



## 12V Immersion Heaters: an explosion risk

In Education in Science September 1979 we reported an incident in which a 12V immersion heater exploded, whilst being used to melt ice in a funnel. We have now had a report of a further explosion, some five minutes after the immersion heater was removed from a block of aluminium.

It appears that the cause of the accident is the same in both cases. The heater is a relatively old model, in which the wires pass through a sealant of cement-like material (the problem does not seem to arise where a silicone rubber sealant has been employed). At some stage, whether through old age or misuse, the cement develops hairline cracks. If it is subsequently allowed to cool with the cement beneath the surface of some water, contraction of the air causes water to be sucked in. When the heater is next used the steam generated inside may not be able to escape sufficiently rapidly, and thus an explosion occurs. Indeed, it is possible that the presence of the water inside the heater causes the cement to re-seal.

There does not appear to be any satisfactory way of testing whether a heater contains traces of water, and it is unrealistic to expect that it would be possible to ensure that a heater was never allowed to cool down under water. Before use, heaters with this type of seal should be carefully examined for any sign of cracks, and if found they should be discarded. Another possibility would be to leave heaters in an oven set at, say, 80°C overnight. This should allow escape of any water vapour, without the attendant risk of an explosion.