INVESTIGATION OF PRECONCENTRATION CONDITIONS OF LEAD(II) FROM AQUEOUS SOLUTION USING GRAFEN OXIDE MODIFIED EXPANDED PERLITE

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Lead (Pb) is one of the major environmental pollutants. It is mainly discharged from exhaust gases of automobile to environment. Moreover, it diffuses to the water and environment through effluents from lead smelters, battery manufacturers, paper and pulp industries and ammunition industries [1]. At higher concentrations, essential metals may also be toxic due to conversion into its toxic compounds. Hence, there is a need to develop rapid, precise, accurate, sensitive and selective analytical techniques for trace metal analysis in environmental samples. The solid phase extraction is still an efficient, sensitive and inexpensive technique to perform removal of metal ions from environmental samples, preconcentration of metal ions for analytical purposes [2]. However, high recovery and enrichment factor can be obtained only if a suitable solid sorbent is used. In recent years we have seen intense interest grow in graphene oxide (GO) as a sorbent material [3].

Perlite is an inert glassy volcanic ryholitic rock and can be expanded up to 10–20 times its original volume when heated rapidly at 700-1200°C. Most of perlite contains greater than 70% silica, and it is inexpensive and abundantly available in Turkish markets so this could make it available candidate as an economical sorbent for removing heavy metals such as lead, copper, cadmium and chromium [4].

In this study, preconcentration conditions of lead (II) using expanded perlite (EP) was investigated. Firstly, preconcentration conditions of some trace elements using expanded perlite adsorption recovery is %100, but however preconcentration process is not reproducible so expanded perlite is modified with graphene oxide. GO was synthesized by a modified Hummers method [5]. A new sorbent was synthesized by covalently binding GO sheets to the silica based perlite. To determine optimum conditions firstly, pH was studied and optimum pH value was found to be at 4, all other parameters were studied at this pH value. The effect of several parameters such as eluent type and concentration, flow rate, breakthrough volume, adsorption capacity and foreign ions effect were studied. Adsorption capacity of GO@perlite was found to be 357.1 mg g⁻¹ for Pb(II) ions. The modification, size and morphology of sorbent was characterized by FT-IR, SEM, XRD and TGA/DTA.

KEYWORDS: Atomic absorption spectrophotometer, graphene, graphene oxide, lead, perlite, preconcentration, trace element

REFERENCES: