

## ● Introduction

It is some time since SSERC has had the opportunity to review any new style of glassware. Glassware doesn't change much and what is around in schools is likely to be largely the same as was used thirty years ago. Volumetric glassware is a good example.

Here we describe a new, safer-style pipette called the diji-pipette made by Diji and compare how well it performs against traditional graduated pipettes.

## ● Description

Diji describe it as a hybrid between a syringe and a pipette. Indeed it looks like a graduated (Mohr) pipette with the pipette filler permanently attached to it and, like the Mohr pipette, is manufactured to the BS700 standard. It is made up of two working parts which are securely screwed together.



FIGURE 1

The graduated pipette part (called a syrette) (Figure 1) is coated with fluoro-plastic (FEP) and has a thread at the end. This screws into the diji hand-piece part (Figure 2) and can therefore reduce the potential for glass piercing injuries which can occur when attaching

traditional pipette fillers to glass pipettes. Glass and liquid are also constrained by the FEP coating if the glass breaks.

The system draws liquid into the syrette using a flexible piston rod which shortens as the liquid fills the syrette and lengthens as liquid is expelled (Figure 3). The hand-piece has an ergonomic shape, which fits neatly into the hand, and is colour coded according to the maximum pipette volume.



FIGURE 2

A good range of sizes are available, with maximum pipette volumes of 1, 2, 5, 10 and 25 ml. The graduations on the syrette are clearly marked in colour making them easy to read, even with coloured solutions.

The manufacturers claim that it is more accurate than an A grade volumetric pipette.

## ● Performance



FIGURE 3

The syrette is filled by gently stroking the piston rod upwards with the thumb. As the syrette is acting like a syringe, all of the air is normally removed by drawing liquid into the syrette and expelling it several times before filling the syrette to the required volume. It is not necessary to bring the pipette to eye level when reading the volume. The volume is measured from where the top of the cone seal on the bottom of the piston rod touches the glass wall of the syrette. There is a grey band on the seal at this point.

The syrette is easily cleaned by simply filling and emptying with water, but the whole system can be disassembled if a more thorough cleaning is required. It is even safe to autoclave the glass part of the syrette without damaging it or affecting its accuracy.

The accuracies of the 25 ml and the 10 ml diji-pipettes were compared with that of a single measurement bulb pipette and a graduated pipette by weighing 25 ml and 10 ml of expelled water using a two decimal place balance. We found their accuracies to be within the specified limits of  $\pm 0.2$  ml and  $\pm 0.1$  ml respectively.

Reading	25 ml Volumetric pipette (g)	25 ml Graduated pipette (g)	25 ml Diji-pipette (g)	25 ml Diji-pipette after autoclaving (g)
Range for 10 measurements	24.89 - 24.93	24.71 - 24.79	24.82 - 24.89	24.82 - 24.89
Average for 10 measurements	24.91	24.75	24.86	24.86

Reading	10 ml Volumetric pipette (g)	10 ml Graduated pipette (g)	10 ml Diji-pipette (g)	10 ml Diji-pipette after autoclaving (g)
Range for 10 measurements	9.98 - 10.01	9.98 - 10.02	9.96 - 10.05	9.98 - 10.03
Average for 10 measurements	9.99	9.99	10.00	10.01

## • Discussion

A number of the SSERC staff are currently using these pipettes and have commented favourably about them. The biologists, especially, have found them very useful in preparing coloured buffers for photosynthesis experiments using algal balls.

The combined pipette and pipette filler is shorter and more comfortable to use than the standard arrangement and much more secure. The filling technique requires some practice before actually using the diji-pipette, but one great advantage of the syrette is that once fluid is taken up, it should not leak out, even if the syrette is laid down on the bench. If it does, then the seal can be adjusted to achieve a better fit.

By clamping the diji-pipette into a stand, it can also be used as a simple burette to introduce the concept, and technique, of titrating, but only for rough titrations where the degree of accuracy is not critical. The piston rod is much easier to manipulate than a ground glass burette tap, and the technique

could be introduced using the diji-pipette, progressing to a proper burette at a later stage.

## • Conclusion

Diji-pipettes have multiple possible uses and are a very useful addition to the glassware store. They have a sturdier design than conventional pipettes and the tip of the syrette is tougher and less prone to break. They are more expensive than the standard pipette and filler, but in the event of an accident, both the piston seal and the syrette are replaceable with spare parts available from the manufacturer. It is therefore unnecessary to replace the complete unit if something breaks. Syrettes are also available in plastic. The plastic type is interchangeable with the hand filler pieces and the FEP coated glass type.

SUPPLIERS			
<b>Edu-Lab, Karoo Close, Bexwell Business Park, Bexwell, Norfolk. PE38 9GA. Tel: 01366 385777 Fax: 01366 386535</b>			
Code: EDU1000	10 cm <sup>3</sup> Diji-Pipette	Grade B	£24.95 each
Code: EDU1000-5	10 cm <sup>3</sup> Diji-Pipette	Grade B	£110 pack of 5
Code: 712-008	10 cm <sup>3</sup> Diji-Pipette	Grade A	£29.50 each
Code: EDU1001	25 cm <sup>3</sup> Diji-Pipette	Grade B	£24.95 each
Code: EDU1001-5	25 cm <sup>3</sup> Diji-Pipette	Grade B	£110 pack of 5
Code: 712-018	25 cm <sup>3</sup> Diji-Pipette	Grade A	£29.50 each
<b>Spares List (as at 12/07)</b>			
<b>For 10 cm<sup>3</sup></b>			
Code: 712-010	Telescopic rod + handpiece		£13.50
Code: 712-011	Tip Assembly Set non-meniscus pack 10		£19.99
Code: 712-012	Connection Piece pk 10		£4.95
Code: 712-013	Syrette Glass Grade B pack 5		£55
Code: 712-014	Syrette Glass Grade A pack 5		£69
<b>For 25 cm<sup>3</sup></b>			
Code: 712-020	Telescopic Rod + handpiece		£13.50
Code: 712-021	Tip Assembly set non-meniscus pack 10		£19.95
Code: 712-022	Connection Piece pack 10		£4.95
Code: 712-023	Syrette Glass Grade B pack 5		£55
Code: 712-024	Syrette Glass Grade A pack 5		£69
<b>Scientific and Chemical Supplies</b>			
<b>Unit 13, Airways Industrial Estate, Pitmedden Road, Dyce, Aberdeen. AB21 0DT. Tel: 01224 774 667 Fax: 01224 774 668</b>			
<b>39 Back Sneddon Street, Paisley. PA3 2DE. Tel: 0141 887 3531 Fax: 0141 889 8706</b>			
Code: PRF 080 010	10 cm <sup>3</sup> Diji-Pipette		£29.93
Code: PRF 080 020	25 cm <sup>3</sup> Diji-Pipette		£29.93
<b>Griffin Education, Bishop Meadow Road, Loughborough. LE11 5RG. Tel: 01509 555 944 Fax: 01509 231 893</b>			
Code: PMR300250M	10 cm <sup>3</sup> Diji-Pipette	Grade B	£25.00
Code: PMR300100Y	25 cm <sup>3</sup> Diji-Pipette	Grade B	£25.00