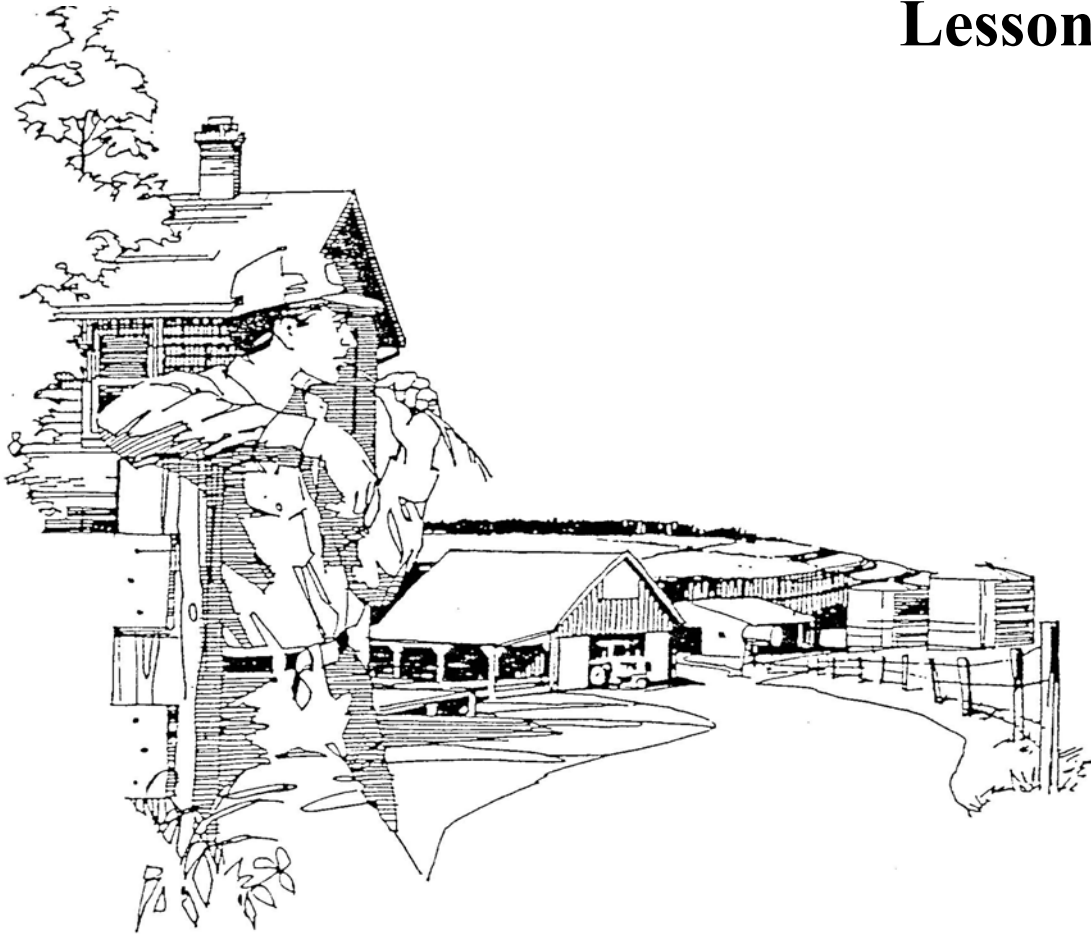


# **Pesticide Applicator Course for Agricultural Producers**

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## **Lesson 6**



## **Protective Clothing And Equipment**

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## **Lesson 6**

### **Protective Clothing and Equipment**

#### **What You'll Learn!**

The purpose of Lesson 6 is to explain the protective clothing and equipment you should use when working with pesticides.

By the time you complete this lesson you should be able to:

- list the correct protective clothing to wear based on the pesticide label and type of work you will be doing;
- explain what to look for when you select protective clothing;
- describe how to clean and care for your clothing and equipment;
- describe how to launder your contaminated clothes;
- list different types of respirators;
- describe how to fit-test your respirator;
- describe how to care for and clean your respirator.

You'll need to know all these things to qualify for certification.



