

Subject: "Evaluation of absorbent material for the neutralization of marine oil pollution"

Relevant Legislation: No.1218.91/97

Relevant FEK: 951/B/23.10.1997, . 12031-12032

Material: O.W.L. Absorbent cleaning

Conditions under legislation

1. α. Oil recovery capacity

2. In the user manual of the material, a clear list of the chemical substances that can be adsorbed by the absorbent material in question is written by the commercial house of the product.

3.

- This list includes:
 - All categories of petroleum products, from gasoline to motor oils.
 - Common solvents of all polarity classes, from non-polar, such as hexane, to polar solvents completely soluble in water, such as alcohol.
 - For all of the above, clear results of the proportions of the pollutant and the absorbent material are given from studies by the manufacturer listed in the following bilingual table:

Acetone (Acetone) 7.19 kgs./kg.

Denatured Alcohol (alcohol) 8.46 kgs./ kg.

Diesel Fuel (Diesel engine - heating) 7.48 kgs./ kg. Gasoline

(Βενζίνη) 5.20 kgs./ kg.

Gear Oil (80W90) (gearbox oils) 9.39 kgs./ kg. Hydraulic Oil

(hydraulic oils) kgs./ kg.

Kerosene (Aviation fuel – kerosene) kgs./ kg.

Light Crude (Light crude oil fraction) 6.93 kgs./ kg.. Linseed Oil
(Boiled) (Linseed oil) 7.70 kgs./ kg.
Methyl Ethyl Ketone (MEK) (Methyl-Ethyl-Ketone) 7.38 kgs./ kg.
Mineral Spirits (lubricants and heavy fractions) 7.20 kgs./ kg.
Naphtha (Light aromatic fractions - naphtha) 6.81 kgs./ kg.
Turpentine (turpentine and related) 8.30 kgs./ kg.
Xylene (Lumber) 7.95 kgs./ kg.

1.b. Hydrophobic

The absorbent material is declared as hydrophobic by the commercial house of the product, both in its user manual and in the Safety Data Sheet.

Our laboratory performed a washability test, which proves that the material is hydrophobic (described in paragraph 1.f.)

1.c. Flammability

The material consists exclusively of plant materials and specifically of peat moss, which according to the material's Safety Data Sheet has no ignition point (not applicable), while the auto-ignition point of the material is declared at 200°C.

Our laboratory carried out the autoignition test (autoignition temperature ASTM E659) and the test result was 205°C. Both, i.e. declared and the measurement result are expected for the type of product.

In conclusion, said absorbent material is not flammable.

1.d. Toxicity – Corrosivity

Our laboratory, at the customer's request, carried out an extensive detection of toxic substances in the absorbent material sample. Specifically, the existence was checked:

A. Polyfluorinated compounds (PFOS, PFOA). B. Residues of plant protection substances.
C. Anionic and cationic detergents.

D. Glycols.

E. Acid esters.

St. Sodium phosphate.

- The results of extensive toxicity analyzes showed that the sample contained:
 - 1.7mg/kg anionic detergents (toxicity limit >1,000mg/kg)
 - 8.5 mg/kg propylene glycol (toxicity limit >1,000mg/kg)
- And 220mg/kg sodium phosphate (toxicity limit >10,000mg/kg) The concentrations of the substances identified are very low, clearly below the limits and cannot give the material toxic properties.

In conclusion, the material does not contain toxic substances and is not toxic.

The sample shows a pH in solubility with deionized water 1:1 equal to 3.7. The effect of pH is acidic, but not corrosive, as materials with a pH<2.0 are defined as corrosive. It is pointed out that a large part of plant-derived materials have a similar pH to the product in question (eg: pears pH=3.8)

In conclusion, the material is not corrosive.

- **1. e. Low ash**
- **Our laboratory carried out the determination of ash (gravimetric @550oC), the result of which was 3.72%w/w.**
- **Although the legislation does not set a specific upper limit for ash, indicatively we quote ash results from plant samples analyzed by our laboratory:**
 - High compression pellets from conifers∠ash=1.06%w/w
- Olive wood chips∠ash=3.1%w/w
- Eucalyptus: barks and branches∠ash=4.93%w/w
- Eucalyptus: tree trunk∠ash=2.18%w/w
- Compost material∠ash=2.2-6.9%w/w

The material in question presents a low ash, comparable to materials of similar origin. In conclusion, the low ash criterion is met.

1. f. Buoyancy in water

Our laboratory carried out the test of buoyancy in water, which lasted 5 days (related photos are attached). Said absorbent material floats in water, does not get wet and continues to have these properties for at least 5 days.

The apparent density of the material is 0.1795kg/l. The water temperature at which the test was done was 20 ± 1 °C.



In conclusion, this absorbent material is not wetted by water and floats in it for a long time (at least 5 days).

1.g. Moisture resistance – long term storage

The material's resistance to moisture and water in general is demonstrated by the buoyancy test described in the previous paragraph.

In direct contact with water, the material remains inert for at least 5 days. In conclusion, the statement of the commercial house selling the product about the hydrophobic nature of the material is true. Hydrophobic materials are not affected by water or humidity.

The trading house from studies it has carried out states that the storage of the material is 5 years for the intended use. In conclusion, the material has sufficient storage time.

FINAL CONCLUSION

The material in question (O.W.L. Absorbent Cleaning) covers all the specifications and properties of absorbents intended to be used in cases of marine oil pollution, as defined by Article I of No.

1218.91/97.

Sincerely,

Stefanos Andreou



ΣΤΕΦ. Κ. ΑΝΔΡΕΟΥ
ΧΗΜΙΚΟΣ MSc