

Study on the utilization of sludge by means of cement recycling skill

Whole term

1992. 10 ~ 1994. 3

(Purpose)

Based on the results of the preliminary test in 1992, this test was scaled up to a pilot plant. The design factor for utilization was confirmed by gathering data and verification. In addition, 'Kanpun' made from the dried sludge was compared with the dewatered sludge. Furthermore, cement made from 'Kanpun' in the pilot plant test was clearly investigated on the difficulties in the production train, physical tests for goods, and the effect of wasted gas. Then, the applicability of cement recycling skill was made confirmed.

(Results)

The application of the mechanism of cement recycling into the waste sludge, means that organic matter in the sludge can act as a raw material for cement as well as can supply heat energy required for the production of cement. There is no waste matter at all.

Inorganic matter in the sludge is composed of silicon, aluminum, calcium, and iron which are similar to the coal stone and clay which the cement is made of. The organic matter in the sludge has similar calorific value to low quality coal. If the dewatered sludge, of which 80% is water, is mixed with an additive such as raw coal in 1:1 ratio, water in the sludge is hydrated with raw coal. The heat generated from hydration makes water evaporate, which results in a mildly odorous white drying powder (Kanpun) that mainly contains a slaked lime holding less than 10% of water.

The reaction is as follows:



1.7 ton of 'Kanpun' is generated from 1 ton of dewatered sludge. And the optimal diameter of the additive is less than 5 mm according to the velocity of the reaction, handling, and storage characteristics.

The mortar strength test of the cement made from 'Kanpun' satisfied the JIS normality. There was no strength loss as that in the case of the general cement. The heavy metal leaching test of the cement matrix resulted in no leaching and therefore, it can be confirmed that it would not cause environmental pollution. The significance of this skill is as follows:

- 1) Effective usage of the wastewater sludge is possible: the whole quantity of sludge can be used as cement so that landfilling is no more required.
- 2) Merchandise covers a wide scope: Cement is used in many fields. Therefore, new market and new usage are not necessary.
- 3) Adoptability in the absence of an incinerator: It can be adopted even in an area where there is no incinerator.
- 4) Constancy over a long period: The cement sector can be maintained constantly over a long period.
- 5) Use of energy from the organic matter: The organic matter in the sludge is incinerated in the process of producing the cement, and the generated energy can be used effectively.
- 6) Simple facility: The facility to supply the additives can easily be set up in the wastewater treatment plant.

This technology as a final treatment option for the waste sludge is a highly effective method. By the results of the above research and development, the questions regarding the cement recycling skill could almost be explained. The basic data from the actual scale plant confirmed the ability of this skill to be utilized.

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Keywords

Drying powder, Kanpun, Utilization as cement, Additive, Quicklime, Slaked lime