

Analysis of Heavy Metals in Solid Industrial Wastes

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Introduction

Disposal of treated solid industrial wastes is a major environmental challenge that has raised the concern of many waste management companies and municipalities around Australia and the rest of the world. Also in Victoria, the disposal of brown coal ash poses a serious problem due to the growing concern for public health and the environment. It is expected that within few years the costs of disposal of such solid industrial wastes into landfill facilities in Victoria will be much higher than at present. For these reasons, the possible re-use of these waste materials by conversion into useful products has become an attractive option to the prohibitively increasing landfill costs.

Aim of Study

To investigate the potential uses of a combined treated solid wastes from a liquid waste treatment plant and fly ash from a brown coal power generation plant for the production of useful products such as road-base and bricks. An important first step in this process is the analysis of possible toxic components. Of particular concern is the level of heavy metals.

Materials and Methods

Composite samples were collected based on sampling program and subsequent analysis of heavy metals of environmental concern were conducted as illustrated in Figure 1. Verification of results were also conducted by a NATA accredited laboratory.

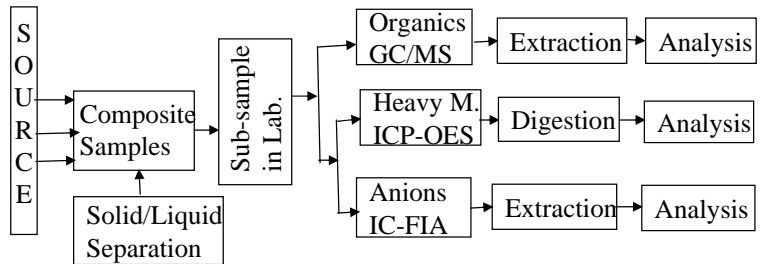


Fig. 1 Sampling and analytical process adopted in the plan

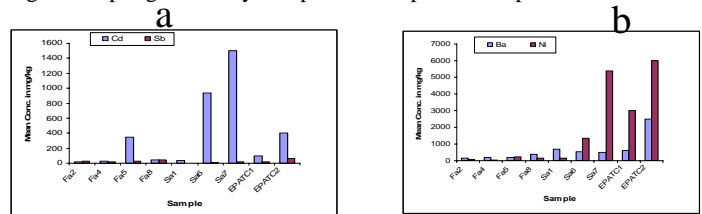


Fig. 2 a & b Mean Total Conc. of Cd, Sb, Ba & Ni in waste samples compared to Vic EPA values in the study period

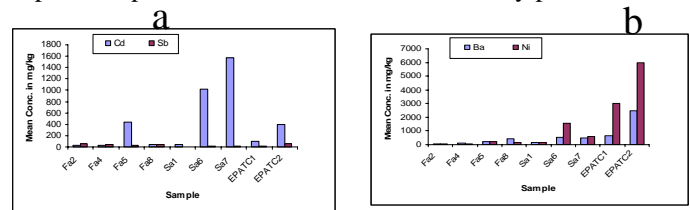


Fig. 3 a & b Mean Total Conc. of Cd, Sb, Ba & Ni in waste samples compared to Vic EPA as reported by ex-lab.

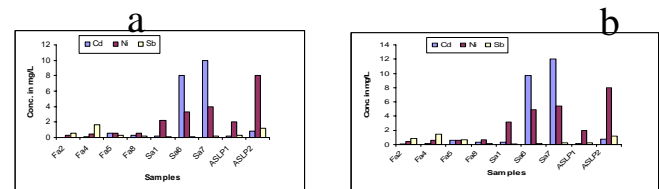


Fig. 4 a & b Leachate Conc. of Cd, Ni, & Sb in waste samples compared to Vic EPA values as reported in the study and by ex-laboratory respectively.

Conclusions

Results

- All samples were analysed for Ag, Al, As, Ba, Be, Cd, Cr+6, Cu, Hg, Mn, Mo, Ni, Pb, Sb, Se, Sr, Ti, and Zn;
- Total and leachable concentrations of most heavy metals were below the Vic EPA regulatory limit for hazard category;
- Ba, Cd, Ni and Sb concentrations in some samples (Fig.2-4) exceeded the regulatory limit.

- No significant difference between the results obtained in this study and those of external laboratory;
- There were good correlations between the high leachable metal concentrations and the total concentrations in some cases; Leachable concentrations of samples with high total Ba concentrations were well below the regulatory values;
- Identification and isolation of the source of Ba will enable recycling of treated solid wastes into useful raw materials for a number of products.