## **The Need for Protection**

**Although protective clothing and equipment is sometimes cumbersome and uncomfortable to wear, you should always do everything possible to protect yourself from exposure to pesticides.**

**In Lessons 4 and 5, you learned about pesticide toxicity and poisoning emergencies. Wearing the proper protective clothing and equipment described in this lesson and following the pesticide safe handling procedures in Lesson 7 will help you avoid such emergencies.**

## **Choosing the Right Clothing and Equipment**

**The protection you use for a particular job should be based on the pesticide label precautions, the pesticide toxicity, and the possibility of your being exposed to the pesticide. Read the label on the pesticide container and follow all directions concerning protective clothing and equipment.**

**Guidelines on protection usually appear on the label under the heading "PRECAUTIONS." Some label precautions may be quite specific, such as the following:**

**"Wear goggles or face shield, rubber gloves, long trousers, long sleeved shirt, and boots high enough to cover ankles."**

**"Wear full protective clothing, goggles, and rubber (natural or synthetic) gloves when handling this material. If exposure by inhalation of dust or spray mist is likely to be encountered, wear an appropriate respirator mask."**

**"Wear clean neoprene gloves and clean waterproof protective clothing. Wear an appropriate respirator."**

**While some labels give complete instructions on protective clothing and equipment, others do not tell you exactly what to wear; they simply imply some protection is needed. Some of the labels with specific directions leave out certain information, such as the need for protective footwear, or what is meant by terms such as "full protective clothing."**

***Often more protective clothing may be needed than is mentioned on the label.***

**In addition to reading the safety precautions on the label, you should look at the precaution symbol. A DANGER, WARNING, or CAUTION symbol will indicate the toxicity of the pesticide. If a pesticide label has a "DANGER - poison" symbol, always wear extra protection.**

**When handling most pesticides you should wear at least the following:**

- **coveralls**
- **rubber boots**
- **waterproof gloves**

**Some situations require extra precautions, including:**

- **eye or face protection**
- **waterproof hat**
- **respirator**
- **waterproof apron**
- **waterproof pants and jacket**

## Protection While Working with Pesticides

How much protective clothing you wear depends not only on the degree of toxicity of the pesticide, but also on what you're doing with it.

Every pesticide application job can be divided into three stages:

- mixing and loading
- application
- clean-up

Each step may require a different degree of protection.

### Mixing and Loading

Protective equipment is especially important during mixing and loading because of the risk of breathing in vapors, or spilling or splashing concentrated product. Wear coveralls, waterproof gloves, rubber boots, goggles or a face shield, a waterproof apron, and a respirator, even if the label does not suggest them.

### Application

The protection you need during application varies with the equipment and pesticide you're using. If you will not come in direct contact with a spray solution, minimum protection you should wear is coveralls, rubber boots, waterproof gloves, and a proper hat. If there is a chance you will be covered with spray solution, wear a waterproof spray suit with a hood, goggles, rubber boots, and waterproof gloves. In addition to the protective clothing listed above, *always* use a respirator if it is required on the label or if there is any danger of inhaling pesticide vapor or spray mist.



### Clean-up

Exposure can occur during clean-up just as easily as during any other part of a spray operation. To protect yourself, wear coveralls, rubber boots, waterproof gloves, goggles, and an apron while you clean your sprayer. Be sure to wear gloves while cleaning your protective gear.

## **Selection and Care of Protective Clothing**

**As you just learned, the type and degree of protection you need when working with pesticides varies according to what pesticide you are using, and whether you are mixing it, applying it, or cleaning up. You should also know how to select, wear, and care for your various items of protective clothing and equipment.**

### **Coveralls**

**Long-sleeved coveralls worn over regular work clothes provide basic protection. The extra layer of material adequately protects your body from most pesticides, as long as the coveralls are not wet through from spray or spillage. Coveralls such as those worn in construction, made of cotton or a cotton-polyester blend, are suitable. They should be made of tightly woven material to reduce the chance of pesticide penetration. The coveralls should not be torn or frayed.**

**Remove your coveralls as soon as you are finished your pesticide activities for the day. Wash them separately from other laundry after each day's use. See the laundry instructions later on in this lesson. If your coveralls are badly contaminated, discard them.**

**Disposable coveralls give you slightly better protection than cloth overalls. They are made of a lightweight fabric which is a little more resistant to pesticide penetration than cotton coveralls. Choose a larger size than you would normally wear so you don't tear the fabric. Discard them after use by placing them in a plastic bag and disposing of them along with the rinsed pesticide containers.**

