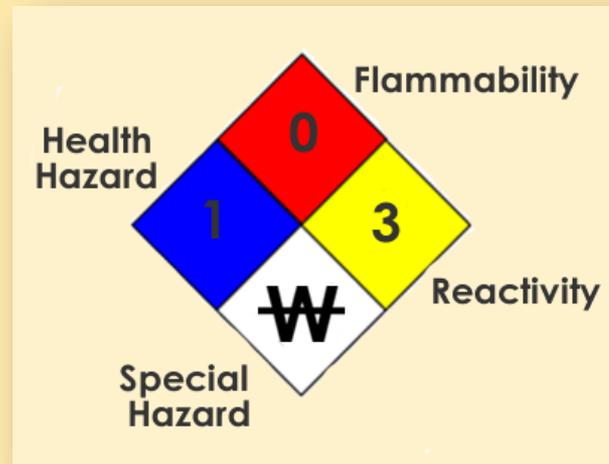


NFPA RATINGS / NFPA DIAMOND



Unit Overview

The unit provides information about the NFPA (National Fire Protection Association) ratings and related NFPA diamond.

By the end of this unit you will be able to interpret NFPA diamonds.

This information will prepare you to quickly identify the potential dangers associated with chemicals used in microsystems fabrication.

Objectives

- ❖ State the four categories of a NFPA diamond.
- ❖ Describe the five hazard levels for each category of a NFPA diamond.

Chemical Labels

OSHA (Occupational Safety & Health Association) requires that all in-plant / in-lab containers of hazardous chemicals be labeled, tagged, or marked with the chemical's identity and potential hazards.

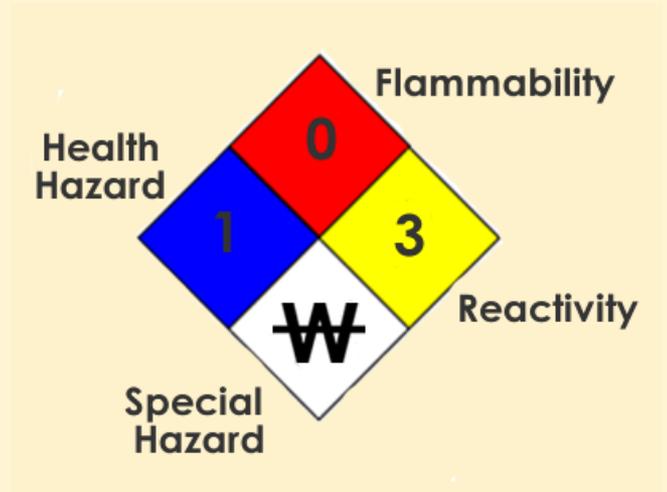
One instrument commonly used to identify a chemical's hazard is the National Fire Protection Association (NFPA) Diamond.



NFPA Standard

The NFPA diamond is a pictorial representation of these ratings as defined in the [NFPA 704 standard](#). The NFPA diamond is sometimes referred to as the "fire diamond".

Its basic information assists fire fighting, emergency and other personnel in selecting fire fighting tactics, appropriate personal protective equipment and emergency procedures.



Where are they?

Examples of where one might see a NFPA diamond:

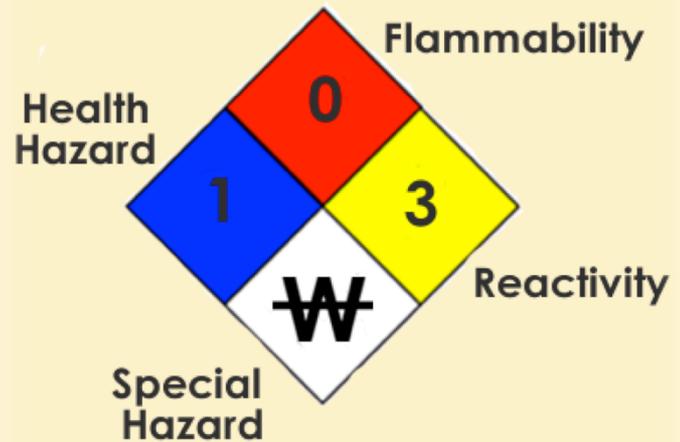
- ❖ 18-wheeler transporting a chemical
- ❖ Compressed gas cylinders
- ❖ Doors to storage rooms
- ❖ Entry doors to manufacturing facilities
- ❖ Chemical labels on bottles and crates

Where else have you seen one?

