Oxford Cambridge and RSA

GCSE Chemistry B (Twenty First Century Science)

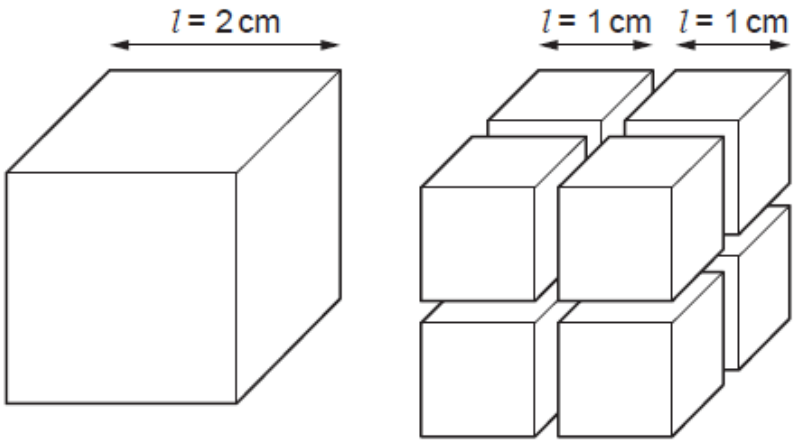
J258/04 Depth in chemistry (Higher Tier)

Question Set 13

1 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:

volume = $l \times l \times l$

surface area = $6 \times l \times l$

Table 2.1 shows the volume, surface area, and surface area to volume ratio for the larger cube.

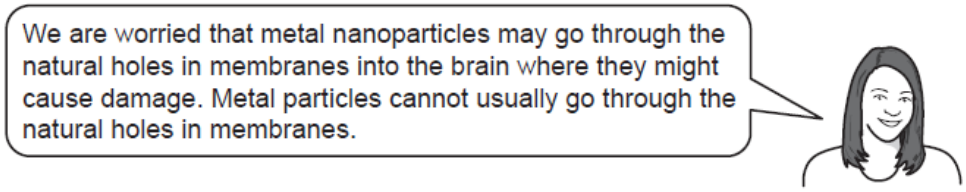
Property	Larger cube	Smaller cubes
Total volume (cm^3)	8	.....
Total surface area (cm^2)	24	.....
Surface area to volume ratio (per cm)	3	.....

Table 2.1

(i) Complete **Table 2.1** 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.

(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 13: 10