

# Water quality survey in Tomb of Emperor Nintoku

Narumi Nishimura/Masayuki Kido/Kazuki Otsuka

## 1 Motive • Purpose • Precedent Study

Although previous studies was about the relationship between water quality and living things, we will continue to make chemical research of the water quality and to study how to purify water in the tomb of Emperor Nintoku.

If we can remove the organic matter that deteriorates the quality of the water, we thought that it might be able to improve the water quality chemically and visually.

We investigate the particle size of the optimal charcoal for the purification of water.

We think of a way to remove organic matter from water efficiently.

## 2 Hypothesis

Since alum and charcoal are effective for water purification, the quality of the water of moats of the tomb of Emperor Nintoku can be improved.

## 3 Experiment method

We put alum, powdered charcoal and crushed charcoal in the water of the 3<sup>rd</sup> moat.

A week after, we measured COD by oxidation-reduction titration.

## 4 Survey Result & Consideration

The result of the main items is shown on these graphs.

The concentration of  $\text{NH}_4^+$ ,  $\text{NO}_3^-$ , and  $\text{PO}_4^{3-}$  did not make striking change.

We found that there is a negative correlation between transparency and water temperature, and transparency fell in summer.

We assumed it to have been caused by massive outbreak of phytoplankton.

The value of COD with Pack Test and that by reduction-oxidation titration were quite different. So we found Pack Test to be incredible.

The value by reduction-oxidation titration always surpassed 8 mg/L, which is environmental quality standard.

So we thought the water was very dirty.

## 5 Result Consideration

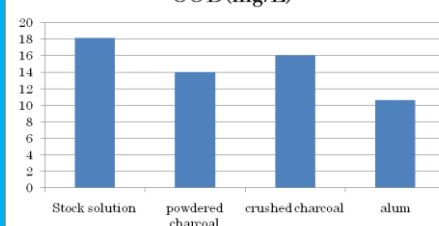
On the all way numerical value of COD decreased.

The smell of the water in which we put charcoal is stronger than that of the water where we put nothing.

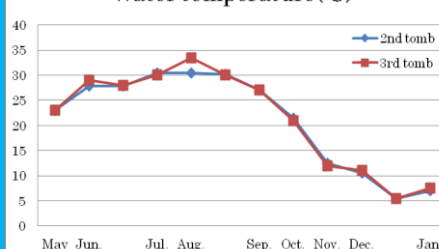
Purification with alum is the most effective, purification with powdered charcoal is the second most effective, and purification with crushed charcoal is the third most effective.

Since charcoal works a lot and strength the smell of the water, we thought purification with alum is more effective in the moats of the tomb of Emperor Nintoku.

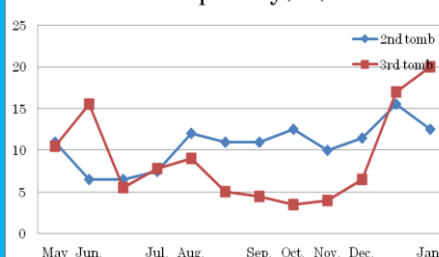
COD(mg/L)



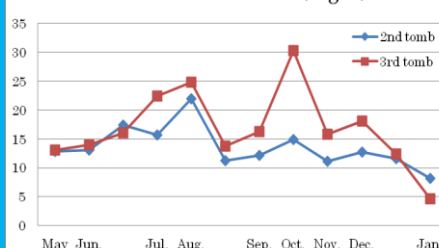
Water temperature(°C)



Transparency(cm)



COD with titration(mg/L)



COD with PackTest(mg/L)

