# CHAPTER VI

## SUMMARY

From the chapters III, IV and V it appears that zirconium trioxalato aluminate is a better impregnating medium than potassium trioxalato aluminate. Analytical separations can be carried out successfully by using this unique technique.

Our observations show that metal ions $Ni^{+2}$, $Co^{+2}$, $Cu^{+2}$ and $Mn^{+2}$ can be successfully separated for various solvent systems and various solvent compositions on Whatman No. 1 filter paper and papers impregnated with potassium trioxalato aluminate and zirconium trioxalato aluminate. Metal ions, $Zn^{+2}$ and $Cd^{+2}$ can be separated for some solvent systems and on plane paper and paper impregnated with zirconium trioxalato aluminate. Metal ions, $Bi^{+3}$ and $Fe^{+3}$ can be separated on impregnated papers only for few solvent systems. $Hg^{+2}$ can not be separated for any solvent systems and for any compositions on the plane as well as on impregnated papers.

It is also observed that separation of metal dithizonates such as $Ni(HDz)_2$, $Co(HDz)_2$ and $Cu(HDz)_2$ can be carried out for various solvent systems on Whatman No.1 filter paper and also on papers impregnated with potassium trioxalato aluminate and zirconium trioxalato aluminate. While $Mn(HDz)_2$ and $Bi(HDz)_3$ can be separated for various solvent systems on paper impregnated with zirconium trioxalato aluminate.

The results of the chromatographic separation of metal ions on Whatman No.1 filter paper and papers impregnated with potassium trioxalato aluminate and zirconium trioxalato aluminate are summarized in table 6.1.

While the results of the chromatographic separation of metal dithizonates on Whatman No.1 filter paper and papers impregnated with potassium trioxalato aluminate and zirconium trioxalato aluminate are summarized in table 6.2.

Table 6.1 potassium

| Metal ions | Paper impregnated with zirconium trioxalato aluminate | |
|---|---|---|
| | Solvent compositions | Separation from other metal ions |
| $Ni^{+2}$ | - | - |
| | 1:2:2 | $Mn^{+2}$, $Co^{+2}$, $Cu^{+2}$, $Cd^{+2}$ and $Fe^{+3}$ |
| | 2:1:2 | $Co^{+2}$, $Mn^{+2}$, $Cu^{+2}$, $Bi^{+3}$ and $Cd^{+2}$ |
| | 2:2:4 | $Mn^{+2}$, $Cd^{+2}$, $Co^{+2}$, and $Fe^{+3}$ |
| | 3:6:6 | $Co^{+2}$, $Cu^{+2}$, $Bi^{+3}$ and $Cd^{+2}$ |
| $Co^{+2}$ | - | - |
| | - | - |
| | 3:2:4 | $Ni^{+2}$, $Cu^{+2}$, and $Hg^{+2}$ |
| | 6:3:1 | $Ni^{+2}$, $Cu^{+2}$, $Bi^{+3}$ and $Zn^{+2}$ |
| $Cu^{+2}$ | - | - |
| | 1:2:2 | $Mn^{+2}$, $Ni^{+2}$, $Bi^{+3}$ and $Cd^{+2}$ |
| | - | - |
| | 3:4:3 | $Co^{+2}$, $Ni^{+2}$, $Cd^{+2}$ and $Fe^{+3}$ |
| $Mn^{+2}$ | 1:1:2 | $Ni^{+2}$ and $Bi^{+3}$ |
| | - | - |
| | 1:1:1 | $Ni^{+2}$, $Cu^{+2}$ and $Bi^{+3}$ |
| | - | - |
| | - | - |
| $Zn^{+2}$ | - | - |
| | - | - |
| | 1:3:6 | $Co^{+2}$, $Ni^{+2}$, $Cd^{+2}$ and $Fe^{+3}$ |
| $Cd^{+2}$ | - | - |
| | 2:2:4 | $Zn^{+2}$, $Ni^{+2}$ and $Fe^{+3}$ |
| $Bi^{+3}$ | - | - |
| $Fe^{+3}$ | 1:2:1 | $Co^{+2}$ and $Bi^{+3}$ |

Table 6.2 : Chromated with potassium
trioxa

| Metal dithizonates | Solv sys | Paper impregnated with zirconium trioxalato aluminate | |
|---|---|---|---|
| | | Solvant compositions | Separation from other metal dithizonates |
| $Ni(HDz)_2$ | H:A: | - | - |
| | A:H: | 2:1:2 | $Mn(HDz)_2$, $Co(HDz)_2$ and $Cu(HDz)_2$ |
| | N:A: | - | - |
| | EMK: | - | - |
| $Co(HDz)_2$ | M:H: | 1:1:1 | $Mn(HDz)_2$, $Ni(HDz)_2$, $Hg(HDz)_2$ and $Fe(HDz)_3$ |
| | N:A: | - | - |
| | EMK: | 3:4:3 | $Mn(HDz)_2$, $Cu(HDz)_2$, $Cd(HDz)_2$ and $Fe(HDz)_3$ |
| $Cu(HDz)_2$ | M:H: | 2:2:1 | $Ni(HDz)_2$, $Hg(HDz)_2$, and $Fe(HDz)_3$ |
| | H:A: | 2:2:1 | $Cd(HDz)_2$ and $Fe(HDz)_3$ |
| | N:A: | - | - |
| | EMK: | - | - |
| $Mn(HDz)_2$ | M:H: | 1:1:2 | $Ni(HDz)_2$, $Hg(HDz)_2$ and $Fe(HDz)_3$ |
| | A:H: | 2:2:1 | $Ni(HDz)_2$, $Cu(HDz)_2$ and $Co(HDz)_2$ |
| | N:A: | 2:2:4 | $Ni(HDz)_2$, $Zn(HDz)_2$ and $Fe(HDz)_3$ |
| | EMK: | 6:3:6 | $Cu(HDz)_2$, $Ni(HDz)_2$ and $Bi(HDz)_3$ |
| $Bi(HDz)_3$ | - | 1:2:2 | $Fe(HDz)_3$ $Ni(HDz)_2$ $Cu(HDz)_2$, and $Mn(HDz)_2$ |

CONCLUDING REMARKS

From the observations, it can be concluded that zirconium trioxalato aluminate is a better impregnated medium than potassium trioxalato aluminate for metal ions and metal dithizonates in several compositions. Also the separation is selective. The method is advantageous over the known reported methods and can be applied in difficult separation problems.