

References

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**Manufactured**

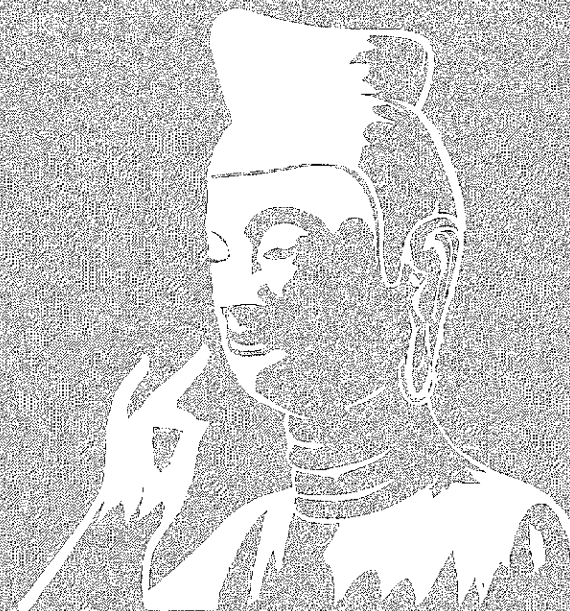
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# NIKKAPELLET OK

**HUMIDITY CONTROL AGENT  
FOR  
CONSERVATION OF CULTURAL PROPERTIES**



**NIPPON KASSEIHAKUDO CO., LTD.**

NIKKAPPELLET OK is a special activated form of montmorillonite clay—special because it has water adsorptive and water desorptive properties without hysteresis phenomenon upon atmospheric relative humidity.

An interesting application of special properties of NIKKAPPELLET OK to conservation of museum objects was originated by Dr. Toishi and his coworkers (members of Tokyo National Research Institute of Cultural Properties). They placed "zeolite gel" or NIKKAPPELLET OK equilibrated with a certain relative humidity in a closed container and succeeded to keep the inside relative humidity almost constant at any temperature.

Relative humidity in a closed container varies depending on temperature. The air enclosed in a container of one cubic meter containing 10.27 grams of water shows 60% of relative humidity at 20°C, 80% at 15°C and 45% at 25°C. NIKKAPPELLET OK which is in equilibrium with 60% of relative humidity at 20°C adsorbs water at 15°C and desorbs water at 25°C and keeps relative humidity almost uniform at 60% at any temperature.

Dr. Toishi and his coworkers have developed a new application to use "zeolite gel" or NIKKAPPELLET OK as a humidity control agent in packages, show-cases, vessels, store-houses etc. and established the conservation method to protect cultural properties from humidity variation.

#### 1. General Characteristics

##### Typical Chemical Compositions

SiO <sub>2</sub>	75.2%
Al <sub>2</sub> O <sub>3</sub>	14.1%

Fe <sub>2</sub> O <sub>3</sub>	1.4%
MgO	2.5%
CaO	0.3%
Na <sub>2</sub> O+K <sub>2</sub> O	0.2%
Ignition Loss	6.3%

##### Physical Properties

Pellet Density	1.03 ~ 1.08
Bulk Density	800 ~ 850 gram/liter
True Density	2.4
Specific Heat	0.2 Cal/kg/°C
Shape	Pellet (dia. 3mm, length 3 ~ 5mm)

##### Practical Properties

Figure 1 shows the adsorption-desorption curve of NIKKAPPELLET OK (A) and a certain kind of Silica Gel (B) for water at 20°C. The adsorption-desorption properties of NIKKAPPELLET OK have no hysteresis phenomenon.

Figure 2 shows fluctuation of temperature and relative humidity of the inside and outside of the closed show-case containing NIKKAPPELLET OK.

NIKKAPPELLET OK keeps relative humidity in the show-case almost uniform in spite of fluctuation of relative humidity of the outside of show-case.

