

OCR (B) Physics A-level

PAG 07.3 - Determine Half-Life Using an Ionisation Chamber

Practical Flashcards

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What is half-life?



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The half-life of a radioactive sample is the time it takes for the number of radioactive nuclei in the sample to decay by halve the original value.



Does the half-life of a radioactive substance change?



Does the half-life of a radioactive substance change?

The half-life of a radioactive substance is a constant for a given sample and so doesn't change with time.



What are the two charged terminals of an ionisation chamber called?



What are the two charged terminals of an ionisation chamber called?

Anode (+) and Cathode (-)



What happens when ionising radiation is incident on the gas particles in the chamber?



What happens when ionising radiation is incident on the gas particles in the chamber?

The ionising radiation will ionise the gas particles, causing them to become charged.



What name is given to the current that flows due to the ionised gas particles?



What name is given to the current that flows due to the ionised gas particles?

The flow of the charged ions in the ionisation chamber is known as the ionisation current.



Describe the relationship between the ionisation current and the intensity of the radiation.



Describe the relationship between the ionisation current and the intensity of the radiation.

The ionisation current is proportional to the intensity of the radiation, since it is related to the number of ions that are formed as a result of the radiation.



How can the ionisation current be measured?



How can the ionisation current be measured?

The ionisation current will be very small and so to measure it a picoammeter should be used.



How can the half-life be determined from a graph of ionisation current against time?



How can the half-life be determined from a graph of ionisation current against time?

The half-life is the length of time it takes for the ionisation current to halve. This should be a constant value and so if possible it should be checked for multiple half-lives on your graph.



Describe the graph of ionisation current against time that should be obtained.



Describe the graph of ionisation current against time that should be obtained.

The relationship should show an exponential decay and so will be a downwards curve.



Why does background radiation not need to be adjusted for when determining a half life?



Why does background radiation not need to be adjusted for when determining a half life?

Background radiation levels are relatively constant and very low, meaning they won't affect the value you obtain for half-life.



Why may your graph not show a perfect exponential relationship?



Why may your graph not show a perfect exponential relationship?

Although radioactive half-life is a constant, radioactive decay is a random process and so for relatively short time periods, there may be some variation.



Why may an old radioactive source be unsuitable for this experiment?



Why may an old radioactive source be unsuitable for this experiment?

Depending on the source's half-life and its age, the activity of the source may have fallen to a level that is too low to obtain an easily measurable ionisation current.



What safety precautions must be taken when working with a radioactive source?



What safety precautions must be taken when working with a radioactive source?

- Limit the time of exposure
- Warning signs should be displayed so people are aware that a radioactive source is in use
- Keep an arm's length away at all times, and only ever handle the source using long-handled tongs



How should a radioactive source be handled safely?



How should a radioactive source be handled safely?

Long-handled tongs should be used to handle a radioactive source, and you should remain at least an arm's length away from it at all times.



How should a radioactive source be stored safely?



How should a radioactive source be stored safely?

Radioactive sources should be locked away in a sealed lead container. A hazard symbol should be visible on the container as well as at the location where it is stored.