NFPA Diamond Colors

In a NFPA diamond each smaller diamond represents a particular hazard.

- ❖ Flammability is RED
- ❖ Health Hazard is BLUE
- ❖ Reactivity is YELLOW
- ❖ Special Hazard/PPE is WHITE



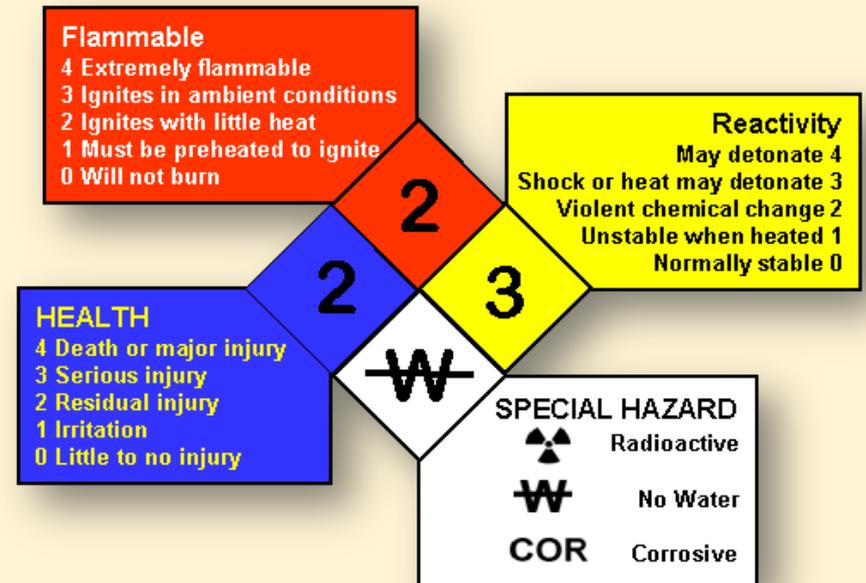
The number within each diamond represents the "level" of the hazard.

NFPA Ratings Levels

The level of each hazard is given a 0 to 4 rating

4 = "Most Severe Hazard"

0 = "Least Severe Hazard"



Review Question

What does each color on the NFPA diamond represent?

- ❖ RED
- ❖ BLUE
- ❖ YELLOW
- ❖ WHITE

Review Question

What does each color on the NFPA diamond represent?

❖ RED

□ *Answer: Flammability*

❖ BLUE

□ *Answer: Health*

❖ YELLOW

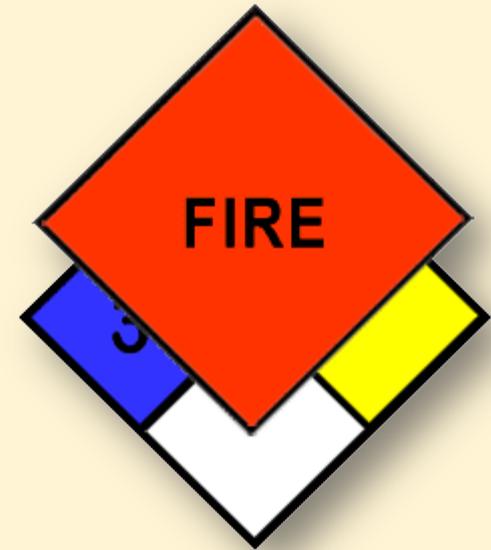
□ *Answer: Reactivity*

❖ WHITE

□ *Answer: Special hazards / PPE*

RED: Flammability Levels

- 4 – Will vaporize at normal atmospheric pressure and normal temperature
- 3 – Ignition may occur under most ambient conditions
- 2 – Must be moderately heated for ignition
- 1 – Must be preheated for ignition
- 0 - Will not burn



Review Question

What is the flammability rating for a chemical that *may* ignite under most ambient conditions?

Review Question

What is the flammability rating for a chemical that *may* ignite under most ambient conditions?

□ *Answer: 3*

BLUE: Health Hazard Levels

- 4** – Exposure may cause death or major residual injury
- 3** – Exposure could cause serious injury even if treated
- 2** – Intense or prolonged exposure may cause incapacitation
- 1** – May cause irritation
- 0** – Hazard no greater than ordinary material



Review Question

What health hazard rating is given to chemical that *may* cause irritation?

