

# ➤ For Your Glove: Nuclear Contamination Demonstration

## Objectives

Students will:

- Explain the difference between contamination and irradiation.
- Understand the precautions related to the spread of contamination.

## Overview

Radiochemists have to work carefully to prevent the spread of radioactive material. They must take special precautions to ensure that the radioactive material doesn't get ingested or onto their skin. To do this, radiochemists have a special way of removing their gloves. There is a technique that they use to take off their gloves which stops any of the radioactive material from touching the scientist's skin.

This activity gets the students to have a go at using the glove removal technique, where they can visually see if they've been able to prevent the spread of contamination by using UV powder and a black light (a UV torch).

## Fast facts

**Subject:** Chemistry

**Age range:** 5+ years old

**Ambassador preparation time:** 30 minutes

**Demonstration time required:** 5 minutes

**Location:** Science Fair

## Equipment

- UV powder and black light (set)
- Nitrile Gloves
- Bin/bucket
- Kitchen paper

*Links to purchase the equipment are given at the end of the guide (Equipment Purchase Links section).*

 Nuclear  
Contamination  
Demonstration

### Procedure

Ask the students to put on a pair of gloves and dab the UV powder around their hands. Ask the students to take these gloves off as cleanly as possible and place the gloves in the bin. Following this, shine a UV light on the student's hand to examine whether they've been able to contain the material.

### Answer<sup>1</sup>

1. When removing outer gloves, the exposed side of the outer layer is considered "dirty" and the inner glove is considered "clean." Contact of a clean surface should be made only by another clean surface.
2. Grasp the outside of one glove, near the wrist, using the other gloved hand.
3. Peel the glove away from the hand, turning it inside out as it is removed.
4. While holding the removed glove with the remaining "dirty" gloved hand, insert the "clean" tip of one finger underneath the edge of the remaining "dirty" glove at the wrist opening.
5. Peel the second outer glove off, turning it inside out as it is removed.
6. Keep holding the first glove until the second glove envelopes the first and both are contained in a single package, with both gloves inside out, one inside the other.
7. Place the gloves into the appropriate waste receptacle.

### Discussion

Contamination is the presence of unwanted radioactive material.

Radiation is energy that moves from one place to another in a form that can be described as waves or particles. Radiation is emitted from the contamination due to the decay of the radioactive nuclei present in the contamination.

The two processes of irradiation and contamination are often confused. However, they are very different and can be used in their own right<sup>2</sup>.

<sup>1</sup>[https://www.epa.gov/sites/default/files/2015-05/documents/402-r-12-005\\_contamination\\_guide\\_aug\\_2012.pdf](https://www.epa.gov/sites/default/files/2015-05/documents/402-r-12-005_contamination_guide_aug_2012.pdf)

<sup>2</sup> <https://www.bbc.co.uk/bitesize/guides/z83dxfr/revision/2>



## Nuclear Contamination Demonstration

Irradiation	Contamination
Occurs when an object is exposed to a source of radiation outside the object	Occurs if the radioactive source is on or in the object
Doesn't cause the object to become radioactive	A contaminated object will be radioactive for as long as the source is on or in it
Can be blocked with suitable shielding	Once an object is contaminated, the radiation cannot be blocked from it
Stops as soon as the source is removed	It can be very difficult to remove all of the contamination

### Real-World Application

Radiochemists have to work carefully to prevent the spread of radioactive material, to ensure that radioactive material doesn't get ingested or onto their skin. To do this, radiochemists wear gloves when handling radioactive material, and use the technique that the students attempt in this activity to remove them safely once they have finished their work. Once the gloves have been safely removed, they are then securely disposed of as radioactive waste.

### Equipment Purchase Links

- UV powder and black light (set):

[https://www.amazon.co.uk/Colour-Glow-Dark-Pigment-Powder/dp/B07VBJFGKC/ref=sr\\_1\\_5?keywords=uv+powder&qid=1669042194&sr=8-5](https://www.amazon.co.uk/Colour-Glow-Dark-Pigment-Powder/dp/B07VBJFGKC/ref=sr_1_5?keywords=uv+powder&qid=1669042194&sr=8-5)

- Nitrile gloves:

[https://www.amazon.co.uk/Nitrile-Powder-Multi-Purpose-Gloves-Disposable/dp/B08FZPVFRG/ref=sr\\_1\\_1\\_sspa?crd=EY90E31SIWYH&keywords=plastic+gloves&qid=1669042321&srefix=plastic+gloves%2Caps%2C94&sr=8-1-spons&sp\\_csd=d2lkZ2V0TmFtZT1zcf9hdGY&pvc=1&smid=AOZNBK3FJUV5Y](https://www.amazon.co.uk/Nitrile-Powder-Multi-Purpose-Gloves-Disposable/dp/B08FZPVFRG/ref=sr_1_1_sspa?crd=EY90E31SIWYH&keywords=plastic+gloves&qid=1669042321&srefix=plastic+gloves%2Caps%2C94&sr=8-1-spons&sp_csd=d2lkZ2V0TmFtZT1zcf9hdGY&pvc=1&smid=AOZNBK3FJUV5Y)

- Bin/bucket:

[https://www.amazon.co.uk/Household-Easy-Grip-Multipurpose-Cleaning-Gardening/dp/B0BBWK6F3L/ref=sr\\_1\\_2\\_sspa?crd=NRZH2BDABYS3&keywords=bucket&qid=1669042269&srefix=bucket%2Caps%2C135&sr=8-2-spons&sp\\_csd=d2lkZ2V0TmFtZT1zcf9hdGY&pvc=1](https://www.amazon.co.uk/Household-Easy-Grip-Multipurpose-Cleaning-Gardening/dp/B0BBWK6F3L/ref=sr_1_2_sspa?crd=NRZH2BDABYS3&keywords=bucket&qid=1669042269&srefix=bucket%2Caps%2C135&sr=8-2-spons&sp_csd=d2lkZ2V0TmFtZT1zcf9hdGY&pvc=1)