

GCSE Chemistry B (Twenty First Century Science)
J258/02 Depth in chemistry (Foundation Tier)

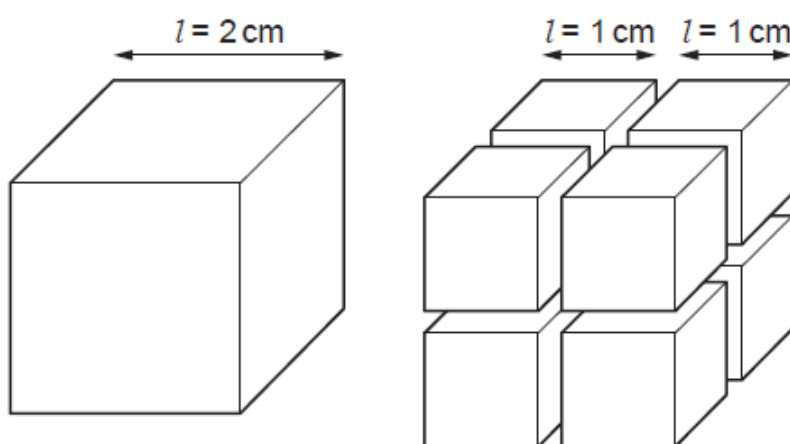
Question Set 22

Silver nanoparticles are used in some socks to remove the smell of sweaty feet.



Silver nanoparticles have different properties to larger pieces of silver because they have a different surface area to volume ratio.

- (a) The diagram shows what happens when a larger cube of silver is cut into eight smaller cubes.



The volume and surface area of a cube can be worked out using these formulae:

$$\text{volume} = l \times l \times l$$

$$\text{surface area} = 6 \times l \times l$$

Table 11.1 shows the volume, surface area, and surface area to volume ratio for the larger cube.

Property	Larger cube	Smaller cubes
Total volume (cm ³)	8
Total surface area (cm ²)	24
Surface area to volume ratio (per cm)	3

Table 11.1

(i) Complete **Table 11.1** by filling in the blank spaces for the eight smaller cubes. Show your working. [3]

(ii) Use ideas about surface area and volume to explain why nanoparticles of silver have a different surface area to volume ratio than larger silver particles. [2]

(b) New research has shown that nanoparticles may be used to treat cancer.

However, some scientists are worried about the negative effects of nanoparticles on the body.

We are worried that metal nanoparticles may go through the natural holes in membranes into the brain where they might cause damage. Metal particles cannot usually go through the natural holes in membranes.



(i) Explain why metal nanoparticles may be able to enter the brain even though metal particles usually cannot. [2]

(ii) Use ideas about **risk** and **benefit** to evaluate the use of nanoparticles in socks and to treat cancer. [3]

Total Marks for Question Set 22: 10

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