Ion-migration and electrophoresis

Many teachers want their pupils to see the migration of ions under an electric field, or to carry out work on electrophoresis. Because of the slow speed at which changes take place it is tempting to use a high voltage. Recently we heard of a pupil suffering severe burns as a result of touching wet blotting paper when carrying out such an experiment with a 300V power supply.

We have previously carried warnings about accidents using exposed conductors at mains voltages, when demonstrating models of national grid transmission lines. Problems may also arise with carbon arc lamps, or when demonstrating the conductivity of molten glass. The Health and Safety Executive has issued guidance and a full discussion of the issues will be found in Chapter 3 of Topics in Safety (third edition 2001, ASE currently under revision). This includes some suggested alternatives to experiments which have sometimes used exposed conductors at mains voltages.

The net effect of the HSE guidance, however, is that no school should carry out demonstrations or pupil practical work with more than 40V on open terminals. It would theoretically be possible to encase the apparatus in a polycarbonate box so that it was impossible to touch live conductors (as in commercial apparatus), but it would be much easier to be patient, and run the experiment at 25V. We repeat ...

NEVER allow any practical activity in which it would be possible to touch conductors at mains voltages, or those from High Tension power supplies.

We know of several serious incidents in recent years, and HSE would probably be hard on schools which ignored this advice.

This item was originally published in EiS in April 1990 and was checked by the ASE Health & Safety Group in March 2016 to ensure it still offers valid advice.