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SODIUM PERCARBONATE

FIRES ON CONTAINERSHIPS

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SODIUM PERCARBONATE FIRES ON CONTAINERSHIPS

Burgoynes has seen several containership fires in recent weeks involving reported cargoes of sodium percarbonate. Concurrently, notifications have been issued by some P&I Clubs to alert their members to the risks associated with this cargo, which has been shipped from Chinese ports[1,2].

We have investigated containership incidents involving sodium percarbonate for several years. These have ranged from single container fires to incidents where the fire spread to adjacent containers, causing significant damage to the vessel and her cargo.

Sodium percarbonate is a white crystalline or granular solid that is commonly used as a source of "active oxygen" in cleaning products. Chemically, it is an adduct of sodium carbonate and hydrogen peroxide.



A sodium percarbonate-based stain remover powder.

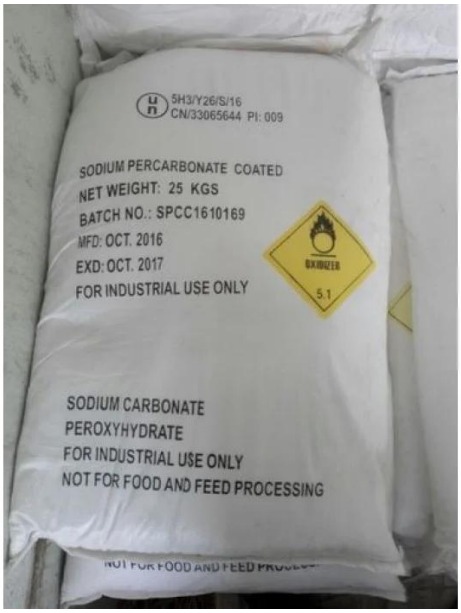
When dissolved in water, sodium percarbonate decomposes to release the hydrogen peroxide component, which is responsible for its oxidising properties. The use of sodium

[1] https://www.kpiclub.or.kr/sub/news_news_alert_board/e153aa48af
[2] https://north-standard.com/insights-and-resources/resources/news/alert-container-fires-involving-un-3378-sodium-carbonate-peroxhydrate

percarbonate has increased in recent years due to a shift from chlorine-based chemicals to more environmentally friendly ones.

Sodium percarbonate is an IMDG Code Dangerous Goods cargo. The proper shipping name is SODIUM CARBONATE PEROXYHYDRATE; it should be shipped under UN3378, and it is an IMO Class 5.1 oxidising solid. Cargoes can fall into either packing group II or III. Most, if not all, of the cargoes we have encountered were correctly declared.

In its pure form, sodium percarbonate can be shipped as a white granular solid, or it can be pressed into small tablets. Some products are coated to improve stability and shelf-life. The material is commonly packaged in woven plastic bags, although other packaging types are also used.



A package of "sodium percarbonate coated" (source: www.chemicalplus.co.za).

Fires can arise because sodium percarbonate can undergo exothermic (heat-producing) decomposition. If the heat generated cannot dissipate, as is often the case for tightly packed cargoes inside a shipping container, then the temperature rises. The increase in temperature increases the rate of reaction and a runaway situation can then occur, which results in fire (a "self-accelerating decomposition reaction").

Whilst the material itself is not combustible, the heat generated by decomposition can cause ignition of combustible materials in the container, such as the cargo packaging and any

dunnage. The oxidising properties of the cargo will then intensify the fire, possibly allowing it to spread rapidly to adjacent containers. If several containers of the cargo are stowed together in a 'block', this can result in a significant fire occurring.

Features of the behaviour are similar to another IMDG cargo, calcium hypochlorite, which is well-known in the marine industry for its associated fire risks (*e.g.* the CMA Djakarta and Aconcagua casualties).



Severe damage to a containership resulting from a cargo fire.

It is recognised that the stability of sodium percarbonate can be affected by factors such as temperature, humidity/moisture, the presence of free water or contaminants, and coating defects. If good quality samples of the cargo can be obtained during an investigation, then laboratory testing can be undertaken to understand the properties of the material and assess the possible causes of decomposition.

