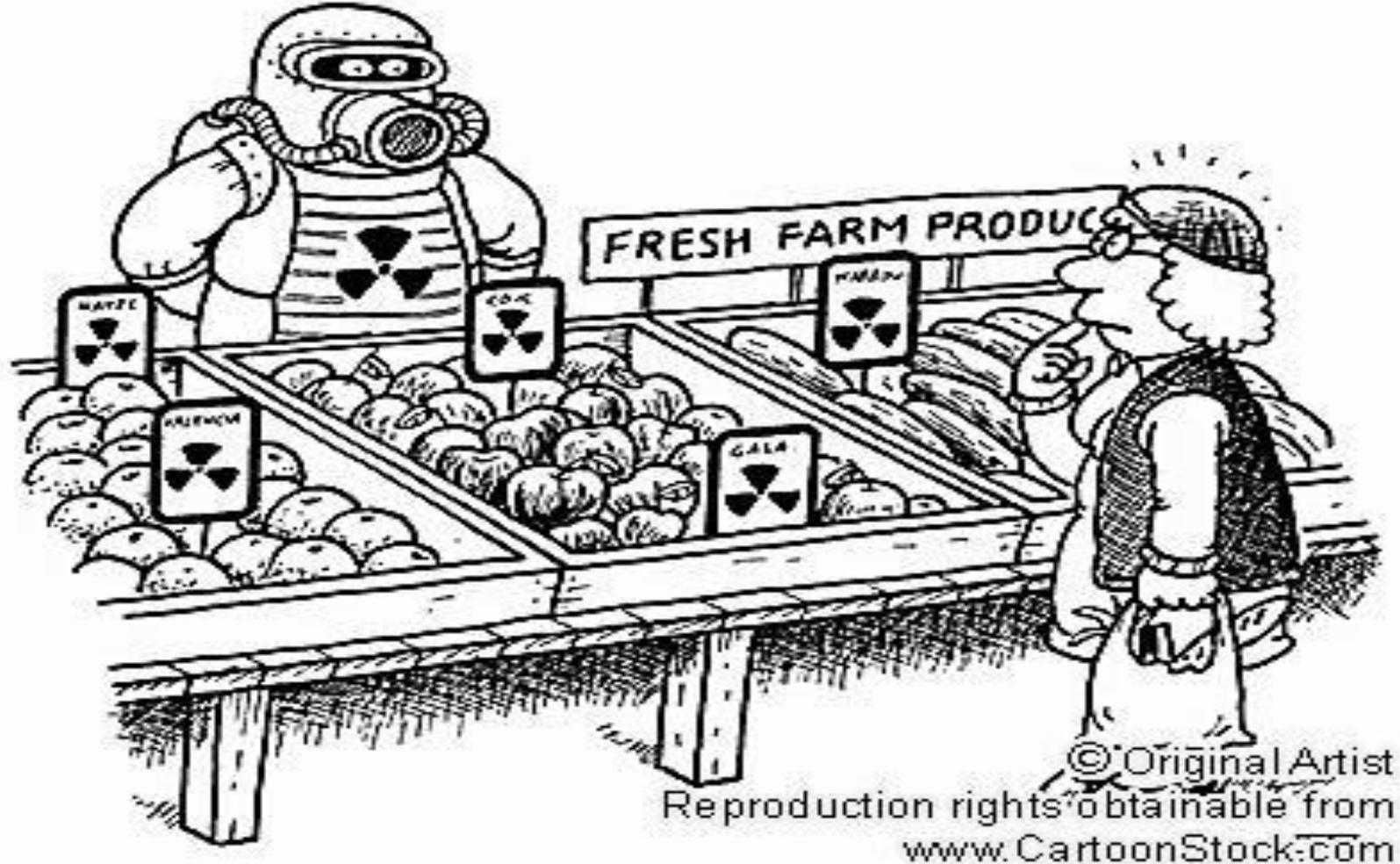
- a) Material Safety Data Sheets (MSDS)
- b) International Marine Organization
- c) Maximum weight that can be lifted by hand
- d) Concentration of a substance over a 15-minute period.

