

**NEW YORK CITY FIRE DEPARTMENT**

**BUREAU OF FIRE PREVENTION**



**STUDY MATERIALS FOR THE  
CERTIFICATE OF FITNESS EXAMINATION FOR  
SUPERVISING CHEMICAL LABORATORIES  
C-14**

## NOTICE OF EXAMINATION FOR

**Title:** Certificate of Fitness for the Supervision of Chemical Laboratories (C-14)

**Date of Test:** Written tests are conducted Monday to Friday (except legal holidays)  
9:00 AM to 2:30 PM.

### QUALIFICATION REQUIREMENTS

1. Applicant must be at least 18 years of age.
2. Applicant must have a reasonable understanding of the English language.
3. Applicant must present a letter of recommendation from his/her employer. The letter must be on official letterhead and must state the applicant's full name, character, physical condition, experience, and address of premises where applicant will be employed.
4. Applicant must present one (1) form of satisfactory identification i.e., driver's license or passport.
5. Applicant must hold a degree in
  - Chemistry, Biology, Biochemistry, Environmental or Health Sciences, Medical Technology and Chemical, Environmental, Mechanical or Biomedical Engineering, or related field or
  - A.A.S degree and a completion of a course on laboratory safety provided by the employer or
  - 60 credits with minimum of 21 credits in science courses and a completion of a course on laboratory safety provided by the employer.
6. Applicant must present evidence of academic degree(s) or transcript to verify science courses.

### APPLICATION INFORMATION

Application Fees: \$25.00 for originals and \$15.00 for renewals. The fee may be paid by credit card (no debit), in cash, money order, or personal check payable to New York City Fire Department. The \$25.00 fee must be payable by all applicants prior to taking the Certificate of Fitness test. Application forms are available at the Public Certification Unit, 1<sup>st</sup> floor, 9 MetroTech Center, Brooklyn, NY 11201.

### TEST INFORMATION

**Test:** The test will be of the written, multiple choice type. A passing score of at least 70% is required in order to secure a Certificate of Fitness.

This study material will help you to prepare for the written examination for the Certificate of Fitness for **Supervising Chemical Laboratories**. The study material includes information taken from the Fire Prevention Code and the Fire Prevention Rules issued by the Bureau of Fire Prevention of the New York City Fire Department (FDNY). The study materials do not contain all the information you need to know in order to work efficiently and safely when supervising a chemical laboratory. It is your responsibility to become familiar with all the rules and regulations of the City of New York, as they apply to this certification, even if they are not covered in these materials.

You must pass a multiple-choice test to qualify for the Certificate of Fitness. Barring any computer problem, you will take this test in a touch-screen computer. A score of 70% is required in order to pass the multiple-choice test. All questions on the multiple-choice test have four answer options. Only one answer is correct for each question. If you do not answer a question, your answer will be scored as incorrect. Read each question carefully before marking your answer. You will be able to **review** all your answers before you finish your test. There is no penalty for guessing on the multiple-choice test.

### **Sample Questions**

#### **1. Who was the first president of the United States?**

- (A) George Washington.
- (B) Madonna.
- (C) Abraham Lincoln.
- (D) Elvis Presley.

The correct answer is "A". You would mark "A" on your touch-screen terminal.

#### **2. What sports team plays at Shea Stadium?**

- (A) Raiders.
- (B) Giants.
- (C) Cardinals.
- (D) Mets.

The correct answer is "D". You would mark "D" on your touch-screen terminal.

## Certificates/Permits

A permit is required to maintain or operate a laboratory or storage room in which flammable gases, solids and liquids, explosive materials, oxidizing materials, and reactive materials are used in testing, research, experimental or instructional work. This permit will be issued by the Fire Commissioner after the location has been inspected and approved as acceptable for such practices. At least one Certificate of Fitness holder is per floor must be on the premises while the laboratory is in operation. Additional Certificate of Fitness holders may be required by the Fire Commissioner in some laboratories. The Certificate of Fitness holders are responsible for making sure that all fire safety regulations and procedures are obeyed on the premises. All Permits and Certificates of Fitness must be posted so that they may be readily inspected by Fire Department Representatives.

### Types of Laboratories

There are four different types of laboratories. These laboratories are classified according to their fire rating and whether or not an automatic sprinkler system is installed. The fire rating is based upon the amount time that the laboratory's construction can contain a fire without it spreading outside of the laboratory. The four different classifications are shown in the table below.

