






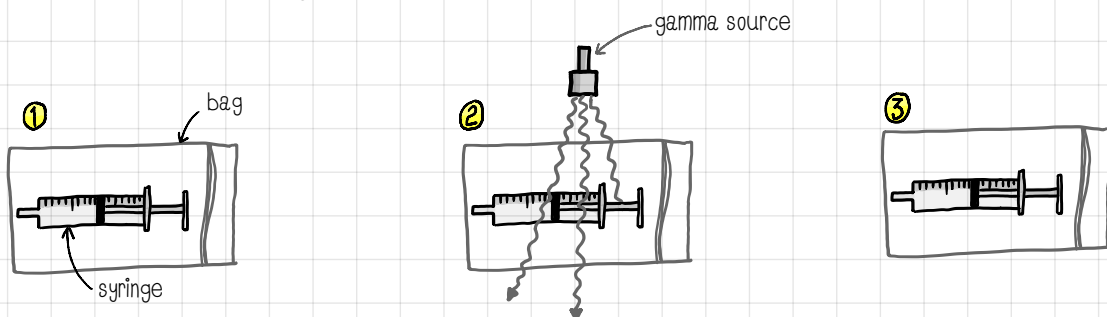
Irradiation and contamination

Review

-  Radioactive isotopes emit radiation from the nucleus of their atoms when they are unstable.
-  Radiation can be ionising, forming charged atoms called ions.
-  Ionising radiation can increase the risk of cancer in humans.

Irradiation

-  Irradiation is exposing an object to nuclear radiation (alpha, beta, gamma or neutrons). After irradiation the object is NOT radioactive.
-  Objects that need to be sterilised can be irradiated with radioactive source, usually a gamma source.







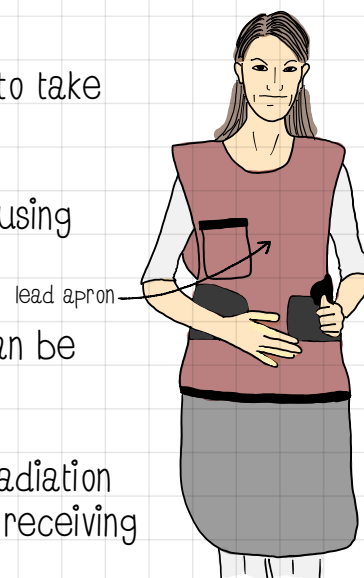
Syringe is placed in plastic bag to stop new bacteria entering.

gamma rays pass through
Syringe irradiated by gamma rays, killing bacteria

Irradiated object is NOT radioactive.
Syringe is now sterilised

Shielding

-  People who work with radioactive isotopes have to take precautions.
-  Alpha particles (low penetration) can be shielded using gloves.
-  Beta and gamma radiation (higher penetration) can be shielded by wearing a lead apron.
-  Wear a radiation monitor to measure how much radiation has been received. This prevents a worker from receiving too high a dose of radiation.



Irradiation and contamination...

Contamination



Radioactive contamination is the unwanted presence of materials containing radioactive atoms on other materials (e.g. contaminated dust).



This is hazardous as the radioactive isotopes will decay and emit ionising radiation. An object that is contaminated is radioactive

Hazards of contamination



Alpha radiation is strongly ionising but is easily stopped by dead cells on the surface of the skin. However, alpha emitters can be dangerous if inhaled or swallowed.

- **Beta particles** are ionising and can penetrate the skin and enter the body.



Gamma radiation is weakly ionising. It can penetrate the body easily but is most likely to pass through. In most cases the ionising radiation can cause damage to the DNA in the nucleus of the cell.

contamination suit

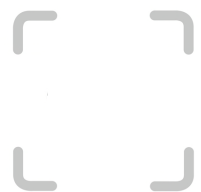


Irradiation	Contamination
Occurs when an object is exposed to a source of radiation outside the object.	Occurs if the radioactive source is on or in the object.
The object does not become radioactive.	A contaminated object will be radioactive for as long as the source is on or in it.
Can be blocked with suitable shielding or moving away.	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.

Reviewing scientific data



Since the discovery of radiation in 1896, scientists have studied the effects of radiation on humans. The findings from these studies are published and shared with other scientists. These can then be checked by other scientists to make sure they are correct. This is called peer review.



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