



Hinchingsbrooke School Science Department

KS3 Homework Task

Forces HW1 – Bacteria make tiny magnets

Date set:

Date Due in:

On the following page is information related to the task. You may need to do additional research to achieve the maximum level possible.

- Answer all questions, if you use PowerPoint please print off and stick in your book
- Fill in your details below

Name:	Form:
Teacher:	Science Set:

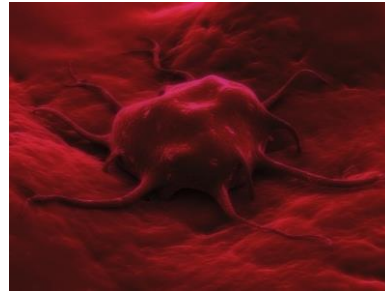
Feedback from teacher:

Student comment:

Bacteria make tiny magnets

A team at the University of Edinburgh has developed a way magnets that they hope can one day be used to treat they grow, some types of bacteria naturally absorb iron surroundings and use it to build a string of magnetic than one thousandth of the thickness of a human hair. The this natural, chain-like magnet like a compass needle to tell they are pointing in as they search for environments rich in nanomagnets' made in this way by bacteria are more

size and shape than it is make man-made magnets.



A cancer cell (iStockphoto)

to make tiny cancer. As from their particles, less bacteria use the direction oxygen. 'Bio-uniform in

possible to

For many years, scientists have been trying to develop ways to use these bacteria-produced 'bio-nanomagnets' to treat cancer. They have been able to guide the bio-nanomagnets using a magnetic field, but they have not been able to develop bio-nanomagnets that are strong enough to be useful. Now, by growing the bacteria in a mixture that contains more cobalt than iron, the team from Edinburgh have produced bio-nanomagnets that are up to 45% stronger than magnets made using iron alone. The magnets that contain cobalt also remain magnetised for longer when the external magnetic field is removed.

Scientists are looking at two different ways to use the bio-nanomagnets to kill cancer tumour cells. One idea is to use them to carry drugs directly to cancerous tissue. The second idea is to use a magnetic field to guide the bio-nanomagnets to cancer tumours and then use a localised, oscillating magnetic field to make the bio-nanomagnets vibrate very rapidly. This makes them heat up, destroying the cancer cells but leaving healthy tissue nearby undamaged, because the bio-nanomagnets are so small.

QUESTIONS

- 1 Describe in your own words what a 'bio-nanomagnet' is.
- 2 The prefix 'nano' is quite common in modern science, for example, in 'nanotechnology'. What do you think 'nano' means?
- 3 How can scientists make the bio-nanomagnets move around?
- 4 Why haven't the bio-nanomagnets been useful so far? What have the scientists from Edinburgh done to improve them?
- 5 What do you think is meant by an 'oscillating' magnetic field? Can you suggest a reason why it makes the bio-nanomagnets heat up?
- 6 Explain how it is possible to leave the healthy cells undamaged while the cancer cells are destroyed.