

Study of Concerning Efficient Introduction of Phosphorus Resource Recovery Technology

Year of research	2009~2010	Research of resource and energy in sustainability
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(Purpose)

Because countries of origin ore limited and main-producing countries restricted to export phosphorus resources, cost of phosphorus ore that is a raw material of fertilizer soared for Heisei 20-21 years. Afterward, it falls, and the price is returning to an original standard, but measures for future phosphorus resources security are necessary considering that economic growth in development countries will be expected, Japan is depending the phosphorus resources 100% imports. Phosphorus within sewage of our country is included higher than 50% of quantity in an import phosphorus ore according to the estimation, and it is thought as potential phosphorus resources of our country. The cost is an extremely important judgment element for local public office examining phosphorus recovery. Therefore this study aimed to evaluate the phosphorus recovery technique arranging the relations with the processing scale that has an influence on the cost greatly.

(Results)

(1) Approximation Study of Economical Evaluation

In order to carry out economical evaluation of phosphorus recovery technique, cost of each phosphorus recovery technique was estimated based on phosphorus balance computation in the standard wastewater treatment plant. Target phosphorus recovery techniques are HAP, MAP, Ash Alkali Extraction, Partial Reduction Melting and Carbonizing. The scale of treatment quantity is 10,000~500,000m³/day. The cost evaluations are as follows. Partial Reduction Melting method is the most expensive in the 10,000 m³/day scale and is unsuitable for small treatment plant. Carbonizing method is the most expensive in the over 10,000 m³/day scale.

For the 100,000 m³/day scale, as a representative example, the numerical value estimation was performed so that the largest value becomes 5 among each phosphorus recovery technique.

HAP (Filtered Water) has a high evaluation in every item because of the relative small installation area. MAP method has a high evaluation for installation. Ash Alkali Extraction method, Partial Reduction Melting method and Carbonizing method have a high evaluation for rate of cost reduction by gain on sale.

(2) Detail Study of Economical Evaluation

Case-study was performed for actual wastewater treatment plants. The introduction costs of phosphorus recovery techniques were estimated at the 4 wastewater treatment plants and the flocculant reduction effect, etc were studied. HAP (Filtered Water) method has a high evaluation overall. Ash Alkali Extraction method, Partial Reduction Melting method and Carbonizing method have a tendency of high evaluation. Ash Alkali Extraction method has a high evaluation in Nagoya city where integrated sludge quantity is large.

As well as development of low cost phosphorus recovery technique is expected, widespread utilization of incineration ash in unchanged form attracts attention. Such as utilization of incineration ash as raw materials of phosphoric acid solution. Also, making an appeal of phosphorus resource from sewerage involved parties to industry is important.

Joint Study : Liaison Conference for Sewerage Technical Development (Cities of Sapporo, Sendai, Saitama, Chiba, Kawasaki, Yokohama, Niigata, Shizuoka, Hamamatsu, Nagoya, Kyoto, Osaka, Sakai, Kobe, Okayama, Hiroshima, Kitakyushu, Fukuoka, Tokyo Metropolitan Government and Japan Institute of Wastewater Engineering Technology)

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