Student worksheet

7.7 Isotopes can release alpha, beta or gamma radiation

Pages 146–147 and 220

Radioisotopes and Half-Life

1 What is the definition of a radioisotope?

2 What does the term half-life mean?

3 The half-life of francium-223 is 20 minutes. A 1000 g sample of francium is left to decay. Complete the following table which calculates the decay of francium over a 3 hour period and graph this trend on the graph paper provided.

|  |  |
| --- | --- |
| Time (mins) | Mass of Sample (g) |
| 0 | 1000 |
| 20 |  |
| 40 |  |
| 60 |  |
| 80 |  |
| 100 |  |
| 120 |  |
| 140 |  |
| 160 |  |
| 180 |  |

3 What pattern do you observe in the graph that you have created?

4 Look at the pattern in your calculations. Will the entire sample of francium eventually decay?

5 Below are some isotopes. For each row, circle the atoms that are isotopes of the same element. Below each, explain the choice you have made.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| a |  |  |  |  |
|  | Explain your choice: | | | |
| b |  |  |  |  |
|  | Explain your choice: | | | |
| c |  |  |  |  |
|  | Explain your choice: | | | |

Extend your understanding

6 Some nuclear waste contains a radioactive isotope with a half-life of 8 years. If 32 years is a safe amount of time to leave it in the ground to decay before digging it up, and a company buries 100g of the isotope, what mass of the isotope will remain when the company digs it back up?

7 Strontium-89 has a half-life of 50 days. How long will it take to decay 1 tonne of strontium-89 so that less than 100g remains?