

リサイクル材の細骨材への利用に関する研究  
**STUDY ON USABILITY OF SOME SELECTED RECYCLED FINE AGGREGATES**

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**ABSTRACT**

The study was accomplished to know the usability of the experimental recycled aggregates through light irradiation behavior, skid resistance and strength properties. The highest increased inside and surface temperature showed the slag aggregate made sample block and the lowest showed the ceramic aggregate block during the light irradiation test. The skid resistance test value was in between 75 to 83 for the all test aggregate block. The highest value of strength showed roof tiles and slag aggregate mortar in different mix proportions and glass aggregate mortar showed the lowest value in all condition. The test results of the recycled aggregates were satisfactory and sometimes better in compare with the standard aggregate sand test results.

**INTRODUCTION**

In the recent year industrial and construction wastes become a big problem because of their risky and expensive management system. Natural calamities are increasing the amount of those types of wastes worldwide. On the other hand the demands of the construction materials are increasing day by day. To save the environment and to continue the present construction in the world use of recycle construction aggregates can play a vital role.

In the year 2001 Japan generated 76150 thousand ton waste only from building industries when their total amount of wastes was 455180 thousand ton including all the waste categories. [1].

The main objective of this study was to investigate the usability of the recycled aggregates by the light irradiation, skid resistance and mortar strength test.

**MATERIALS AND METHODS**

The investigation was accomplished with four recycled fine aggregate and one traditional fine aggregate. The selected recycled aggregates were ceramic, roof tiles, glass and slag aggregate. Sand was used as standard fine aggregate. All the recycled aggregates were collected different waste recycle centers within the Mie prefectural area in Japan.

**Light Irradiation Test:** The experiment was accomplished in a controlled room at 20°C and with R.H. 50%. Concrete-mortar block (30x30x5cm) was prepared, a non-contact thermocouple temperature sensor was used and the beam lamp irradiation was applied for 4 hours in this experiment.

**Skid Resistance Test:** The test was performed by using British Pendulum Tester. The experiment was accomplished by following the “ASTM E 303: Standard Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester” [2].

**Strength Test:** The experiment was accomplished by following “JIS R 5201: Physical testing methods for cement” [3]. Type-A (cement: fine aggregate=1:2) and Type-B (cement: fine aggregate=1:3) samples were prepared for the test.

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## RESULTS

### Lamp Irradiation:

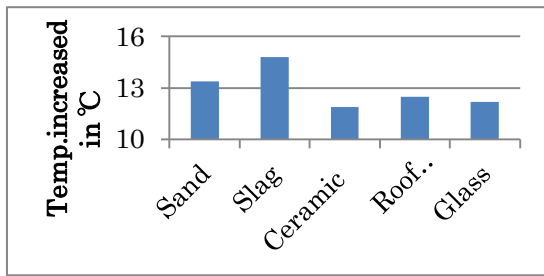


Fig.1: Sample block increased inside temperature

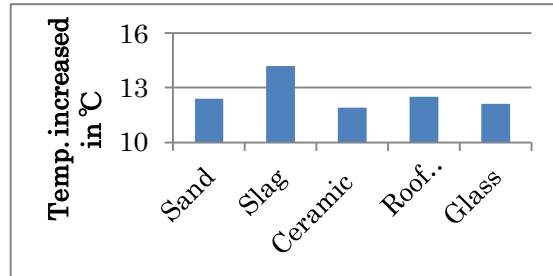


Fig.2: Sample block increased surface temperature

### Skid Resistance:

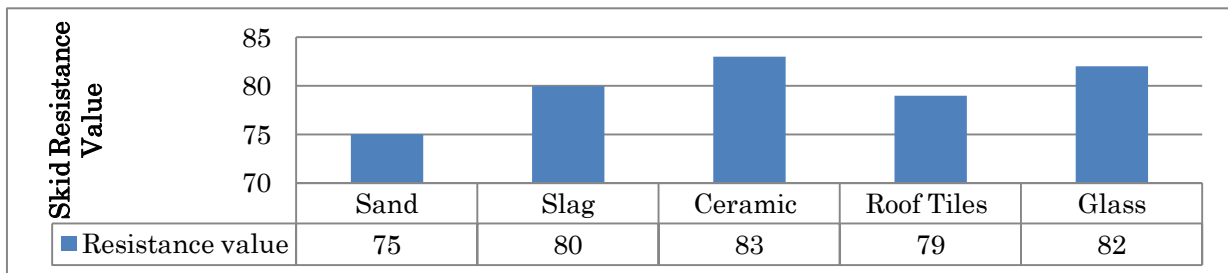


Fig.3: Skid Resistance Test Result

### Mortar Strength :

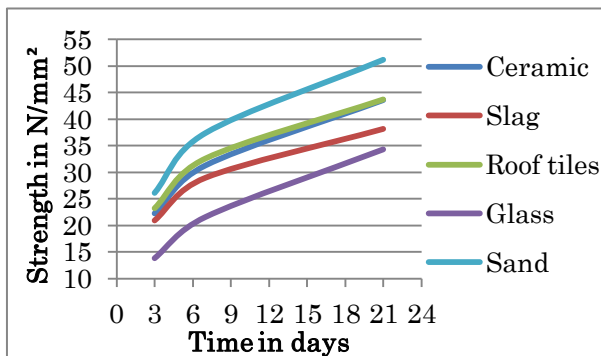


Fig.4: Strength of type-A mortar samples

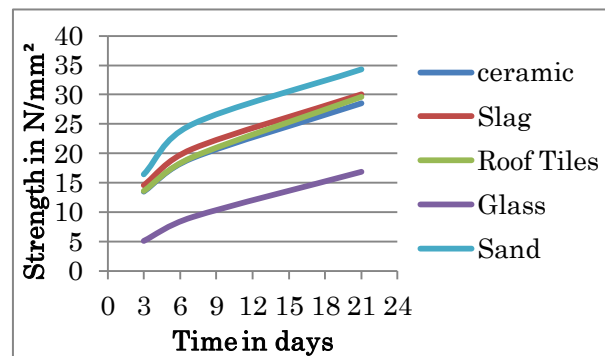


Fig.-5: Strength of type-B mortar samples

## CONCLUSION

Ceramic aggregates would be the good choice where normal surface temperature is needed and slag could be used where high surface temperature is needed. Ceramic aggregates would be the best choice where high skid resistance is needed and other aggregates also could be used (also in bend or slop condition) to make road and pavement surface. Slag and roof tiles aggregates could be used to get good strength.

## REFERENCES

- [1] Waste Report, Environmental Statics 2012 (Chapter: 3.6, 2.37, 3.19), Ministry of Environment, Government of Japan. [http://www.env.go.jp/en/statistics/contents/index\\_e.html#haikibutu](http://www.env.go.jp/en/statistics/contents/index_e.html#haikibutu)
- [2] American Society for Testing and Materials (ASTM). ASTM E 303: Standard Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester
- [3] Japanese Industrial Standards Committee. JIS R 5201: Physical testing methods for cement