Lab Type	Fire Rating	Fire Protection
I	2 Hours	Sprinklers
II	1 Hour	Sprinklers
III	2 Hours	No Sprinklers
IV	1 Hour	No Sprinkler

**Chemicals stored and used in a laboratory can be placed into one of nine major categories according to its properties. A brief description of each of these categories is given below.**

- 1. Flammable Liquid** - Any liquid mixture, substance or compound which will emit a flammable vapor at a temperature below 100 degrees Fahrenheit when tested in a Tagliabue open cup tester (e.g., acetone, ethyl alcohol).
- 2. Combustible Liquid** - Any liquid mixture, substance or compound which will emit a flammable vapor at a temperature above 100 degrees Fahrenheit when tested in a Tagliabue open cup tester (e.g., fuel oil).
- 3. Flammable Solid** - A solid substance other than one classified as an explosive which is liable to cause a fire through friction, through absorption of moisture, through spontaneous chemical changes, or as a result of retained heat from manufacturing or processing (e.g., white phosphorous, nitrocellulose, metallic sodium and potassium, zirconium powder).
- 4. Oxidizing Material** - A substance that yields oxygen readily to support combustion (e.g., potassium permanganates, sodium nitrate, hydrogen peroxide).
- 5. Flammable Gas** - A gas that will form an explosive mixture upon concentration with air or that will ignite in air. Utility gas piped into a laboratory will not be considered as flammable gas for purpose of classification under these regulations.
- 6. Unstable (Reactive) Chemical** - A substance, other than one classified as an explosive or blasting agent, that will vigorously and energetically react, is potentially explosive, will polymerize or decompose instantaneously, will undergo uncontrollable auto-reaction or can be exploded by heat, shock, pressure or combinations thereof. (E.g., organic peroxides, nitromethane, ammonium nitrate). Unstable chemicals may only be used when the laboratory has a explosion hazard control system installed.

**7. Explosive Material** - Any quantity of Class A, Class B or Class C explosive as classified by the D.O.T. and any other chemical compounds or mixtures thereof used as the propelling or exploding material in any cartridge or other explosive device.

**8. Volatile Inflammable Oil** - Any oil or liquid that will generate an flammable vapor at a temperature below 100 degrees Fahrenheit when tested in a Tagliabue open cup tester. This refers to liquid products of coal tar, shale oil and petroleum. (E.g., xylol, toluol, gasoline, naptha, benzine)

**9. Corrosive Acid** - Sulfuric, hydrochloric, nitric, etc.

### **Laboratory Safety Procedures**

Containers used to store chemicals and gases must be clearly labeled. These labels must indicate the container's contents and the conditions under which the chemicals must be stored, **including expiration dates and shelf life**. The Certificate of Fitness holder must periodically check the labels to make sure that they are still legible. When the label on a container is not legible and its contents cannot be identified, the Certificate of Fitness holder must treat its contents as hazardous. The Certificate of Fitness holder must then make arrangements to have the contents of the container disposed of in a safe manner.

After using a chemical, the Certificate of Fitness holder must make sure that it is returned to the original storage location. Care must also be taken to make sure that the chemicals are stored in sealed containers. These containers must be in good condition. When defective or damaged containers are discovered, they must be replaced promptly.

Materials Safety Data Sheets (MSDS) must be made readily available to laboratory staff and emergency personnel at all times. Each MSDS lists a chemical's characteristics and describes the precautions that should be taken when it is handled. The MSDS may also provide information about the steps that should be taken in case of an emergency. The Certificate of Fitness holder must make sure that all MSDS are kept current and available at all times.

### **Bonding During Pouring Operations**

The build up of static electricity is a potential source of ignition and must be avoided when transferring a flammable liquid from one metal container to another. This is achieved by running a bonding wire from one container to the other. It is also advisable to ground the entire operation. It is also advisable reduce static electricity build up when transferring some liquids to a glass container (e.g., polar solvents). In this situation, the static electricity build-up should be limited by reducing the free fall distance of the liquid during the transfer. This is achieved by pouring the liquid through a funnel during the transfer. The funnel should be long enough so that it reaches the bottom of the glass container. As an added precaution, it is recommended that this type of transfer be done under controlled ventilation or in a fume hood when possible.