**If your coveralls are wet through with pesticide at any time, remove them and your underclothing immediately. Wash any areas of the skin which have become contaminated. Put on clean clothes and coveralls before continuing to work with pesticides.**



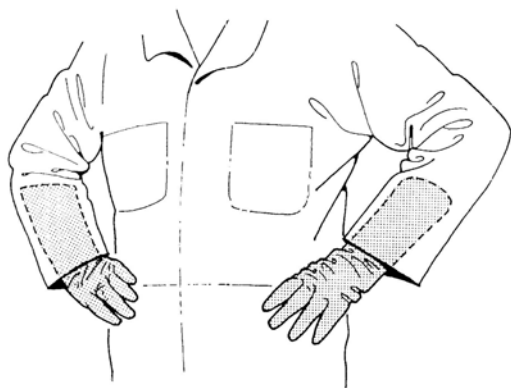
## **Gloves**

**Always wear clean waterproof gloves to handle pesticides. Never touch pesticides with your bare hands. The gloves should be made of rubber, neoprene, polyvinyl chloride, or polyethylene. Check which gloves your pesticide supplier recommends for the type of pesticide you are using.**

**Don't use gloves made of leather, cloth, or canvas, or gloves with cloth lining. These materials are difficult to clean. They absorb pesticides and keep them in contact with your hands.**

**Keep the sleeves of your coveralls over the tops of your gloves to prevent any solution from running inside your gloves. For maximum protection, fold down the tops of the gloves to make cuffs. With the gloves under your sleeves, the cuffs prevent pesticides running down the gloves onto your arms when you raise your hands.**

**Check gloves regularly for holes or leaks. Trap air inside the glove and put it in water to check for holes. Do not wear a glove which is even slightly damaged. Gloves with holes will increase your hands' exposure by keeping the pesticide in contact with your skin.**



**Wash gloves thoroughly with soap and hot water after each use. That way they'll be clean and dry when you begin your next pesticide application.**



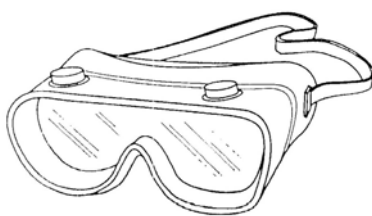
## **Boots**

**Wear waterproof, unlined, knee-high boots of rubber or neoprene when you load, mix, or apply pesticides. Wear your pant legs outside your boots so the pesticide doesn't run into your boots. Do not wear boots made of leather or fabric. They absorb pesticides easily and are impossible to clean. Thoroughly wash the outside of your boots and remove them immediately after using pesticides.**

## Goggles and Face Shields

Give your eyes special consideration. Absorption of pesticides through the eyes is nearly 100%. The effects of pesticides in the eyes can range from eye irritation to severe damage.

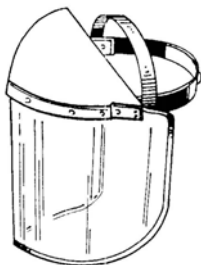
Wear goggles if there is any chance of getting pesticide spray or dust in your eyes. Prescription eyeglasses do not provide enough protection, and goggles will fit over most eyeglasses. *Do not use goggles with cloth or foam headbands or with ventilation holes, like those used in construction.*



Do not wear contact lenses when handling pesticides as they are permeable to vapors and gases. They can also keep the pesticide in contact with the eyes.



Face shields protect your face and eyes from direct splashes of pesticides. Some face shields attach to hard hats. Always wear a face shield when you are mixing or loading toxic pesticides. Face shields will not protect the eyes as well as goggles if you are exposed to spray mist.



Wash goggles and face shields with warm, soapy water immediately after use and store in a clean, dry place.

## Hats

**Wear a waterproof hat when pesticides may be splashed or when you could be exposed to spray drift. A hard hat with a brim provides adequate protection in most tractor-drawn row crop sprayer applications. But wear a wide-brimmed rubber rain hat for more protection, especially where you might come in contact with spray, such as in air-blast spray applications. Some spray suits have attached hoods which protect your head and neck area.**



**Do not wear baseball caps, or fabric or straw hats, as these absorb the pesticide and keep it in contact with your head. Wash the waterproof hat in warm, soapy water immediately after use and store in a clean, dry place.**