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# ROUTES OF INTAKE

The route of entry of a chemical into the body

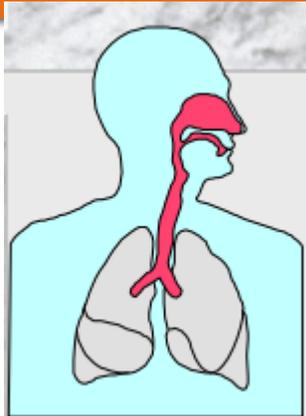


# ROUTES OF INTAKE CHEMICALS TO THE BODY

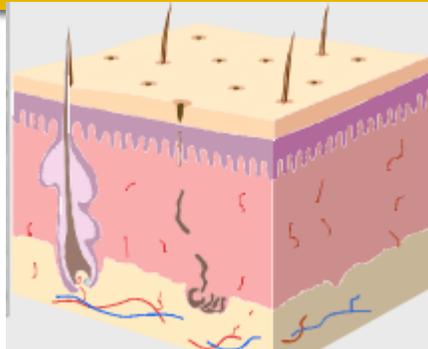


Chemicals harm the health by entering the body in three ways.

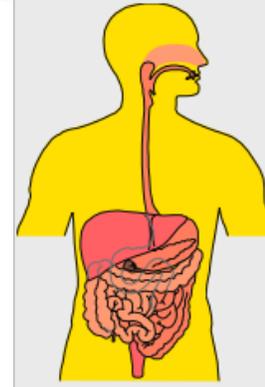
**INHALATION**  
(breathing)



**SKIN**  
**ABSORPTION**



**INGESTION**  
(swallowing)



# ROUTES OF INTAKE CHEMICALS TO THE BODY

## INHILATION

Breathing in dusts, gases and vapours is the **most common** route of entry.



Inhalation may result in:  
Bronchitis; asthma;  
cancers, etc.



## ABSORPTION

Absorption through the skin (or eye) is another route of entry for toxic substances.

Effects include:  
Burning of the skin/eye;  
Irritation of the skin (dermatitis); sensitising effects (contact dermatitis); skin cancer;



## INGESTION

Swallowing substances is the least common route of entry for toxic substances. However, they can pass through the digestive system, and affect the gastro-intestinal organs of the body:  
Chemicals may be wallowed accidentally if food or hands are contaminated.



The workplace should keep records of assessment for 40 years. 

Should keep «medical surveillance records» for 40 years. 

If the activity of that workplace ceases, then records must be delivered to the provincial directorate of social security institution *(SGK İl müdürlükleri)* 



Which of the following is wrong with regard to the entry of chemical agents into the body?

- a) Through inhalation
- b) Through absorption through the skin
- c) Through digestion
- d) By thermal radiation

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# Classification of Chemicals

Hazardous chemicals can be examined under three main headings as stated in the European Union legislation:

**Health hazard group**

**Physical hazard group**

**Environmental Hazard group**

★ **Employee damage himself**

★ **damage to the environment** ★

# CLASSIFICATION ACCORDING TO THE REGULATION ON HEALTH AND SAFETY PRECAUTIONS IN «WORKING WITH CHEMICAL SUBSTANCES»

KİMYASAL MADDELERLE ÇALIŞMALARDA SAĞLIK VE GÜVENLİK ÖNLEMLERİ HAKKINDA YÖNETMELİK'E GÖRE SINIFLANDIRMA

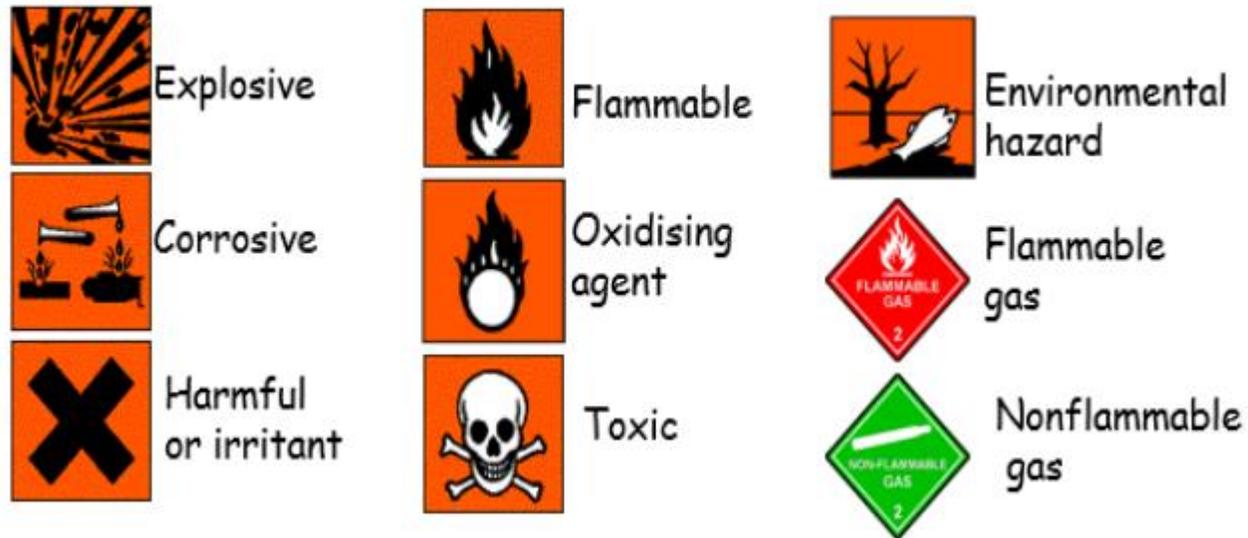


1. Explosives (E),
2. Oxidizing gases (O),
3. Flammable gases
4. Highly Flammable gases (F),
5. Extremely flammable gases (F+)
6. Toxic (T),
7. Very toxic
8. Harmful (Xn),
9. Corrosive (C),
10. Irritant (Xi),
11. Allergic,
12. Carcinogenic, (T)
13. mutagen,
14. Toxic for fertility
15. Environmental hazard (N)



# Chemical hazard symbols

Some of the chemical hazard symbols are shown here. The chemical containers must be labelled by these symbols with respect to its content.



**Chemical hazard symbols shown with black symbols on orange sheets**

-For full list, you can visit <http://chemistry.about.com/od/healthsafety/ig/Laboratory-Safety-Signs/>

-These symbols are internationally agreed.

-The door of storage room or chemical cabinets must be labelled with respect to its contents.

★ Biological and radiation hazard symbols are shown here. They are shown black symbols on yellow sheets



## Explosives (E)

An **explosive** (or **explosive** material) is a reactive substance that contains a great amount of potential energy that can produce an **explosion** if released suddenly, usually accompanied by the production of light, heat, sound, and pressure.



## Oxidizing (O)



If a substance oxidizes, it combines with oxygen and loses hydrogen to form another substance



# What is the difference between flammable, highly flammable and extremely flammable gases?



- Extremely flammable: Flash point below  $< 0\text{ C}$ , Boiling point is  $35\text{ C}$

