Study on Fundamental Properties and Applicability to Marine Structures of the Blocks Made of Steel Slag

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About 40 million tons of steel slag is generated as by-product in Japan every year. Reducing or recycling such by-product is required for circulative society. Recently it was found that block with a high endurance and very low pollution could be made of steel slag without using cement.

Fundamental properties and applicability to marine structures of the block made of steel slag was investigated. The slag block was made of pretreatment slag, ground granulated blast furnace slag, water and small amount of calcium hydroxide after mixing by existing concrete plant or facility and setting in a mold, just like concrete. The slag block is heavy and its density is about 2.5g/cm^3, because pretreatment slag contains large amount of iron oxide. As compared with the concrete having same compressive strength, it has the same flexural and splitting tensile strength but slightly lower elastic modulus.

The slag block shows a good wear resistance and durability in seawater with elevated temperature. It elutes no harmful ions and dose not raise the pH value of seawater surrounding the block.

The breakwater blocks and fishing banks made of slag and concrete were exposed to seawater, and the growth of biofouling organisms on these was compared. The slag block was observed more biofouling build-up and large number of species than the concrete block.

The slag block has features shown below as compared with concrete block, and it can be used as a marine structure. (1) Use of 100% recycled resource. (2) Same strength as ordinary concrete. (3) Lower alkaline elution. (4) High specific gravity. (5) No elution of harmful ions. (6) More biofouling organisms.