### **Handling of Acids and Bases**

Special precautions must be taken when handling concentrated acids and bases due to their corrosive nature. A substance is considered acidic when it has pH level less than seven. A substance is considered a base when it has a pH level greater than seven. When the pH level is exactly seven, the liquid is considered to be neutral. Care must be taken when mixing acids with water. The acid should be added to the water slowly. Do not add the water to the acid. Contact with skin or other sensitive tissues may cause severe burns. It is recommended that gloves, safety carriers, aprons and face shield be used when handling concentrated acids and bases. However, if contact with skin occurs the affected area should be flushed with water for at least 15 minutes. Then medical attention should be sought to treat the burn.

## Incompatible Chemicals

Incompatible chemicals should not be allowed to come into contact with each other. Contact between incompatible chemicals can produce poisonous or flammable gases, explosions, or spontaneous ignition. Some examples of incompatible chemicals are shown in the table below. The chemicals in the right column should not be allowed to come in contact the chemicals in the left column.

Acetone	Concentrated Acids, Nitric Acid, Perchloric Acid, Peroxides, and Permanganates
Alkali and Alkaline Earth Metals such as Sodium, Potassium, Lithium, Magnesium, Calcium, Aluminum	Carbon Dioxide, Carbon Tetrachloride and other Chlorinated Hydrocarbons (also do not use water or foam on fires involving the metals in the left column)
Acetylene	Chlorine, Bromine, Copper, Silver, Fluorine, and Mercury
Hydrogen Peroxide	Copper, Chromium, Iron, most metals or their salts, any flammable liquid, combustible materials, Aniline, or
Nitric Acid	Acetic Acid, Aniline, Concentrated Caustics, Chromic Acid, Hydrocyanic Acid, Hydrogen Sulfide, Flammable liquids and gases, and Nitritable substances
Oxygen	Oils, Grease, Hydrogen, Flammable liquids, and gases, Flammable solids

## Fume Hoods and Exhaust Systems

Approved fume hoods and exhaust systems which are vented to the atmosphere must be installed to extract noxious odors, flammable and poisonous gases and radioactive materials from storage areas and laboratory units. In locations where perchloric acids, strong oxidizing agents or highly reactive chemicals are used the fume hood must be served by an independent duct. This system must vent to the atmosphere without coming into contact with the vapors and gases extracted using the other fume hoods. Fume hoods are to be vented at a minimum average face velocity of 100 feet per minute, with minimum face velocity at any point not less than 75 feet per minute. Washdown provisions are required in fume hoods in which perchloric acids are heated above room temperature. The Certificate of Fitness holder must make sure that these systems are maintained in good working order. The hoods are designed for use when working with chemicals and should not be used for the storage of chemicals.

## Signs and Warning Placards

A list indicating the maximum amounts of hazardous chemicals that may be stored in each laboratory unit must be posted at a designated emergency response station. This list will be used by emergency personnel in case of a fire, explosion or other emergency. The list will allow the fire fighting personnel to adjust their fire fighting strategies for the premises. This list might also be reviewed by Fire Department representatives when conducting announced or unannounced inspections of the premises.

Wherever water reactive chemicals are stored, the Certificate of Fitness holder must make sure the sign below is posted:

**In Case of Fire Do NOT Use Water**

The sign shown below must be posted on the door to each chemical laboratory unit. The letters must be painted red on a white background.

**LABORATORY**  
**POTENTIALLY HAZARDOUS SUBSTANCES**

Signs indicating that smoking is prohibited must be conspicuously posted inside storage rooms and laboratories areas. These signs must also be posted outside the entrances to these areas. Smoking is never permitted inside the laboratories or storage rooms. Signs must also be posted at the entrances to areas where flammable gases, explosives, or materials that react with water are used or stored. These signs must indicate the type and nature of these gases and materials.

Warning placards indicating the type and nature of materials and gases used or stored in an area must be posted at the entrances to such areas. For example warning placards must be posted when radioactive or biohazardous materials or poisonous gases are used or stored in an area.

Exits: All exits in the laboratories must be clearly marked with illuminated exit signs. The Certificate of Fitness holder must make sure that these signs are kept clearly visible at all times. The Certificate of Fitness holder must also make sure that all laboratory exits are kept free of obstructions at all times.

## Storage Regulations

A limited amount of chemicals may be stored in each laboratory. The Certificate of Fitness holder must make sure that chemicals are stored under appropriate conditions. The table below describes the maximum laboratory storage limits.

A classification list stating the maximum amount of chemicals which may be used or stored in each laboratory unit must be provided at a single designated response point for emergency response.

