

Solutions

2.1 Contamination: the unwanted presence of materials containing radioactive atoms on other materials. Irradiation: the process of exposing an object to nuclear radiation.

2.2 Tongs keep the source away from her body – dose falls rapidly with distance; arm's length maximises that distance, reducing the intensity reaching her.

2.3 So other scientists can check the findings by peer review.

3.1 (a) Radioactive material has settled **on** surfaces – atoms present on the town, not just radiation passing by; the hazard lasts while those atoms are present and decaying. (b) Skin stops alpha particles, so external alpha does little harm; inside the lungs, alpha's strong ionisation damages tissue directly with nothing to stop it. (c) Walls and roof absorb/attenuate the passing radiation; staying inside also limits breathing in contaminated dust.

3.2 (a) Irradiation never makes an object radioactive – no radioactive atoms are transferred to the patient. (b) Lead strongly attenuates gamma, so almost no radiation reaches the staff; the beam passes only through the treatment window aimed at the patient, where full intensity is needed.

3.3 Stop working and contain the spill – prevent spreading material; remove the glove carefully without touching the skin; wash hands and check for contamination on the skin and clothing; report and have the area decontaminated by procedure. The spill is contamination: beta-emitting atoms sit on the glove and keep decaying until removed; a 10-second irradiation delivers a momentary dose that ends when the source is off – no material remains, so no continuing dose.