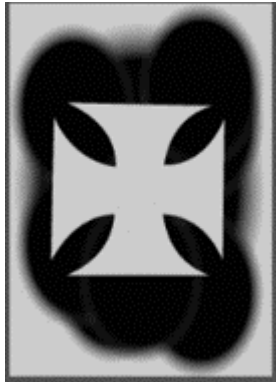


3.1 Becquerel discovers radiation from uranium

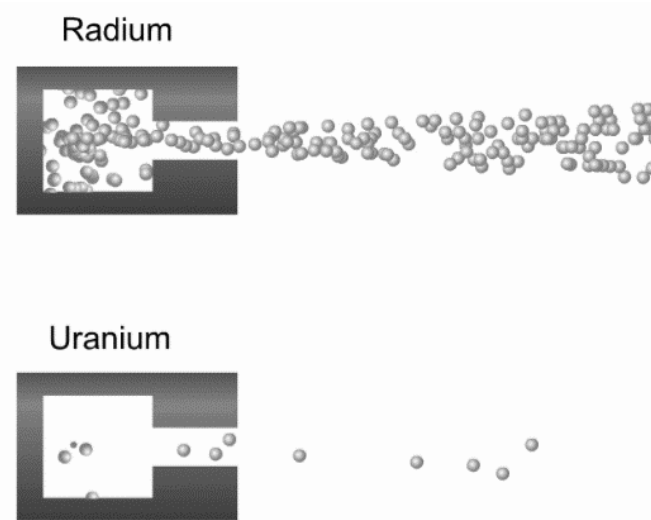
- Henri Becquerel discovered by accident that uranium gave off a strange kind of unknown radiation



Becquerel found that uranium continuously gave off a new kind of ray that fogged film but wasn't X-rays

3.2 Marie Curie finds more radioactive elements

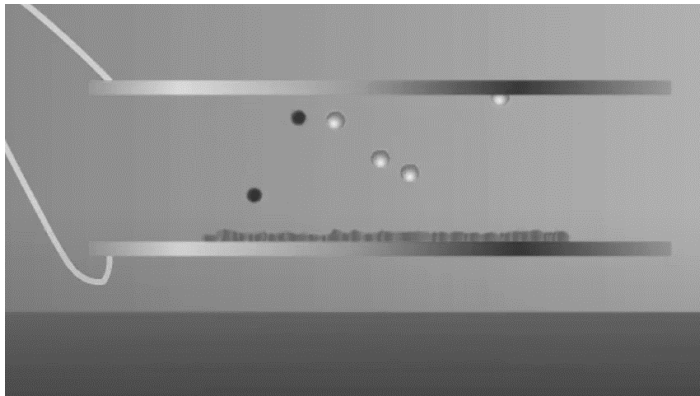
- Marie Curie investigated radioactivity with Henri Becquerel and her husband, Pierre
- She discovered other radioactive elements that occurred naturally with uranium
- She is the only person to have been awarded two Nobel Prizes in different subjects - physics and chemistry



Radium was much more radioactive than uranium so could be used for experiments

3.3 Rutherford separates alpha, beta and gamma

- Ernest Rutherford discovered that radiation consisted of two types of particle by how they were blocked by different thickness of very thin metal foils
- He called the two types alpha and beta radiation
- He named gamma radiation, but didn't discover it



Uranium powder giving off alpha and beta radiation

3.4 The sparkler analogy

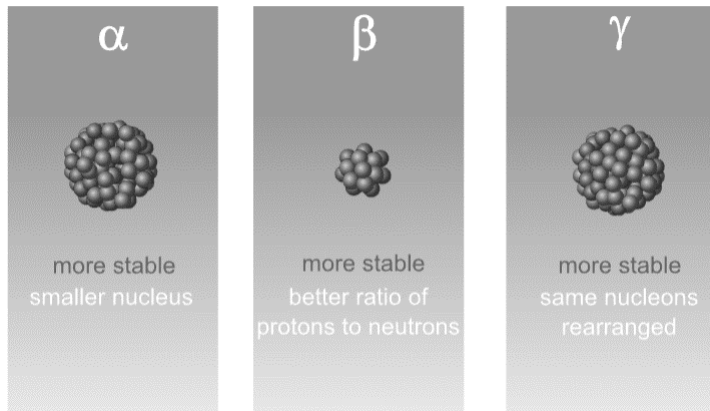
- A radioactive substance is like a sparkler wire
- The sparks are like the radiation
- Radiation doesn't go very far, doesn't last very long, and doesn't make other things radioactive



It's easy to keep away from radiation if you can stop the radioactive substance moving about

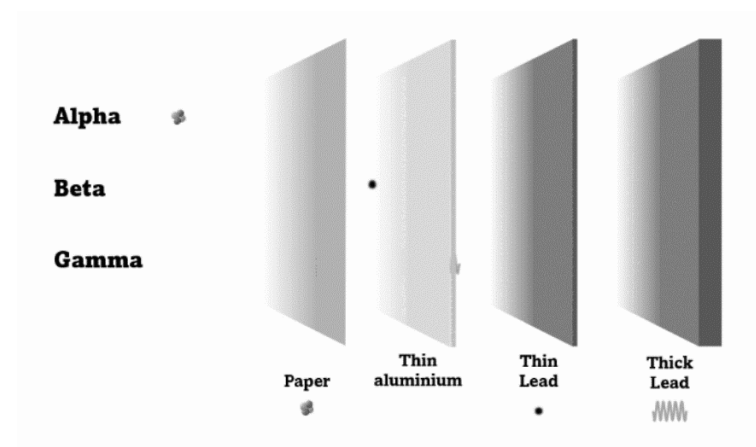
3.5 Nuclear changes with alpha, beta, gamma

- A nucleus will decay if it is unstable
- Decay means the nucleus changes (but doesn't disappear), and gives off a particle at the same instant
- An alpha particle is identical to a helium nucleus
- Alpha decay makes a big nucleus smaller
- A beta particle is an electron that is created when a neutron changes into a proton
- Beta decay makes the mix of protons and neutrons more stable
- Gamma is a form of invisible, high-energy light
- Gamma decay makes the arrangement of protons and neutrons more stable



3.6 Penetration and ionisation

- The more ionising the radiation, the quicker it loses energy, and so the shorter the distance it travels
- Alpha particles are highly ionising and so are stopped easily by 10 cm or so of air, or skin or paper
- Beta particles are less ionising and so can make it through thin aluminium, but are stopped by thin lead
- Gamma is much less ionising so can make it through thin lead, but is stopped by a few centimetres of it



3.7 Detecting radiation

- Radiation can be detected by fogging film or using a Geiger counter