Lab Type	Fire Rating	Fire Protection	Flammable Liquids	Flammable Solids	Oxidizing Materials	Unstable Reactive
I	2 hours	Sprinklers	30 gals	15 lbs.	50 lbs.	12 lbs.
II	1 hour	Sprinklers	25 gals	10 lbs.	40 lbs.	6 lbs.
III	2 hours	No Sprinklers	20 gals	6 lbs.	30 lbs.	3 lbs.
IV	1 hour	No Sprinklers	15 gals	3 lbs.	20 lbs.	2 lbs.

**Note:** The Fire Commissioner may grant special permission to exceed the above limitations.

## General Storage Rules

1. Minimize the amount of chemicals stored in the laboratory. That is, only store those chemicals that are required.
2. Use safety cans to store flammables when possible.
3. Use approved fireproof storage cabinets for storing flammables that cannot be stored in flammable cans. These cabinets must be approved by OSHA's General Industry Standards for Flammable and Combustible Liquids.
4. Make sure that all containers are properly labeled.
5. Do not store flammables where they are exposed to direct sunlight.
6. Periodically check that the storage areas are adequately ventilated.
7. Do not fill closed lid containers to the top.

## Storage Rooms

Each storage room must be constructed in a manner such that it has at least a 2-hour fire rating. An automatic exhaust and a sprinkler system must be installed in each storage room. All electrical equipment in all flammable liquid and all flammable gas storage rooms such as motor controllers, thermal cutouts, switches, relays, the switches and contactors of autotransformer starters, resistance or impedance devices or other devices which in their normal operation tend to create arcs, sparks, or high temperatures, shall not be installed unless such devices are of a type approved for use in explosive atmospheres. Lamps in fixed positions are to be enclosed in a manner approved for explosive atmospheres and must be properly protected by substantial metal guards where exposed to being broken. Lamps cannot be of a pendant type unless the lamp is supported by hangers of rigid conduit or flexible connectors approved for explosive atmospheres. All rubber covered wires used must have insulation no less than three sixty-fourths of an inch thick.

## Flammable Liquids

Generally, flammable liquids and volatile flammable oils (VFOs) are stored in metal containers. However, they may be stored in approved glass containers when there is a concern for maintaining the purity of the liquid. They may also be stored in glass containers when the liquid would cause the metal to corrode. The maximum capacity of these glass containers is one gallon. Containers used to store VFOs must be placed in steel storage cabinets.

## Flammable Gases

Limited amounts of flammable gases may be stored in the laboratory when the gas is used for part of an ongoing operation only. Under NO circumstances may the flammable gases be used or stored below grade level. The flammable gases must be stored separately from chemicals, acids, and oxidizing agents.

Flammable liquids, gases and solids must be protected against ignition sources. Do not expose the flammable liquids, gases or solids to open flames or extreme heat. The safest way to heat a flammable substance is to use a heat jacket. The table below indicates the maximum amount of flammable gases that may be stored in a laboratory.

Area of Laboratory	*Maximum Capacity
Up to 500 Sq. Ft.	9.24 Cu. Ft.
Per additional 100 Sq. Ft.	1.54 Cu. Ft.
Maximum per laboratory Unit	15.4 Cu. Ft.

\*Water container capacity



## **Compressed Gases**

Compressed gas cylinders are often used in the laboratory. All compressed gases are potential hazards because of the pressure within the cylinder, their flammability, and/or their toxicity. The Certificate of Fitness holder should know the potential hazards associated with compressed gases. He/she should also know how to administer first aid treatment in case of an emergency. Several safety procedures must be followed when dealing with compressed gases.

1. Cylinders must be secured in an upright position using a belt or a chain. In no case may the cylinder be secured to plumbing or electrical conduits. All cylinders are color-coded. This color code is used to identify the contents of the cylinder. Never change the color of the cylinder. The valve protection caps must be replaced when cylinders are not in use. Care must be taken when handling the cylinders to prevent physical damage. Cylinders should be transported using suitable hand-trucks and should never be rolled or dragged.
2. When cylinders are stored, they must be separated according to their contents. Full and empty cylinders must be stored separately. All cylinders must be tagged to indicate whether they are full or empty. Cylinders not in use should be removed from the laboratory. The number of cylinders used in the lab should be limited to minimize fire and toxicity hazards.
3. All work done using compressed gases should be conducted in well-ventilated areas.
4. Smoking is not permitted at all near stored gases.
5. The conditions of the cylinders, valves and related equipment must be checked regularly for leaks and physical damage. A soap and water solution test should be used to check for leaks. Leaking or defective cylinders must be replaced promptly.
6. All compressed gas cylinders must have passed a hydrostatic pressure test within the past 10 years.
7. No flammable gas cylinders may be stored or used below grade level without special approval from New York City Fire Department.