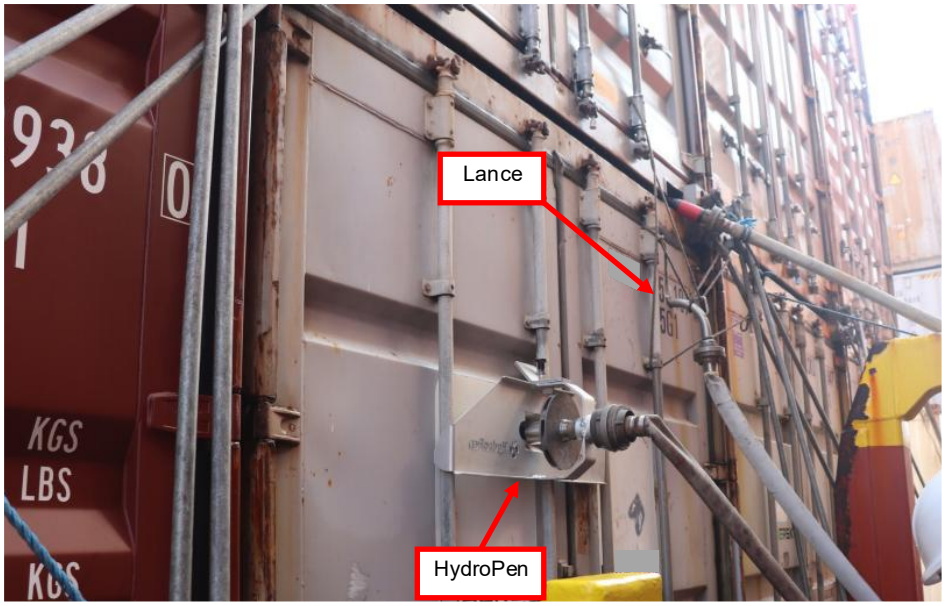
In terms of cargo handling, the IMDG Code assigns Stowage Category A, meaning containers of sodium percarbonate can be carried on or under deck. Stowage Codes SW1 – Protected from sources of heat, and H1 – Keep as dry as reasonably practical, are also assigned. The assignment of these stowage codes fits with the known properties of the material explained above.

The Code outlines that "protected from sources of heat" means that containers should be stowed away from heated ship structures (*e.g.* fuel tanks). In addition, the Code also recognises the potential for solar heating of containers when in direct sunlight and outlines that "depending upon the nature of the goods in the cargo transport unit and the planned voyage precautions shall be taken to ensure that exposure to direct sunlight is reduced".

If a fire occurs on board a ship, the relevant fire schedule in the IMDG Code EmS Guide is Fire Schedule Alfa (A). This outlines that fires should be fought from a protected position from as far away as possible, due to the possibility that exposed cargoes might explode or their containment might rupture.

Fire Schedule Alfa outlines that fires on deck should be fought with water spray from as many hoses as possible. In the case of an under-deck fire, ventilation should be stopped and vents closed, and the fixed firefighting system deployed. If the fixed firefighting system is not available, then water spray should be created with "copious quantities of water".

In some cases, we have seen water mist lances and/or 'HydroPen' type devices used to penetrate the container shell and spray water directly inside to suppress the fire and remove heat. The use of such devices depends on the incident and operational circumstances and should only be deployed after a vessel-specific risk assessment.



A HydroPen and lance being used to spray water into a container.

Summary

Sodium percarbonate presents a potentially significant fire hazard during sea transport. Its propensity to undergo exothermic decomposition, combined with its oxidising properties, means that a fire may develop and spread beyond the container of origin, with serious consequences for the vessel and her cargo.

Our marine and chemical experts have extensive experience of incidents involving sodium percarbonate and other reactive chemical cargoes. We can provide robust technical advice during live incidents, assisting P&I interests and their members during the initial stages of casualty management, assessing risks of fire spread, and the potential involvement of other cargoes. Once the immediate firefighting and salvage requirements have been met, we can commence a detailed forensic investigation to establish the cause.

We have experienced investigators capable of managing multi-party attendances on board and liaising with salvors, surveyors and other stakeholders. Our capabilities extend to include a thorough analysis of the IMDG Code requirements in respect of stowage, segregation and handling, and expert interpretation of any chemical analysis of cargo samples.

To discuss an incident or potential instruction, please contact one of our experts in your local Burgoynes office or those named below.

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