Caving Disaster and Oil Spill Removal Adsorbent Mag-Sorbent

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Abstract : For trying to frontal attack of new solution by fusion of technical tasks and conditions with it's solving methods of the essential tasks of marine resource development and environmental conservation in addition with elements of electronic high-technologies, the magnetic oil spill adsorbent of Mag-Sorbent* has been prepared and proposed to dispose oil spill from the marine disaster for preventing oil pollution by using them and their system with sequentially circular collection of oil spill mag-sorbent powder and fabrics on the electronic equipment like as barge robot for the scheme of sustainable development of environment-friendly technology. Because of recent marine accident occurred at Tae-An cost and earthquake in Sichuan province were very large scale accident of disaster to prevent and manage of them.

So, it was verified from the experiment of electronic demonstrator that the skimmer system of oil spill mag-sorbent powder and fabrics prepared was very effective and useful technique to collect oil spill samples on the water surface specially at the closed space of underground cave. At this point, the barge-based electronic remote control was very useful system operating easily on the marine fields but also water level at the small pool to skim it with the environment-friendly system of the disposing marine disaster and preventing oil pollution using magnetic adsorbents of *Mag-Sorbent**.

Key Words : environmental conservation, disaster prevention, adsorbent, Skimmer, *Mag-Sorbent**

Ⅰ. Introduction

Enjoying the sophisticated high level science and technology even at modern society, an accident program or processing technology of a special disposal skim is not enough against to the large scale disaster such as shipping disaster. And so, it is today's reality that the primitive way of disposing oil spill is drawing it up directly by the people's activity, which is the most valid way of removing it, when the maritime disaster of oil spill was occurred. It was clearly seen as the fact that the handling process of oil spill accident occurred by a crude oil tanker Hebei-spirit at Tae-An coast in the west sea of Korea

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Looking at the process First, there is no initial response technology to collect and dispose the huge amounts of oil spill effectively. Second, instead of collecting oil spill, the Scattered Emulsifier makes occurrence of secondary cause of environmental pollution problems sinking it to the bottom or lower part of the sea water rather than recovering. Third, there is no effective means to preserve ecological environment, marine resources and facilities against to the oil spill band coming with black disaster. Therefore, the severe toxicant of oil spill should be contacted directly by them breathing hazardous substances of vapor gases, however, there is no way to dispose and collect it without human efforts of themselves, unavoidably. Because of this, a lot of direct difficulties and those of health and hygiene problems, such as living people's sanitation, has a number of issues. Therefore, the effective and technical collection method is required for those problems of oil spill on the water surface.

So, it was suggested as a new technical scheme to dispose the oil spill using the mag-sorbent powders, pieces and fabrics of high functional materials for the problems. It can be done easier and quicker to recover the oil spill at the marine shipping accident, and it can be removed continuously without any workers damage of the danger and toxicity from the hazardous substances of the oil spill and pollutant.

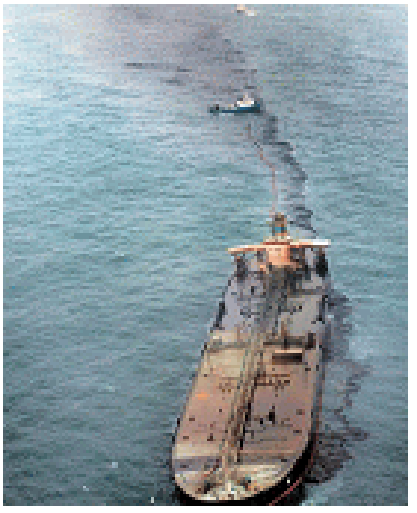

Fig 1. Herbei-spirit oil tanker and crude oil spill at the seashore of Tae-an after collision accident

For this, the disaster-prevention equipment (conveyor barge collector, etc) was built to get early response of the spreading accident damage, and unmanned remote-control barge robot system driven by RF was also built with features to minimize or eliminate workers for the best effects, and to operate from the ground headquarter. So as to have a safe handling and security with minimizing expenses of

maritime accidents, the new measures were proposed to contribute to disaster prevention and handling of the large-scale marine accident.

Fig 2. Task performance of disaster prevention

Ⅱ. Oil Spill Accident and Removal

1. Oil Spill Removal

1) Crude and Refined Oil Accident

Because of the maritime accident release a great deal of oil spill in the temporary, the damage will be a big and intensive in immediate. The crude oil spill accident of Sea-prince oil tanker was recorded in July 1995, as a typical accident in Korea, to be realized the seriousness of marine pollution due to leakage of crude oil to Korean people. Once oil leaked needs a long term of recovery at least several tens of years, and the full recovery, however, it is because virtually impossible, is no longer someone else's job to do. The maritime accidents are able to dispute between countries and spread to the cross-countries, so it is required to manage them with international and inter- countries joint response.

However, high technology associated with the marine oil pollution is still relatively weak state, and the last 10 years, the government's support for the development of marine disaster prevention technology in a very vulnerable state, is known to damage the reputation as a maritime country, as well as for accident and disaster prevention with no real efforts to create a society is criticized. This was confirmed in a clearly, which caused tanker crash in the western coast of the Korean peninsula on Dec. 7, 2007. It is alike human-sea tactics like that because more than 1,000,000 peoples who participated voluntarily, the so-called crude oil-volunteer and by the activities of the indigenous people of their dazzling of all worlds was one more surprised.

