

## GCSE Chemistry B (Twenty First Century Science)

J258/03 Breadth in chemistry (Higher Tier)

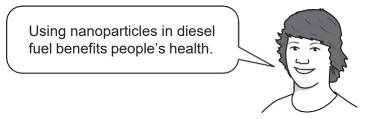
**Question Set 6** 

Nanoparticles of cerium oxide, CeO2, are added to diesel fuel.

They act as a catalyst for the combustion of the fuel.

- (a) Describe a property of nanoparticles that makes them good catalysts. [1]
- (b) The addition of nanoparticles allows more complete combustion of the fuel.

Kai talks about nanoparticles in diesel fuel.



Evaluate Kai's statement.

In your answer give arguments **for** and **against** the use of nanoparticles. [3]

(c) CeO<sub>2</sub> contains  $O^{2-}$  ions.

Explain how the formula shows that Ce is present as Ce<sup>4+</sup> ions.

[1]

(d) A nanoparticle has a volume of  $8 \times 10^{-27} \text{ m}^3$ .

A molecule has a volume of  $4 \times 10^{-30} \text{ m}^3$ .

Estimate how many moles of this molecule there are in the nanoparticle.

## **Total Marks for Question Set 6 : 8**



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