## **Corrosive Acids and Bases**

Area used to store corrosive acids must be carefully designed to make sure that spills of acid will not come into contact with bare metal or cellulosic materials with nitric acid. Strong organic acids should be stored separately from mineral acids. The perchloric acids must be stored in glass containers separated from the organic materials. Containers of sodium bicarbonate or other suitable neutralizing or absorbing agents must be provided in these storage areas. They can be poured onto acid spills to help neutralize and contain the spill. These agents must be positioned in a location that remains accessible at all times.

Strong acids must be stored separately from strong bases. Care must also be taken to make sure that the acids are not stored near substances which react with them to evolve heat, hydrogen or explosive gases.

When acids or flammable liquids are stored in excess of 5 gallons, special emergency showers must be installed within 25 feet of the laboratory door. The showers are designed to quickly drench the individual in case of emergency. The Certificate of Fitness holder must make sure the showers remain accessible and unobstructed at all times.

## **Water Reactive Chemicals**

Water reactive chemicals must be stored in enclosures or receptacles that protect the chemicals from contact with water. It is essential that these materials are kept dry at all times and should not be stored directly under sprinkler heads.

## **Storage of Liquids Having a Flashpoint of Less than 100° Fahrenheit in Refrigerators**

All storage of liquids having a flashpoint of less than 100 degrees Fahrenheit, when tested in a Tagilabue Open Cup Tester and if required to be stored in refrigerators, shall be stored in explosion proof refrigerators which have been approved by the Board of Standards and Appeals or Underwriters Laboratories. Such storage may be maintained in iceboxes cooled with dry ice. Where refrigerated room or walk-ins boxes are used, they shall be cooled by indirect refrigeration, and with the electrical equipment explosion proof.

Signs must be provided for all non-explosion proof type refrigerators in the laboratories that read as follows:

<p style="text-align: center;"><b>STORE NO FLAMMABLE LIQUIDS FLASHING BELOW 100 DEGREES FAHRENHEIT</b></p>
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### **Organic Peroxides**

These chemicals are hazardous because of their extreme sensitivity to shock, sparks, or other forms of accidental ignition. The following are examples of compounds that are known to form peroxides: ethers, aldehydes, and ketones. The presence of peroxides can be easily detected using Merckoquant Peroxide test strips.

Follow the manufacturer's recommendations for storing and handling peroxides. The peroxides should be stored at the lowest possible temperature consistent with solubility or freezing point. Never store a peroxide below its freezing point as its shock sensitivity will be increased. The peroxides must be stored in a location that will protect them from friction, grinding, and all forms of impact. This is especially important for solid peroxides.

Use only the amounts of peroxides required to complete the task. Do not return the unused peroxides to the container. Caution must be used when mixing the peroxides. A ceramic or wooden spatula should be used during mixing. A metal spatula must never be used. Smoking, open flames, or other sources of ignition are not permitted near peroxides.

### **Electrical Equipment**

The Certificate of Fitness holder must make sure that all electrical appliances are kept in good working order. When a defect is discovered the appliance must be repaired or replaced immediately. All fixed electrical equipment used in "cold" rooms where flammable gases or liquids are used must be explosion proof.

### **Explosion Hazard Control Systems**

The fire commissioner may require explosion hazard control systems to be installed in some locations. The type of system required is determined on an individual basis. The Certificate of Fitness holder must make sure that all explosion hazard control rules and regulations are obeyed in these areas.

### **Fire Prevention and Protection Systems**

Several fire protection and fire prevention systems are required in all storage areas and laboratories. The Certificate of Fitness holder must make sure that these systems are maintained in good working order at all times. Some of these systems are briefly described below.

## Fire Alarms

Generally, either smoke and/or heat detectors are used as fire alarm devices. They are designed to automatically sound the alarm when a fire is detected. An alarm will sound on the premises and a signal may be sent to a central monitoring station. The personnel at the central monitoring station will then notify the fire department. The smoke and heat detectors must be tested annually. These inspections must be conducted by persons holding a Certificate of Fitness for the maintenance and testing of smoke and heat detectors. During these inspections, the Certificate of Fitness holder will calibrate the smoke and heat detectors where necessary. An defective detectors that are discovered must be replaced immediately.