0



- Highly flammable: Flash point below  $< 21\text{ C}$

0

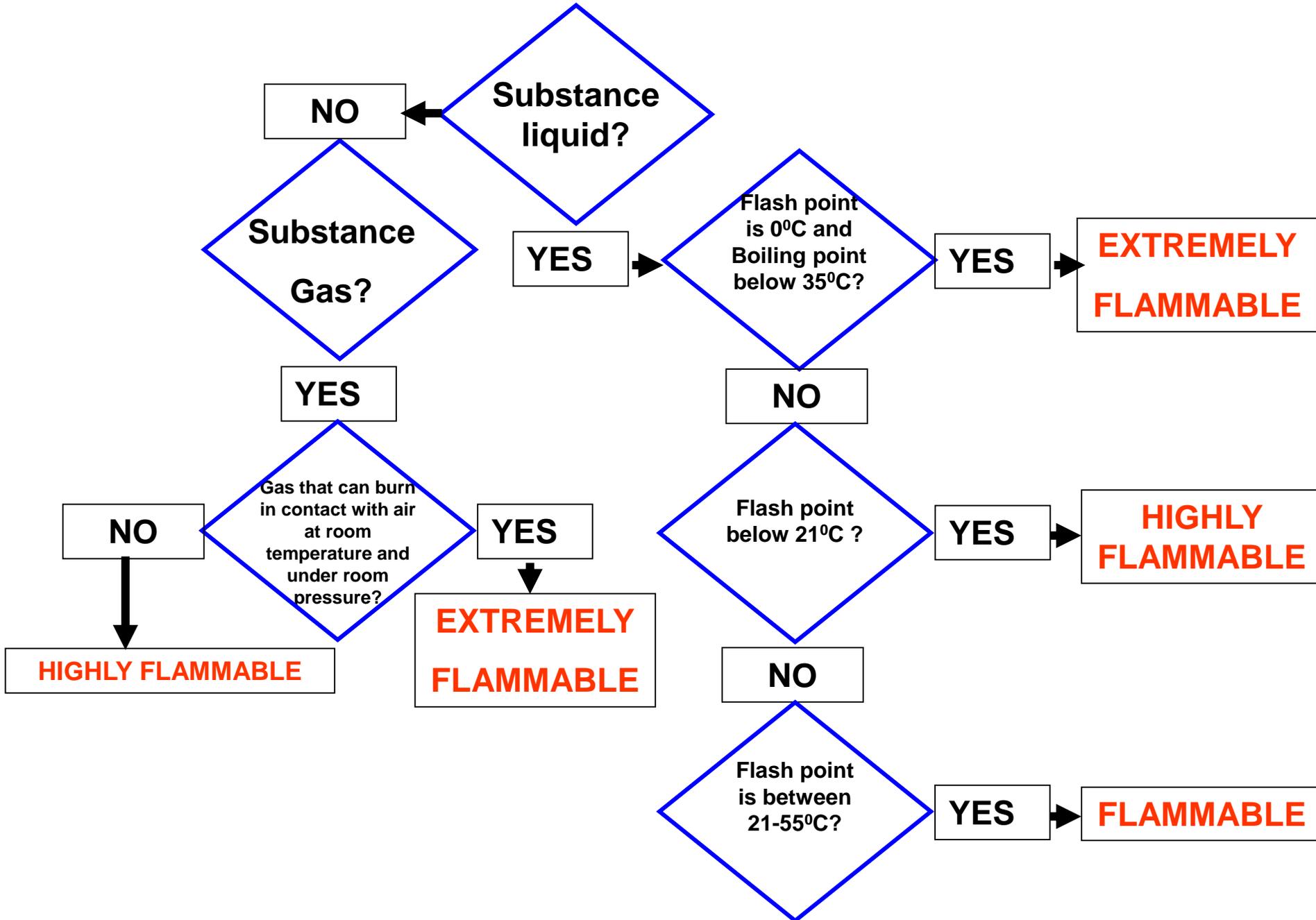


- Flammable: Flash point is between  $< 21-55\text{ C}$

0



# Algorithm Of Flammable, Highly Flammable And Exteremy Flammable Substances



**Toxic (T)**



Poisonous. Containing or being poisonous material especially when capable of causing death or serious debilitation



**VERY toxic (T+)**

Very poisonous.



Harmful (Xn)



Xn: Nocif  
(zararlı)

Substances that cause acute or chronic damage or death on human health when inhaled, taken by mouth, absorbed through the skin

Corrosive (C)



C: Corrosive  
(Aşındırıcı)

In contact with living tissue, they can cause tissue destruction.

Irritant (Xi)



Xi: irritant  
(Tahriş edici)

It is not corrosive, but which causes a reversible inflammatory effect on living tissue by chemical action at the site of contact.,

**Chemicals are classified as;**

**Solids (Powders)**

**Liquids (Acids)**

**Gases**

- The most common acids are;

- *hydrochloric acid,*
- *sulfuric acid,*
- *nitric acid,*
- *chromic acid,*
- *acetic acid and*
- *hydrofluoric acid,*



sodium hydroxide burn



spilled acid burn



© iStockphoto.com

# A small HF acid burns and its results



damaged gloves



2 hours later



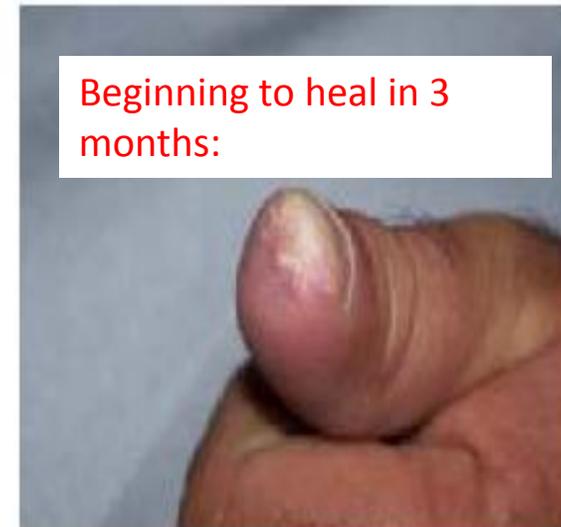
1 day later



3 days later



12 days later



3 s later

# Carcinogenic, Mutagen, Toxic Substances for fertility

They are substances that cause or accelerate cancer formation when inhaled, taken orally, when penetrated into the skin..

They are substances that cause genetic deformations when inhaled, taken orally, when penetrated into the skin.

They are substances that cause fertility deformation when inhaled, taken orally, when penetrated into the skin.

## Category 1 (T)

Substances known to be carcinogenic.



## Category 2 (T)

can be considered as carcinogenic.



## Category 3 (Xn)

Potential Carcinogenic Effects with insufficient Data



