Guide to labelling mobile phase buffers

AKN0027

ACE Knowledge Note #0027

Introduction

It is important that mobile phases are correctly and unambiguously labelled to avoid mistakes when using unfamiliar methods. The clear labelling of mobile phases can help others better understand the method being used.

Mobile Phase Labelling

A common method of describing a mobile phase is in the format:

organic solvent/aqueous buffer (x:y)

e.g.

acetonitrile/100 mM ammonium formate pH 3.0 (80:20)

This format states the ionic strength of the aqueous buffer (100 mM ammonium acetate) and the ratio of organic solvent/aqueous buffer (80:20). To make one litre of this mobile phase would require:

800 mL acetonitrile + 200 mL 100 mM ammonium formate pH 3.0 in water

When mixed, the resulting ionic strength of this mobile phase is:

200/(200+800) x 100 mM = 20 mM

Therefore, a better way of labelling this mobile phase would be:

20 mM ammonium formate pH 3.0 in acetonitrile/water (80:20)

This format states the total ionic strength of the mobile phase (20 mM ammonium formate) and the ratio of organic solvent/water (80:20). Using this format also helps keep ionic strength constant when varying other parameters, such as the organic solvent/water ratio.

For example, two mobile phases that might be used for a gradient:

A: 10 mM ammonium formate pH 3.0 in acetonitrile/water (10:90)
B: 10 mM ammonium formate pH 3.0 in acetonitrile/water (90:10)

To make one litre of each mobile phase would require:

A: 100 mL acetonitrile + 800 mL water + 100 mL 100 mM ammonium formate pH 3.0 in water
B: 900 mL acetonitrile + 100 mL 100 mM ammonium formate pH 3.0 in water

By using this format it is obvious that the ionic strength is the same in lines A and B and will be a constant 10 mM at any point in the gradient.

To write these mobile phases in the other format would be:

A: acetonitrile/100 mM ammonium formate pH 3.0 (90:10)
B: acetonitrile/11.1 mM ammonium formate pH 3.0 (10:90)

In this format, it is not obvious that these two mobile phases both have an ionic strength of 10 mM.