## Sprinklers

Sprinkler systems are designed such that water is automatically discharged when a fire occurs. The system consists of an arrangement of piping connected to a reliable water supply. Sprinkler heads are installed at intervals along the piping. Under normal conditions, the sprinkler heads are kept in the closed position by a fusible link. The fusible link is designed to melt when the temperature in the room reaches an unsafe level. When the fusible link melts, water is forcefully discharged at a controlled rate onto the fire. The discharge of the water suppresses the fire and prevents it from spreading.

## Standpipe System

Generally, a standpipe system is installed in or close to the laboratory or storage area. This system consists of a series of pipes and hoses that may be used to discharge water in case of a fire emergency. The Certificate of Fitness holder must know how to operate the standpipe system in case of an emergency.

## Fire Extinguishers

Fire extinguishers must be provided in each laboratory and storage area. Such extinguishers shall be located so that no point shall be further than fifty feet from an extinguisher. Generally, dry-chemical extinguishers are installed in laboratories and storage areas. These extinguishers are most effective when they are discharged at the base of the fire. However, the Fire Commissioner may require other types of extinguishers depending on the nature of the chemicals used in the laboratory.

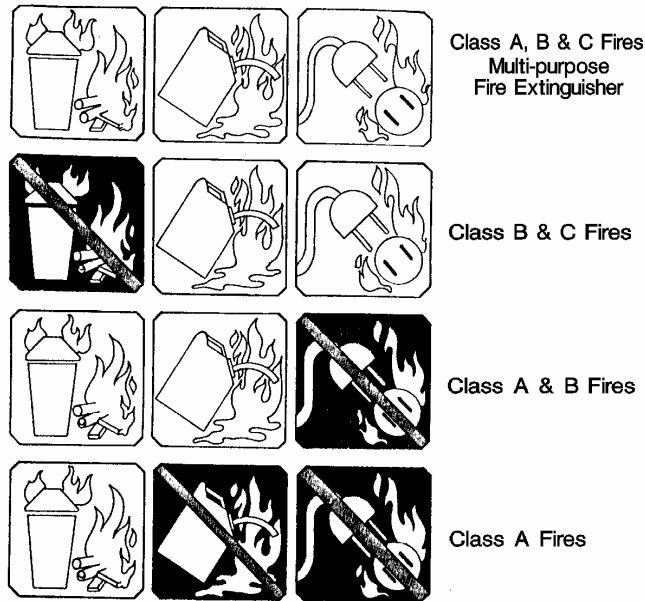
The Certificate of Fitness holder must be familiar with the different types of fire extinguishers that are present. He/she must know how to operate the extinguishers in a safe and efficient manner. He/she must know the difference between the various types of extinguishers and when they should be used. A description of the three classes of fires and the appropriate extinguishers are described below.

**Class A fires** occur when ordinary combustible materials are ignited. For example, wood and paper fires are Class A fires. Water type extinguishers should be used to extinguish these fires. The water type extinguishers cool the fire while quenching the flame.

**Class B fires** occur when flammable liquids or greases are ignited. These fires must be extinguished by smothering the flame. The flame may be smothered using CO<sub>2</sub>, dry chemical or foam extinguishers. Water type extinguishers are not effective for class B fires.

**Class C fires** occur when electrical equipment catches fire. These fires must be fought with fire extinguishers that do not conduct electricity. CO<sub>2</sub> and dry chemical extinguishers must be used to extinguish electrical fires. Foam and water type extinguishers must not be used to extinguish electrical fires.

Symbols may also be painted on the extinguisher. The symbols indicate what kind of fires the extinguishers may be used on. Examples of these symbols are shown in the following page.



The symbols with the shaded background and the slash indicate that the extinguisher must not be used for that type of fire. The Certificate of Fitness holder must understand these symbols. Generally, there are clear operation instructions on the side of the fire extinguisher. They describe how to use the extinguisher in case of an emergency. An example of these instructions is shown below.



All extinguishers must be visually inspected by the Certificate of Fitness holder at least once a month. Special attention must be paid to make sure that the extinguishers are fully charged. When a defective extinguisher is discovered the Certificate of Fitness holder must make arrangements to have it replaced immediately. The extinguishers must be tested and charged by a representative of the manufacturer twice (semiannually) a year. The signature of the person conducting the tests and the test date must be recorded on the tag attached to the extinguisher.

