Journal of Chromatography, 144 (1977) 275–277

CHROM. 10,211

Letter to the Readers

Flat-bed ion-exchange materials

Flat-bed techniques using ion exchangers have been employed for 23 years. Amongst the early types there were home-made resin-impregnated filter-papers which were soon superseded by a range of Amberlite ion-exchange papers containing various resins. Unfortunately, the most useful paper for investigations in inorganic chemistry, namely that with the strongly basic anion-exchange resin, Amberlite SB-2 paper, is no longer available in Europe.

We tried to replace this paper with a ready-made thin layer which is marketed by Macherey, Nagel & Co. (Düren, G.F.R.), Polygram Ionex-25 SB-Ac, and which, according to the label, has a layer of "0.25 mm strongly basic ion-exchange resin, acetate form".

As it is virtually impossible to convert such layers into another anionic form by washing, we felt that the acetate form was well chosen as it would not interfere much with eluents such as hydrochloric acid. We had published a survey of the behaviour of metal ions in nitrite media using these layers[1] and the results were confirmed with other media[2].

Recently, we started to re-examine the anion-exchange behaviour of some cobalt(III) complexes of the type $Co(en)_3^{3+}$ on these layers as there have been some reports that anionic outer-sphere complexes could be studied in equilibrium experiments with anion-exchange resins[3]. We were therefore pleased when some preliminary experiments with Polygram Ionex-25 SB-Ac layers showed rather strong adsorption for this type of complex. Typical results are shown in Fig. 1.

We were less enthusiastic, and even perplexed, when even stronger adsorption was found under conditions where no outer-sphere complexation was likely (Fig. 2). We thought at first of phenomena associated with some particular property of the resin, mainly because no adsorption could be observed either on Amberlite SB-2 papers or on Dowex-1 columns. As the label does not indicate the degree of cross-linking of the strongly basic ion-exchange resin, we wrote to the manufacturer for further information.

We were informed that the layer is made of "Kieselgel for thin layers ion-exchange resin, strongly basic, 8% DVB with quaternary ammonium groups, acetate form, binder as usual for the preparation of thin-layer plates or sheets". This reply explained the unusually strong adsorption of the cationic complexes: Kieselgel is a very efficient cation exchanger for these complexes, as we had reported previously[4].

The composition and the manufacturer's reply pose a rather serious problem. Much of the chromatographic work carried out nowadays is not performed merely in order to obtain a separation, but usually some chemical problem or discussion concerning the mechanism of such a separation is involved, with conclusions based on what one thinks the sorbent–solute interactions are about. This is impossible, however, if the label for the thin-layer material is misleading or incomplete. I consider

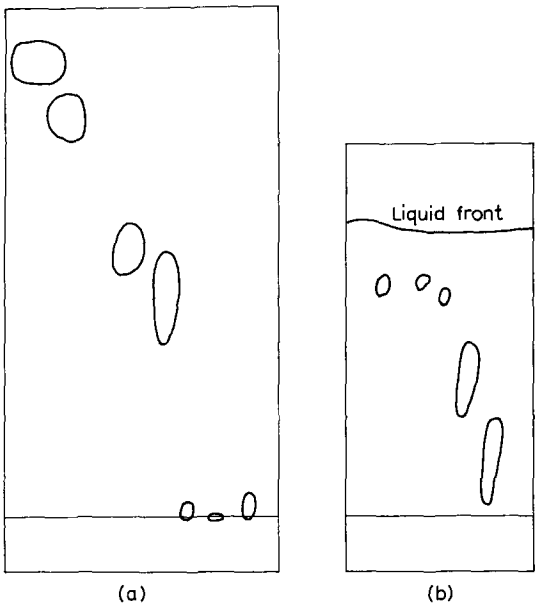

Fig. 1. (a) Movement (from left to right) of Ni^{2+}, $Co(en)_3^{3+}$, $Co(tn)_3^{3+}$, $Co(pn)_3^{3+}$, $Co(dip)_3^{3+}$, $Co(o\text{-}phen)_3^{3+}$ and CrO_4^{2-} on Polygram Ionex-25 SB-Ac developed with 4 *N* ammonium sulphate solution. (b) Movement (from left to right) of $Co(en)_3^{3+}$, $Co(tn)_3^{3+}$, $Co(pn)_3^{3+}$, $Co(dip)_3^{3+}$ and $Co(o\text{-}phen)_3^{3+}$ on Polygram Ionex-25 SB-Ac developed with 5 *N* perchloric acid.

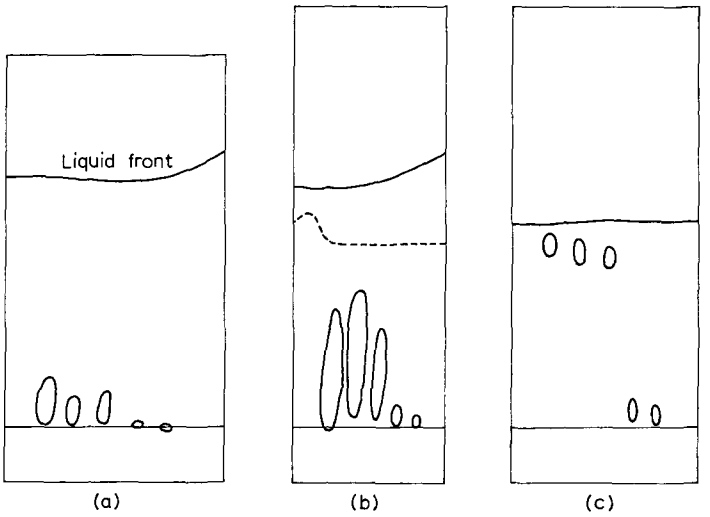

Fig. 2. Chromatogram of cobalt complexes on Polygram Ionex-25 SB-Ac. The complexes (from left to right) are $Co(en)_3^{3+}$, $Co(tn)_3^{3+}$, $Co(pn)_3^{3+}$, $Co(dip)_3^{3+}$ and $Co(o\text{-}phen)_3^{3+}$. Developing solvent: (a) 0.5 *N* sodium acetate solution; (b) 1 *N* hydrochloric acid; (c) 6 *N* hydrochloric acid.

it undesirable for a manufacturer to market an anion exchanger that has a cation exchanger added without mentioning the fact. Furthermore, the reply from the manufacturer in this instance also mentions a "binder as usual for the preparation of thin-layer plates of sheets", which seems to be unnecessarily vague information. It will certainly add a factor of uncertainty to any speculation based on the chromatographic behaviour on such "secret" layers.

In describing this problem I am aware that it is only an example and that similar problems exist nowadays with column supports for both gas and liquid chromatography as well as for most other ready-made thin layers.

I conclude thus this letter with a plea to all manufacturers to label their chromatographic products correctly and completely, and with a further plea to all authors who encounter similar problems to report them promptly in the literature and, when using unusual supports, to describe them as fully as possible.

Laboratorio di Cromatografia del C.N.R.,
Via Romagnosi 18/A,
00196-Rome (Italy)

M. LEDERER

REFERENCES

1 V. Cardaci, M. Lederer and L. Ossicini, *J. Chromatogr.*, 101 (1974) 411.
2 G. J. de Jong, W. Th. Kok and U. A. Th. Brinkman, *J. Chromatogr.*, 135 (1977) 249.
3 M. T. Beck, *Coord. Chem. Rev.*, 3 (1968) 91.
4 M. Lederer and M. Battilotti, *J. Chromatogr.*, 89 (1974) 380.

Received May 20th, 1977)