## Aprons

**Wear a waterproof apron when you pour and mix concentrated pesticides to protect yourself from splashes. The apron is not necessary if you are wearing a waterproof spray suit. Regular coveralls do not provide sufficient protection if you spill or splash toxic pesticides.**



## **Waterproof Spray Suits**

**If there is any danger of your coveralls being splashed or soaked through during pesticide application, wear a waterproof spray suit. It should be made of a material that will resist penetration of the solvents in the pesticide. Rubber, neoprene, and polyvinyl chloride are usually suitable. Check your equipment supplier's recommendation for the pesticide you are using.**

**To clean your spray suit, follow the manufacturer's recommendation.**



## **Exercise 6.1**

**Check your protective clothing. Do you have all of the following in good repair:**

	<b>Yes</b>	<b>No</b>
• <b>long-sleeved coveralls or a supply of disposable coveralls?</b>	—	—
• <b>unlined knee-high rubber or neoprene boots?</b>	—	—
• <b>a waterproof apron?</b>	—	—
• <b>long rubber, neoprene, polyvinyl chloride, or polyethylene gloves?</b>	—	—
• <b>goggles (without cloth or foam headbands or ventilation holes)?</b>	—	—
• <b>a face shield?</b>	—	—
• <b>a hard hat or wide-rimmed rubber rain hat?</b>	—	—
• <b>a rubber, neoprene, or polyvinyl chloride spray suit?</b>	—	—

**If you have checked "yes" for every item, you are well prepared to work safely with pesticides this season. If any of these pieces of protective clothing are missing or worn out, replace them for your own protection.**

## **Clean-up**

**Protective clothing will retain pesticide residue after use. Handle your clothing carefully to prevent contamination during clean-up. Follow these six steps:**

- 1. Wash your gloves thoroughly. Then remove your clothes and the remainder of your protective equipment with the gloves still on. If this is too awkward, you can wear surgical gloves underneath your regular gloves. They are available from pharmacies or home improvement centres.**
- 2. Put your coveralls in a plastic bag until you launder them.**
- 3. Wash your goggles, hats, boots, gloves, and rubberized aprons in warm, soapy water, and store them in a cool, dry place.**
- 4. Wash your respirator according to the instructions given later on in the lesson.**
- 5. Carefully remove your gloves and wash them or discard them in a plastic bag along with the rinsed pesticide containers.**
- 6. Shower with lots of soap as soon as possible. Do not eat, drink, or smoke before you have washed thoroughly.**



## **Laundry Instructions**

**Launder all your clothing after each day of applying pesticides. Wash protective clothing after each use. Wash clothing separately from the rest of the laundry.**

**If clothing has become soaked with a pesticide spill, discard it. It is nearly impossible to remove all pesticide residue from such clothing, even after several washings.**

**When washing contaminated clothing, remember:**

- **Do not touch contaminated clothing with bare hands. Use rubber gloves.**
- **Pre-rinse clothing using the pre-soak cycle. Use full water level and the hottest water setting on your machine.**
- **Use a heavy duty detergent.**
- **If clothes are heavily contaminated, run two complete cycles.**
- **Hang the clothes outside to dry in sunlight if possible. Never dry protective clothing in an clothes drier, to prevent contamination of the drier drum.**
- **Clean the washing machine by running it through a full cycle with detergent and no clothes in order to remove any pesticide residue.**

## Exercise 6.2

For their own protection, everyone in your family who does laundry should be familiar with the procedures for washing contaminated clothing. Explain procedures to them. A poster with illustrated laundry instructions has been included with your course materials. Hang it beside your washing machine.

Check here when you are sure your family knows the procedures. Then proceed to Quiz 6.1.

### **LAUNDRY INSTRUCTIONS**

Launder all of your clothing after each day of applying pesticides. Wash protective clothing after each use. Wash them separately from the rest of the laundry.

If clothing has become soaked with a pesticide spill, discard it. It is nearly impossible to remove all pesticide residue from such clothing, even after several washings.

**When washing contaminated clothing, remember:**

- K Do not touch contaminated clothing with bare hands. Use rubber gloves.**
- K Pre-rinse clothing using the pre-soak cycle. Use full water level and the hottest water settings on your machine.**
- K Use heavy-duty detergent.**
- K If clothes are heavily contaminated, run two complete cycles.**
- K Hang the clothes outside to dry in the sunlight if possible.**
- K Clean the washing machine by running it through a full cycle with detergent and no clothes to remove any pesticide residue.**

## Quiz 6.1

1. The following three paragraphs describe different situations in which you might be working with pesticides. In the space below each, list the minimum protective clothing and equipment you should be wearing.

