SUMMARY AND CONCLUSION

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Environmental pollution is a prime concern in recent years. Among the pollutants metallic pollutants are non biodegradable and hence it is necessary to estimate and remove these metals effectively.

In recent years polymeric supports have been used for anchoring of various chelating reagents for the preconcentration and separation of metal ions. Styrenic and acrylic polymeric matrices have been widely used for this purpose. Dithizone is one of the most versatile chelating reagents having high affinity for various metal ions. Hence attempts are made to develope a polymeric support anchored with dithizone for the removal and separation of metal ions from waste water. In the present study crosslinked poly (vinyl pyridine) was prepared from 4-vinyl pyridine and divinyl benzene. The poly (vinyl pyridine) was further chlorometylated and was used for anchoring of dithizone. The support was thoroughly characterised by spectral and thermal techniques and elemental analysis. The pyhsicochemical properties such as moisture content, true and apparent density, void volume fraction were studied.

Further the support was used for the preconcentration of metal ions : copper, nickel, zinc, lead, cadmium, mercury, gold, platinum and palladium by batch processes. Optimization of various conditions was done for the preconcentration and the results obtained are given below in tabular form.

From the kinetics of exchange process it was observed that time required for 50% of metal exchange ($t_{1/2}$) was small. The nature of exchange of metal ions was studied through interruption test and was found that exchange is governed by particle diffusion process.

The resin was further used for column chromatographic separations of binary and ternary mixtures of copper, nickel, zinc, lead, cadmium, mercury, gold, platinum and palladium with 1:1, 10:1 and 1:10 (w/w) ratios. The separations did not show any cross contamination but quantitative separation of palladium and platinum was not possible due to similarity in eluting reagents.

Further the use of resin was extended for the online preconcentration of copper, nickel, zinc, cadmium, mercury, gold and palladium at ng levels using a continuous flow manifold and a microcolumn containing chelating resin under study. It was observed that for the preconcentration 2-4 cm long columns were sufficient. Flow rate of 2 cm^3 min^{-1} was observed to be optimum in the study of copper, nickel, mercury, gold and palladium and 1 cm^3 min^{-1} in the study of cadmium and zinc. The chelated metals from the resin were eluted by using 20 μl of various acids of different strengths. The optimum pH observed for the preconcentration was : copper, 5; nickel, 5; zinc, 4; cadmium, 4; mercury, 3; gold and palldium, 1.0 - 7.0.

The dispersion of the system was found to be 3.42%. The calibration plot constructed had 0.9807 to 0.9990 correlation coefficients.

On comparision with the work reported for dithizone anchored on polystyrene support it was observed that the support prepared in our laboratory shows better potential in the preconcentration and effective separation of heavy metal ions. A brief comparative account is given here.

Table : Brief summary of the results obtained

Metal	Optimum pH	$t_{1/2}$ min	Activation energy ΔE J mol^{-1} x 10^{-4}	Exchange capacity mmol g^{-1}	
				Observed in the present study	reported* earlier
Cu(II)	5.0	35.5	1.04	0.51	n.r.
Ni(II)	5.0	30.0	2.72	0.59	n.r.
Zn(II)	5.0	45.5	0.33	0.65	n.r.
Pb(II)	1.0-7.0	160.0	-	0.06	n.r.
Cd(II)	5.0	30.0	2.51	0.19	n.r.
Hg(II)	3.0	20.0	1.04	0.72	n.r.
Au(III)	1.0-7.0	60.0	2.19	1.24	0.74
Pt(IV)	1.0-7.0	10.0	1.95	1.29	0.39
Pd(II)	1.0-7.0	50.0	2.23	0.99	0.68

* Grote, M. and Kettrup, A.; *Anal. Chim. Acta.*; 1985, **177**, 223

n.r. = not reported