### Fire Blankets

Fire blankets may be provided in some laboratories. They are usually located in a metal case mounted on the wall. When clothing catches fire the blanket may be used to smother the flames. However, they can also be used to smother small fires when there are no extinguishers available. The Certificate of Fitness holder must make sure that the fire blanket is easily accessible at all times.

## Emergency Procedures

The Certificate of Fitness holder must activate the fire alarm and notify the Fire Department immediately when a fire or explosion is discovered. The Certificate of Fitness holder must know the telephone number of the Fire Department Borough Communication Office. The borough telephone numbers are listed below. These telephone numbers should also be posted near the telephones most likely to be used in case of an emergency.

### In Case of an Emergency Call

Manhattan	(212)-999-2222
Bronx	(212)-999-3333
Brooklyn	(718)-999-4444
Queens	(718)-999-5555
Staten Island	(718)-999-6666

The Certificate of Fitness holder must wait at the emergency response station for the fire department personnel to arrive. He/she must answer any questions asked by the fire fighters when they arrive. For example the he/she must indicate the location of the fire and describe the type of fire protection devices available. He/she must also describe the types of chemicals stored on fire floor. The Bureau of Fire Prevention must be notified as soon as possible after the explosion or fire has occurred. The Bureau of Fire Prevention may require a detailed report on the causes and the consequences of the explosion or fire. Generally, this report must be filed within 10 days after the incident.

An evacuation plan must be established for each laboratory. The Certificate of Fitness holder must take great care to make sure that copies of the evacuation plan are posted in appropriate locations throughout the laboratory. The plans must include a drawing of the laboratory and show all emergency exits. This evacuation plan must also describe the procedures that must be followed when exiting the building during an emergency. The evacuation plan must take into consideration the hazardous nature of the chemicals stored and used in the building. Generally, several employees are required to supervise the evacuation operations (e.g., a fire drill conductor and the wardens). However, the Certificate of Fitness holder may aid in the evacuation procedures. Fire drills must be conducted at least once a year to familiarize employees with the evacuation procedures. Care must be taken to assess the effectiveness of the evacuation plan.

The Certificate of Fitness holder must know how to respond when an individual's clothing has caught fire. The correct procedure is to immediately roll the person on the floor to smother the flames. This will quickly extinguish the flames. Fire blankets, showers and fire extinguishers should only be used when they are immediately at hand.

### Disposal of Chemicals

Old, unwanted, contaminated or unidentified chemicals must be disposed of in a manner consistent with New York City, New York State, and Federal Regulations. The Certificate of Fitness holder must make sure that these disposal regulations are obeyed.

## HAZARD SIGNAL ARRANGEMENTS

Flammable and combustible liquids are highly hazardous and require special handling. Fire and explosion are the hazards most commonly associated with flammable and combustible liquids. These hazards can occur when the vapors released from these liquid ignite. There are also acute and chronic health effects that can develop if flammable liquids come in contact with human tissue or are inhaled or ingested.

A simple classification system has been developed by the National Fire Protection Association (NFPA) that allows the flammability, reactivity, and health hazards associated with a material to be quickly

identified. The classification system is referred to as the Hazard Signal Arrangement. This system uses the term "material" to represent all liquids, gases and solids. Under the classification system, each material is given three ratings that represent the material's flammability, health, and reactivity hazards (in that order). Each rating ranges from 0 to 4. The higher the hazard signal number, the greater the degree of hazard associated with the material. The hazard signals are also color coded: red for flammability, blue for health, and yellow for reactivity. A hazard classification sign may be posted on containers used to ship or store these materials. The classification numbers are always arranged in triangular fashion as shown in the diagram below.

Flammability (Red)

4

Health (Blue) 2

3 Reactivity (Yellow)

### **Flammability Hazard**

The flammability signal describes the conditions under which the material will burn. Brief descriptions of the degrees of flammability hazard are given below.

- 4** Materials that will rapidly or completely vaporize at atmospheric pressure and normal ambient temperature, or which are readily dispensed in air will burn readily.
- 3** Materials that can be ignited under almost all ambient temperature conditions.
- 2** Materials that must be moderately heated or exposed to relatively high ambient temperatures before ignition can occur.
- 1** Materials that must be preheated before ignition can occur.
- 0** Materials that will not burn.