- a) You are cleaning your sprayer. The label precaution says: "Wear clean neoprene gloves and clean, waterproof protective clothing. Wear an appropriate respirator." The minimum protective clothing and equipment you should be wearing is:

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- b) You are mixing your pesticide. The label precaution says: "Avoid inhalation of dust," and has a "DANGER - poison" symbol. The minimum protective clothing and equipment you should be wearing is:

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- c) You are applying a pesticide with a spray solution. The label says: "Wear full protective clothing, goggles, and rubber gloves (natural or synthetic) while handling this material. If exposure by inhalation of dust or spray mist is likely to be encountered, wear an appropriate respirator mask." The minimum protective clothing and equipment you should be wearing is:

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**2. Fill in the blanks in each of the statements below.**

- a) Coveralls worn over regular clothing provide good protection as long as they are not \_\_\_\_\_.
- b) Wear your pant legs \_\_\_\_\_ your boots so the pesticide does not run into your boots.
- c) Do not use boots or gloves made of \_\_\_\_\_ or \_\_\_\_\_ when you work with pesticides.
- d) Do not use goggles with headbands made of \_\_\_\_\_ or \_\_\_\_\_ or goggles with \_\_\_\_\_ when you work with pesticides.
- e) Wear a waterproof apron when \_\_\_\_\_ and \_\_\_\_\_ concentrated pesticides unless you are wearing a waterproof spray suit.
- f) When you remove contaminated clothing, put it in \_\_\_\_\_ until you launder it.
- g) If clothing has become soaked with a pesticide spill, \_\_\_\_\_.
- h) Wear \_\_\_\_\_ to handle contaminated clothing.
- i) Wash protective clothing after each use \_\_\_\_\_ the rest of the laundry.

Now check your answers against the Answer Key at the end of the lesson. If you answered almost every question correctly, move on to the section on respirators. If not, go back and review the material on protective clothing once more.

## **Respirators - When to Use Them**

**Protect yourself from inhalation exposure. Wear a respirator when you work with very toxic pesticides. Always use a respirator if label precautions require one or if there is a DANGER symbol on the label.**

**Many pesticides without the DANGER symbol include label precautions to avoid inhalation of dust, vapor, or spray mist. These precautions mean you should wear a respirator when mixing or loading these pesticides, or when washing off your spray equipment. Wear a respirator when applying pesticides if you will be exposed to pesticide dust, spray droplets, or vapors. Wear a respirator if you apply pesticides in an enclosed space, such as a greenhouse.**

## **Types of Respirators**

**There are several types of respirators. Each is suitable for different purposes. Whichever respirator you choose, it should be approved by either the U.S. National Institute for Occupational Safety and Health (NIOSH) or an agency sanctioned by the Workers' Compensation Board. Dust masks are *not* adequate protection while working with pesticides.**

**A specially-designed, enclosed tractor cab fitted with air-purifying devices can protect you from pesticide vapors. A regular enclosed cab is *not* adequate protection and a respirator is required.**

**Four types of respirators are discussed below:**

- **chemical cartridge respirators**
- **canister respirators**
- **powered air purifiers**
- **supplied-air respirators**

**Let's take a look at each of these in more detail.**

## **1. Chemical Cartridge Respirators**

**Chemical cartridge respirators are available in different sizes and in half face and full face models. The half face-piece respirator is the most common respirator worn for pesticide use. Filters are attached to the face piece. There is a dust pre-filter and a cartridge filter. The cartridge filter contains absorbents such as activated charcoal to remove pesticides.**

**Make certain the chemical cartridge is approved for use with pesticides or organic vapors. The cartridge should be the same brand as the face mask.**

**A full face-piece cartridge respirator covers the mouth, nose, and eyes. This respirator gives more face protection than a half face-piece respirator with goggles. It should be worn where there is potential face and eye exposure to toxic pesticide spray mist.**



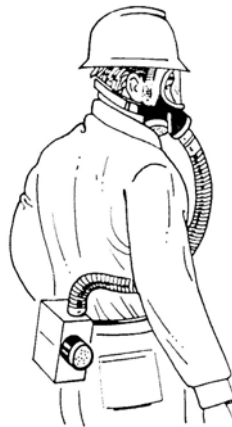
## 2. Canister Respirators

These respirators (formerly called gas masks) are similar to cartridge respirators but generally have a full face piece and a larger container (canister) of absorbent material. Canister respirators provide more protection from vapors than cartridge respirators. They can be used in areas where there may be a relatively high concentration of vapors, such as for escape from a greenhouse after release of a fumigant. They should not be used to work in a greenhouse after release of a fumigant.



