

GCSE Chemistry B (Twenty First Century Science)

J258/03 Breadth in chemistry (Higher Tier)

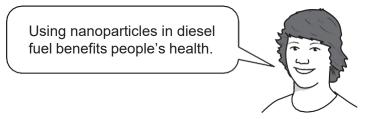
Question Set 6

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) CeO₂ contains O^{2-} ions.

Explain how the formula shows that Ce is present as Ce⁴⁺ 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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