

Polymer beads *versus* dead diatoms

When diatoms die, they sink to the bottom of the ocean. They're tiny algae, but they have tough two-part shells that survive the rigours of the ocean depths, and they accumulate in thick layers.

Sometimes what was ocean bed becomes land; then where the diatoms fell we have diatomaceous earth. Run dirty water through this and it comes out clean. Diatomaceous earth is widely used in small water-supply filtering plants and in swimming-pool filters.

A problem with using it as a filter aid, though, is that when it gets clogged up with dirt it has to be thrown away and replaced. Dr Robert Eldridge and colleagues in the CSIRO Division of Chemical Technology in Melbourne have now developed equally effective re-usable filter aids.

These are tiny odd-shaped beads made of insoluble polymers. They are fractions of a millimetre across, and they contain iron compounds

that make them attractive to magnets and able to be magnetized.

This magnetic characteristic is what makes it possible to remove the accumulated dirt and re-use the beads; they are easily gathered up and washed. Or they can be shaken in alternating magnetic fields so that the dirt is dislodged.

The scientists have found that, when magnetized, the irregularly shaped beads line themselves up in such a way that many tortuous channels form for water to trickle through. When the particles are sufficiently small and all about the same size, the result is a highly effective filter.

In one experiment a batch of beads was washed and re-used nine times. The filtering performance improved over the first few cycles and then deteriorated slowly, but so slowly that the ninth run still gave better results than the first. The scientists have

not yet found out how many times a set of beads can be used, but it seems to be a large number. They have found that filtering performance improves when dirty water passes through two layers, the first with slightly bigger beads than the second. Also, making the beads more magnetic improves the result.

Whether the beads will be able to challenge diatomaceous earth in the marketplace is not yet certain. It's a matter of balancing the economies of re-use against the higher price of polymers. The scientists' present estimate is that the beads would have to be re-used 50 times in a swimming-pool filter to be on even terms, economically, with diatomaceous earth.

ICI Australia Limited helped with the research, and joint patents have been taken out by CSIRO and ICI.

Magnetic filter aids. B. A. Bolto, K. W. V. Cross,

R. J. Eldridge, E. A. Swinton, and D. E. Weiss. *Filtration and Separation*, 1974, 11 (in press).
D. E. Weiss and H. A. J. Battaerd. *Australian Patent Application* 28282/71.
B. A. Bolto and R. J. Eldridge. *Australian Patent Application* PB2092/73.