## 3. Powered Air Purifiers

These respirators use an electric pump to draw air through a filter. Breathing is easy because no effort is required to draw air through the filter. Powered air purifiers can provide better protection than cartridge or canister respirators. Check that any unit you purchase has sufficient air flow and the correct filters.



#### **4. Supplied-Air Respirators**

**These respirators come with their own air supply, either a cylinder worn on the back, or a line to a distant tank. They are designed for use in emergencies such as reentries to fumigated areas or fighting fires in a pesticide storage area.**



#### **Testing Respiratory Equipment**

**All respirators come with instructions on use and testing. Read them.**

**Check and fit-test your respirator each time you use it.**

#### **To Check a Respirator**

**Check all cartridges and attachments for fit. Ensure valves are clean and function correctly. Check face plates for leaks or cracks.**

**Fit-testing is most important. Without a proper fit you are not protected.**

**To check for proper fit:**

- **There should be no air leaks around the face mask. Adjust any headbands carefully to obtain a good seal. Men should shave before using the respirator. Facial hair prevents a proper fit.**
- **Inhalation test: Place the palm of the hand over the cartridge inhalation points and breathe in. If you cannot feel air enter the mask and the face plate collapses slightly, there is a proper fit and the exhalation valve is functioning correctly.**



- **Exhalation test: Completely cover the exhalation valve with the palm of your hand. Breathe out enough to cause a slight pressure inside the face plate. If no air escapes from around the face plate, it is fitted properly and the inhalation valve is functioning correctly. If air escapes, adjust the straps and mask for a better fit and try again.**



**Do not wear a respirator which does not pass these tests.**

## **Exercise 6.3**

**Take out your respirator and try the inhalation and exhalation tests described on the previous page. If your respirator passes the test and it has fresh cartridges (see below), it is ready to use. If not, you may need to make adjustments or obtain a different size of respirator to improve the fit.**

### **Respirator Cartridge Replacement**

**Check the package for cartridge replacement instructions. You can expect about four hours of life from the pre-filters and eight hours from the cartridges. These estimates can vary depending on vapor concentration and on the person using the respirator. If you ever notice that breathing becomes more difficult or that you can smell the pesticide, replace the pre-filter and cartridges immediately. Replace cartridges at least once a year, and more often if you use them frequently.**

**Do not use cartridges which are more than one year old if they have been removed from their sealed bag.**

**Replace all canisters on gas masks when they have exceeded the expiry date. Most canisters have a color indicator which shows when they need to be replaced.**

**Do not use a canister which has had the seal broken if you do not know when it was last used.**

### **Respirator Fogging**

**Temperature may have an effect on your respirator. Low temperatures may cause the face plate or lenses to fog. Anti-fogging compounds are effective for temperatures down to 0° C. Nose cups are available to direct exhaled air away from the face plate.**

## **Cleaning of Respiratory Equipment**

**Respirators should be cleaned after each use. Use waterproof gloves when cleaning your respirator. Remove all filters, cartridges, or canisters and set them aside.**

**Wash the respirator in warm water with a mild detergent or in a cleaner specified by the manufacturer.**

**Rinse thoroughly and drain to dry. Dry the face plate with a clean dry cloth.**

**Put the respirator back together following the manufacturer's directions.**

**Store the respirator in a cool, clean, dry place. Store it in a plastic bag to extend the life of the cartridge.**



## **Quiz 6.2**

**Let's see what you remember about the selection and care of respirators. Try the following quiz.**

**1. Fill in the blanks using the words given below.**

- i) a half face-piece cartridge respirator**
  - ii) a full face-piece cartridge respirator**
  - iii) a canister respirator**
  - iv) a powered air purifier**
- 
- a) A suitable respirator to use where there is a relatively high concentration of pesticide vapors which are not immediately dangerous to life is \_\_\_\_\_.**
  - b) Breathing is easiest with \_\_\_\_\_.**
  - c) A suitable respirator to use where there is potential face and eye exposure to toxic pesticide spray mist is \_\_\_\_\_.**