#### 2. General Information for Application

- 1) Containers, show-cases, vessels in which relative humidity should be controlled must be air tight.
- 2) Optimum relative humidity for each kind of objects should be decided by a specialist in conservation science. NIKKAPPELLET OK is available with any relative humidity decided.
- 3) Standard dosage of NIKKAPPELLET OK is 1 kg per 1 cubic meter of capacity of a container. 1 kg of NIKKAPPELLET OK has cubic

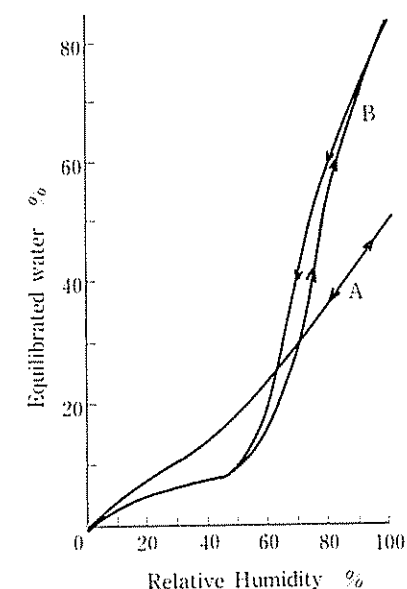


FIGURE 1

measure of about 1.25 liter.

In the following cases, dosage should be increased.

- a) When there is wide range of fluctuation of temperature during a short time (more than 20°C within 12 hours).
- b) When there is big difference between relative humidity in the environmental air and relative humidity to be attained in containers at the time of application (more than 20%).
- c) When the objects to be preserved or exhibited have water adsorptive or water desorptive properties.
- 4) NIKKAPPELLET OK should be put in a thin layer (20 mm depth) in a box with an airy lid such material as punched board, lattice, net, etc.. The box can be placed in any place in a container but it should not be placed near the hot lighting.

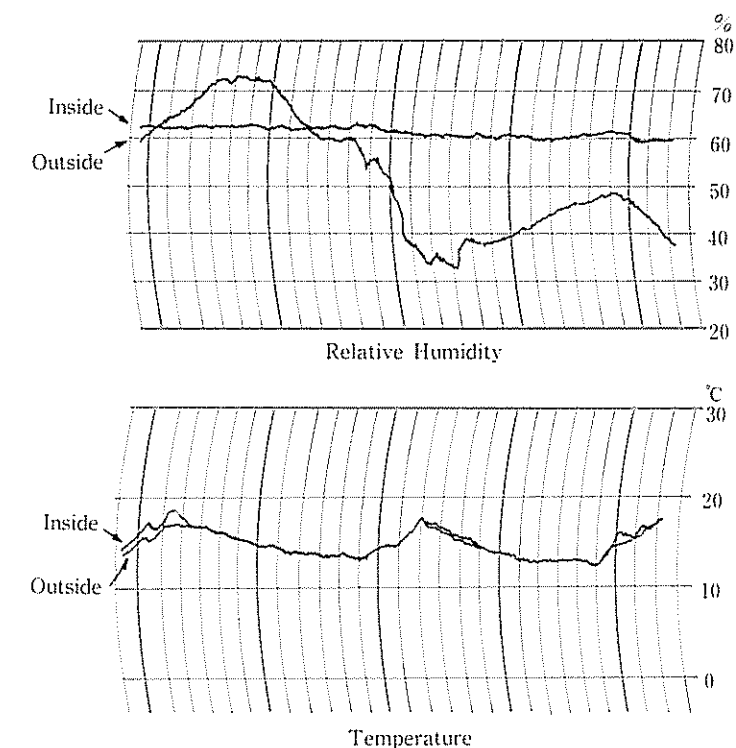


FIGURE 2

5) NIKKAPPELLET OK should not be used with water, wet materials and desiccants.

6) NIKKAPPELLET OK should not be recklessly exposed to the air. The package should be kept sealed.

Further informations for conservation technics is available at the following organizations.

DEPARTMENT OF CONSERVATION  
SCIENCE, TOKYO NATIONAL RESEARCH  
INSTITUTE OF CULTURAL PROPERTIES.

13-27, Ueno Park, Tokyo, 110, Japan

FINE ARTS DIVISION, AGENCY FOR  
CULTURAL AFFAIRS (BUNKACHO).

2-2, Kasumigaseki 3-chome, Chiyoda-ku,  
Tokyo, 100, Japan