

Knowledge



1. In between group 2 and 3
2. Because they do not follow the same electron configuration rules as the other metals
3. One that is
4. Coarse and fine
5. A few hundred
6. Catalysts, colours in paints, glass etc, jewellery, pots and pans, electrical wiring (Cu)
7. Suncreams, cosmetics, wound dressings, medicine delivery (fullerenes) computer chips
8. Antibacterial

Application

1. They are hard, dense, conduct electricity, shiny and strong
2. Because they have a larger surface area : volume ratio and this changes their properties
3. a) A fine nanoparticle is around 1000x larger than the atom
b) 3
4. You can use less, it will be cheaper, more effective
5. Their effects on the human body are unknown. They could get into waterways and damage wildlife, they may be able to get through the skin (eg cosmetics) and into the body and cause cell damage.

- 6a) any **two** from:

ignore any conclusion drawn referring to data below 7.5 nm or above 20 nm

- 100% of (type 1 and type 2) bacteria are killed with a particle size of 7.5 to 8.5 nm
 - accept nanoparticles in the range of 7.5 to 8.5 nm are most effective at killing (type 1 and type 2) bacteria
- as the size increases (beyond 8.5 nm), nanoparticles are less effective at killing (type 1 and type 2) bacteria
- type 1 shows a linear relationship **or** type 2 is non-linear
- type 1 bacteria more susceptible than type 2 (at all sizes of nanoparticles shown on the graph)
 - allow type 2 bacteria are harder to kill

6b) (yes) because you *could confirm the pattern that has been observed OR*

(no) because trend / *conclusion* is already clear

Comparative
language

7. Both transition metals and group 1 are shiny metals that conduct electricity. They also both conduct heat.

However, the transition metals are generally much stronger and are more dense – they would sink in water whereas the first 3 metals in group 1 float on water.

Group 1 compounds tend to be white, whereas the compounds of the transition metals tend to be coloured.