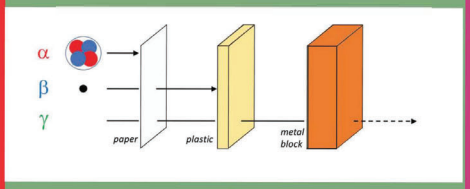
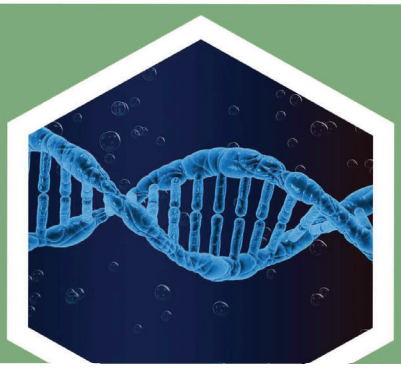
"RADIATION" is very simple, meaning a material (a chemical element in this case) that gives off, or radiates, something as either particles or energy. Certain elements, like uranium only have unstable isotopes, whilst other elements, like carbon have isotopes that can be stable or unstable. Unstable isotopes (collectively called radionuclides or radioisotopes) are radioactive, meaning the number of neutrons and protons in their nucleus is unbalanced, and they want to become stable. They mostly do this by emitting alpha, beta and gamma radiation (other types of radiation such as neutron radiation and positron radiation do exist but are quite rare).

ALPHA (α) radiation: Heavy, slow moving particles made of 2 protons and 2 neutrons. Because they are slow moving they are easily blocked by most things but can be dangerous if inside the body. Stopped mostly by a few cm of air, paper, etc.

BETA (β) radiation: Lighter, faster moving particles made of just 1 electron. Harder to shield against but are generally less dangerous.

GAMMA (γ) radiation: High energy ray. No mass so very poorly shielded, really only slowed by very dense materials like thick metals or concrete.





Alpha, beta and gamma radiation is therefore stopped, or partially stopped, by different materials. The type of emission partly determines the use of each radionuclide; for example, an alpha emitter is unlikely to be used to sterilise food as the alpha particles can't penetrate beyond the outer layers.

We at the University of Southampton, together with the Royal Society of Chemistry, TRANSCEND Consortium and NNUF-EXACT, put this game together to help teach you more about nuclear science. We want to show you that radioactive things are actually completely safe if handled properly, and really, really important in day-to-day life - everything from treating cancer, powering space ships, preventing fires, dating old artifacts and even sterilising food! Radioactivity is much more widely used in everyday life than people think.

UNIVERSITY OF Southampton

THE SCIENCE OF RAD RATINGS

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