

GCSE Chemistry A (Gateway Science)
J248/04 Chemistry A C4-C6 and C7 (Higher Tier)

Question Set 4

1 This question is about properties of materials.

Police bullet-resistant vests could be made from steel or Kevlar[®].



The table shows some information about steel and Kevlar[®].

	Steel	Kevlar [®]
Density (g/cm ³)	7.85	1.44
Relative strength	1	5
Flexibility	low	high
Resistance to corrosion	low	high

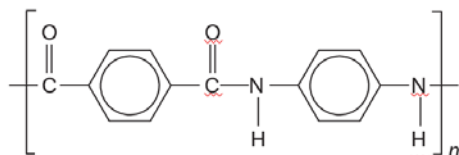
(a) Describe and explain **two** reasons why bullet-resistant vests are made from Kevlar[®] instead of steel.

1

2

[4]

(b) Look at the structure of Kevlar[®].



What type of molecule is Kevlar[®]?

[1]

- (c) Nanoparticles are being used to make a material that is better than Kevlar[®] at resisting bullets.

Nanoparticles are often made of silicon dioxide.

A silicon dioxide nanoparticle has a diameter of 18 nm. The diameter of a silicon atom is 0.22 nm.

- (i) Estimate how many times larger the silicon dioxide nanoparticle is, compared to a silicon atom.

Give your answer to 1 significant figure.

Number of times larger = [3]

- (ii) Silicon dioxide is used as a **catalyst**.

Suggest why 1 g of silicon dioxide is **more effective** as a catalyst when used as nanoparticles rather than as a powder. [3]

Total Marks for Question Set 4: 11

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