**2. Describe the inhalation test for respirators.**

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**3. Describe the exhalation test for respirators.**

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**4. Fill in the blanks in each of the statements below.**

- a) Replace cartridges at least \_\_\_\_\_.
- b) Replace the dust pre-filter and cartridge filter when you notice that \_\_\_\_\_ or you can \_\_\_\_\_.
- c) Wear \_\_\_\_\_ when cleaning respiratory equipment.
- d) To clean your respirator, remove all \_\_\_\_\_, \_\_\_\_\_ or \_\_\_\_\_.
- e) Wash your respirator using \_\_\_\_\_.
- f) To extend the life of the cartridge, store the respirator in a \_\_\_\_\_.

**Now check your answers against the Answer Key at the end of this lesson. If you're satisfied with your results, complete Lesson 6.**

## **Looking Ahead**

**In Lesson 6 you have learned how to choose, wear, and take care of the protective clothing and equipment you need when you use pesticides. In Lesson 7 you'll learn more about practices that promote personal and environmental safety.**

## **Answer Key**

### **Quiz 6.1**

1. a) You are cleaning your sprayer. The label precaution says: "Wear clean neoprene gloves and clean, waterproof protective clothing. Wear an appropriate respirator." The minimum protective clothing and equipment you should be wearing is: Waterproof spray suit, waterproof hat, waterproof gloves and rubber boots, goggles, and a respirator.
  - b) You are mixing your pesticide. The label precaution says: "Avoid inhalation of dust," and has a "DANGER - poison" symbol. The minimum protective clothing and equipment you should be wearing is: Coveralls, waterproof gloves, rubber boots, an apron, face shield, and a respirator.
  - c) You are applying a pesticide with a spray solution. The label says: "Wear full protective clothing, goggles, and rubber gloves (natural or synthetic) while handling this material. If exposure by inhalation of dust or spray mist is likely to be encountered, wear an appropriate respirator mask." The minimum protective clothing and equipment you should be wearing is: Coveralls, rubber boots, waterproof hat, waterproof gloves, goggles, spray suit, and a respirator.
2. a) Coveralls worn over regular clothing provide good protection as long as they are not wet through.
  - b) Wear your pant legs outside your boots so the pesticide does not run into your boots.
  - c) Do not use boots or gloves made of leather or cloth when you work with pesticides.
  - d) Do not use goggles with headbands made of cloth or foam or goggles with ventilation holes when you work with pesticides.
  - e) Wear a waterproof apron when pouring and mixing concentrated pesticides unless you are wearing a waterproof spray suit.

- f) When you remove any contaminated clothing, put it in a plastic bag until you launder it.
- g) If clothing has become soaked with a pesticide spill, discard it.
- h) Wear waterproof gloves to handle contaminated clothing.
- i) Wash protective clothing after each use separately from the rest of the laundry.

## Quiz 6.2

- 1. a) A suitable respirator to use where there is a relatively high concentration of pesticide vapors which are not immediately dangerous to life is a canister respirator.
- b) Breathing is easiest with a powered air purifier.
- c) A suitable respirator to use where there is potential face and eye exposure to a moderately toxic pesticide spray mist is a full face-piece cartridge respirator.
- 2. Inhalation test: Place the palm of the hand over the cartridge or inhalation point and breathe in. If you cannot feel air enter the mask and the face plate collapses slightly, there is a proper fit and the exhalation valve is functioning correctly.
- 3. Exhalation test: Completely cover the exhalation valve with the palm of your hand. Breathe out enough to cause a slight pressure inside the face plate. If no air escapes from around the face plate, it is fitted properly and the inhalation valve is functioning correctly. If air does escape, adjust the straps and mask and try again.
- 4. a) Replace cartridges at least once a year.
- b) Replace the dust pre-filter or cartridge filter when you notice that breathing is difficult or you can smell the pesticide.
- c) Wear rubber gloves when cleaning respirator equipment.
- d) To clean your respirator, remove all filters, cartridges, or canisters.
- e) Wash your respirator using warm water with a mild detergent.
- f) To extend the life of the cartridge, store the respirator in a plastic bag.