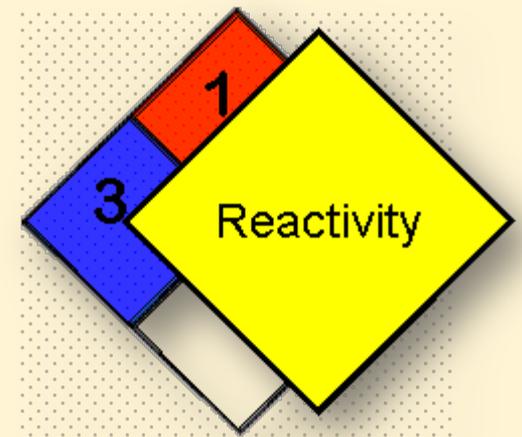
Review Question

What health hazard rating is given to chemical that *may* cause irritation?

□ *Answer: 1*

YELLOW: Reactivity Levels

- 4** – Can detonate at normal temperatures or pressures
- 3** – Can detonate with shock or strong ignition source
- 2** – Can undergo violent chemical change at elevated temperatures or pressures
- 1** – Can become unstable at elevated temperatures and pressures
- 0** – Stable



Review Question

What reactivity rating is given to a chemical that can undergo violent chemical change at elevated temperatures or pressures?

Review Question

What reactivity rating is given to a chemical that can undergo violent chemical change at elevated temperatures or pressures?

□ *Answer: 2*

WHITE: Special Hazard or PPE

Special symbols are used to indicate specific hazards

White is also used to indicate if special personal protective equipment (PPE) is required.



Special Hazards



Radioactive

COR
Corrosive



**Goggles
Required**



Reacts with Water

OX

Oxidizer

These are some of the symbols that may be used in the WHITE of a NFPA diamond.

Review Question

What are three items or warnings that you would find in the White diamond?

Review Question

What are three items or warnings that you would find in the White diamond?

- ❑ *Answer: Special hazards such as oxidizer, corrosive, poison and PPE items*

Review Question

What do the ratings in this NFPA diamond indicate?

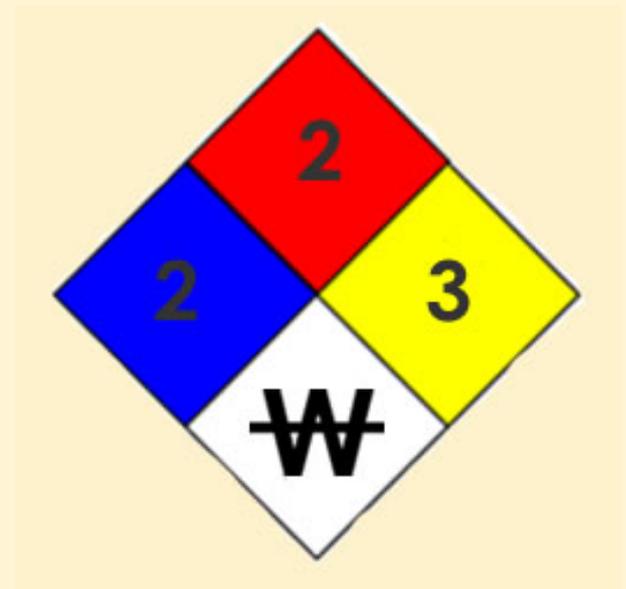
- ❖ *Red:*
- ❖ *Blue:*
- ❖ *Yellow:*
- ❖ *White: Do not mix with water.*



Review Question

What do the ratings in this NFPA diamond indicate?

- ❖ *Red: Must be moderately heated for ignition*
- ❖ *Blue: Could cause serious injury*
- ❖ *Yellow: Can detonate with shock*
- ❖ *White: Do not mix with water*



Summary

The NFPA diamond is a reliable warning symbol used on labels, doors, compressed gas cylinders, and other chemical storage devices.

It is important to be able to interpret the information provided by the NFPA diamond.

Disclaimer

The information contained herein is considered to be true and accurate; however the Southwest Center for Microsystems Education (SCME) makes no guarantees concerning the authenticity of any statement. SCME accepts no liability for the content of this unit, or for the consequences of any actions taken on the basis of the information provided.

Acknowledgements

Made possible through grants from the National Science Foundation Department of Undergraduate Education #0830384, 0902411, and 1205138.

Any opinions, findings and conclusions or recommendations expressed in this material are those of the authors and creators, and do not necessarily reflect the views of the National Science Foundation.

Southwest Center for Microsystems Education (SCME) NSF ATE Center
© 2009 Regents of the University of New Mexico

Content is protected by the CC Attribution Non-Commercial Share Alike license.

Website: www.scme-nm.org