However, it was very lagging behind technique of the traditional classic one to have been used and the mostly used methods were spreading the emulsifier to

make it sediment under the water and the adsorbent fabrics. And the necessary consumables such as emulsifier and oil-adsorbent, including the uses of the numbers of emergency shortages, for a possible ordinary shipping disaster an accident due to inadequate preparation and support of other countries techniques and materials have been still relied on and, in addition, because of the limits of processing technology, the spreading emulsion to subside sediment down on the sea bottom rather than removing oil spill away from the water surface, they leave the 2nd result of pollutant under the seawater. It was never same as our point of view toward the maritime disaster disposal, which was clearly anti eco-friendly process that we do not want. All the way to the end, many kinds of ways were mobilized.

Fig 3. Crude oil-volunteer activity of human-sea tactics by more than millions of peoples

However, peoples attending the volunteer activity are continuing even till today. It's used so far more than any other disaster prevention equipments and technologies, which was identified that was the most effective disaster prevention work.

2) Prevention and Measures

Shooting the water cannon and rotating the boat-screw above the water surface to disperse and blow away the oil spill is one of the ways to dispose it. But, finally, it is more natural and desirable to clean up the oil spill to remove the roots of environmental damage of the collection rather than abandoned collection back to the only one earth's natural environment.

Here, as required for disaster prevention technology, it should be applied the magnetic oil adsorbent powder material for removal of refined thin oil slick due to the rapid spread and low viscosity. And, it should be applied the magnetic oil adsorbent bulky pieces and wide fabrics material for removal of oil spill as the crude oil because of its high viscosity and rigidity.

So, we suggest and submit the needs of development to apply field technology for maritime disaster prevention and the practical use of the advantages of high

functional oil mag-sorbent powder and fabrics for disaster prevention and measures of disposing oil spill removal as the "Unmanned Remote Controlled Barge Robot System with Circular Continuous Oil Spill Removal Conveyor using Magnetic Oil Spill Adsorbent of Mag-Sorbent".

2. Floating Magnetic Oil Spill Adsorbent

1) The Mag-Sorbent Powder

The main ingredient of the floating magnetic oil spill adsorbent of the powder material makes it easy to get around the natural resources of the quartz with main components of silicon dioxide (SiO2), or that of volcanic lava of scoria and as same as others. In general, it could be prepared by the SHS method of Self-propagating High-temperature Synthesis technology with simple non- magnetic mineral matters under high temperature combustion treatment and by the MCR method of Mechano-Chemical Reaction technology with quartz material crushed under organic solvents to obtain ferromagnetism property like as magnetic metals of oil-friendly micro-structural adsorbent powder.

As well, the essentially organic material with the properties of entirely non-magnetism could be treated into self-combustive magnetic oxide (SMO) powder by self-combustion reaction synthesis (SRS) technology. So, it was processed into the magnetic oxide powder of its specific gravity less than 1, which was lighter than water.

Fig 4. *Mag-Sorbent*⋆ powder prepared by SRS

Thus, environment-friendly functionality of magnetic oil adsorbent powder, which has been granted specially with its functions of water surface floating matter for environ- mental purification was fabricated, and then it could be developed and used actively as the floating magnetic oil adsorbent for removal of oil slick on the water surface as Mag-Sorbent.

The practicable techniques are as follows;

► Self-propagating High-temperature Synthesis method (SHS)

► Mechano-chemical Reaction (MCR)

► Scoria Magnetism and Metalization (SMM)

► Self-combustion Reaction Synthesis (SRS)

◗ Self-combustive Magnetic Oxide (SMO)

Fig 5. *Mag-Sorbent* fragments prepared by SRS

Fig 6. *Mag-sorbent* fabrics of shuttlecock

2) *Mag-Sorbent** Fragments and Fabrics

The organic magnetic oxide fragments of a big external form were prepared by the above techniques based on the SRS and SMO for the floating magnetic oil adsorbent fragments, and the fabrics material of Mag-Sorbent was prepared with the magnetic powder or fragments which were put in the oil adsorbent fabric bag combined with the magnetic metal ribbon or magnetic wire to produce the floating magnetic oil adsorbent fabrics. Thus, it was loaded for use of the oil spill recovery on the magnetic oil-adsorptive sequence-conveyed remote-controlled barge.

Ⅲ. Conclusion

Currently, the collections of maritime oil spill are being used practically in different ways developed. Thus, we are here for getting sustainable development of marine resources and environmental preservation that can not be separated by antagonistic double-faced nature of the both sides of social problems to be resolved, and suggesting solutions with more convenient and economical by proposing the maritime disaster disposal system of series circulating collection type with the equal solution to the row and environment-friendly sustainable development and Maintenance.

In the demonstration of preliminary experiments, it was verified that the method of the oil spill collection using mag-sorbent

powder and fabrics was a very effective technique to collect oil samples.

Therefore, by applying a new form of novel technology fused with electronics and marine engineering proposed in this thesis, it could be able to contribute significantly to the development of the will for the environmental protection, disposing marine disaster and its prevention with the environment-friendly management technology. Specific purpose of the electronic controlled collection system with Mag-Sorbent is to use for disposing oil pollutant on the water with easy and simple particularly for caving disaster in the cave.

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