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Article

Transporting lithium-ion batteries: Know your risk

Lithium-ion (Li-ion) batteries power many electrical devices, from children's toys and mobile phones, to laptops and vehicles and are shipped around the world. They are one of the most energy dense batteries available on the market, deliver large amounts of current, are comparatively low maintenance, and have a low self-discharge rate. However, they have a tendency to overheat, explode, and catch fire. We examine the risks of transporting Li-ion batteries and provide cargo owners three key steps to help manage these risks.

How Li-ion battery fires start

Li-ion batteries have the potential to ignite and explode because they contain a flammable liquid electrolyte. This risk is compounded when batteries are damaged, either

due to improper storage, use, or while they are being charged. Additionally, counterfeit batteries — that are widely in circulation — may be missing protective seals between the terminals or are too weak to work effectively. Regardless of manufacturing quality, if a Li-ion battery short circuits for any reason, the terminals heat up and the electrolyte liquid begins to boil. If the electrolyte steam cannot escape the battery, thermal runaway occurs, causing the battery to swell, and may ultimately lead to explosion and fire.

Li-ion battery fire is extremely hot and difficult to extinguish. Because it is self-sustaining, it will continue to burn even without an external source of oxygen to feed it. Attempts to extinguish Li-ion battery fires with water may produce even worse conditions, given that lithium reacts vigorously with water and forms toxic gases. Furthermore, Li-ion battery fires may appear to be fully extinguished when they are not, sometimes reigniting days later.

Due to the specialized equipment and knowledge required to safely contain and extinguish such fires, many vessels may not be appropriately prepared.

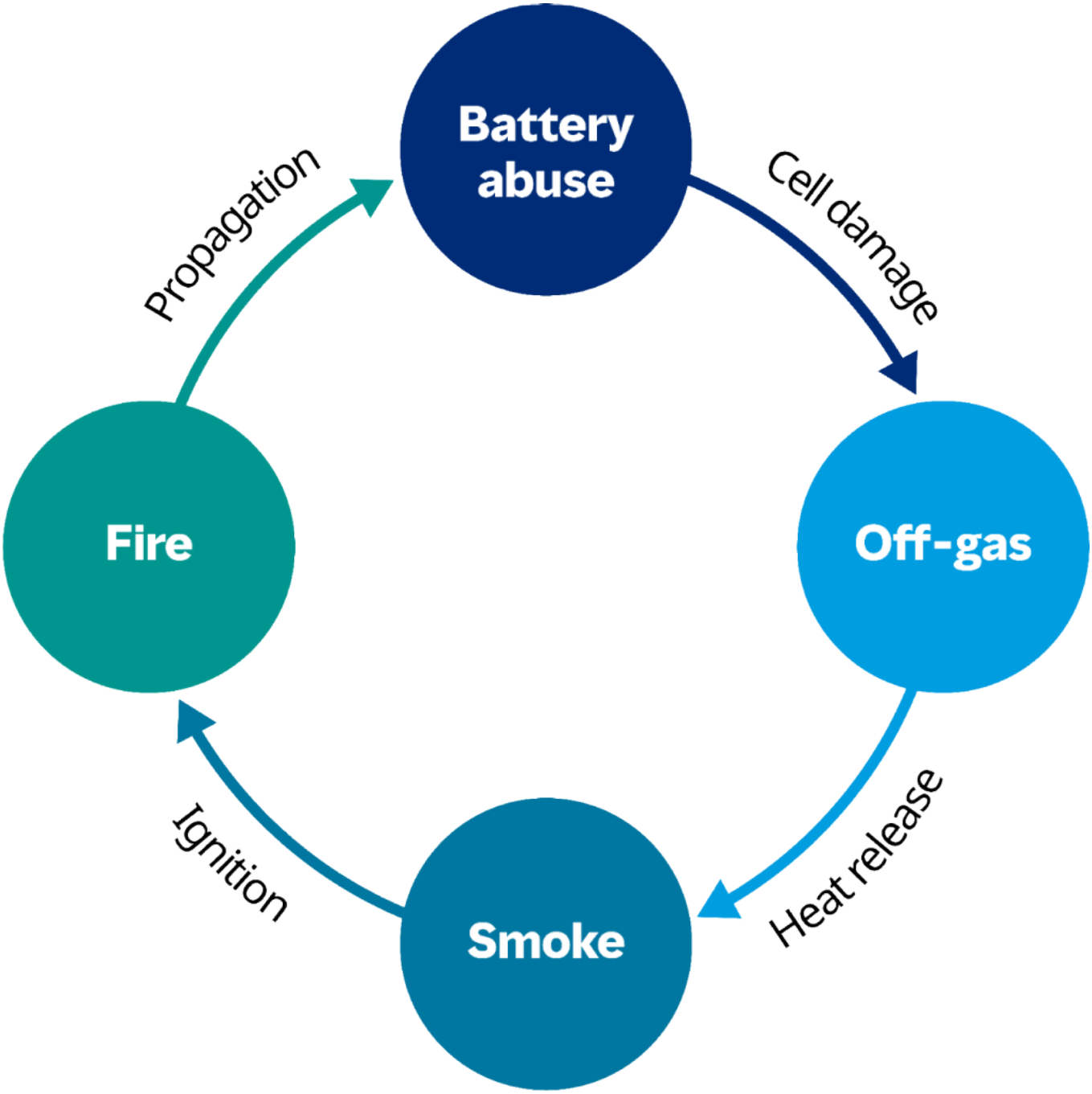

Figure 1: Thermal runaway feedback loop.

Know your risks

The increased volume of products powered by Li-ion batteries being shipped around the world has highlighted the risks that these batteries pose not only to the vessels carrying them, but also to the crews on board. Additionally at risk are the cargo owners of goods

with Li-ion batteries, who may be held liable for injuries or loss to other parties caused by a Li-ion battery fire.

Today's car carrying vessels are able to carry over 6,500 car equivalent units (CEU), and ones designed to carry more than 9,000 CEUs are expected to enter service by the end of next year. It only takes one electric vehicle to catch fire and start a furious blaze with the potential to engulf the whole ship. There have been numerous examples where Li-ion batteries are suspected of having ignited and leading to fires on board pure car carrier (PCC) vessels. Container ships are exposed to similar risks when carrying goods that include Li-ion batteries. Although shippers are required to itemize any dangerous goods, these descriptions may be inaccurate, either intentionally or due to a lack of knowledge about the dangers associated with Li-ion batteries.

Three actions to reduce Li-on battery fire risk

Considering the potential fire hazard of shipping electrically powered vehicles or quantities of Li-ion batteries, it is crucial for cargo owners to secure the appropriate insurance coverage and take action to manage their risks, including:

1. Work with your broker or insurance advisor to confirm whether your policy covers the potential liabilities that could arise during the transportation of Li-ion batteries, such as loss or damage to the carrying vessel or vehicles, or to the property or goods belonging to other parties. Some of the consequences may not be covered, or may actually be excluded, such as resultant pollution, demurrage (the cost of delaying the vessel), and general average declarations.
2. Ensure that the description of cargo given to carriers specifically mentions electric vehicles or goods containing Li-ion batteries, and that these goods are packaged in compliance with the International Maritime Dangerous Goods (IMDG) Code. These actions help promote safer carriage of dangerous goods aboard the vessel, and help protect you against accusations of "misdeclaration," should a fire be caused or exacerbated by the Li-ion batteries within your shipped goods. When dangerous goods, such as Li-ion batteries, are not properly declared, they are unlikely to be handled with the appropriate care. Additionally, if a fire breaks out, the crew might not be aware of how to tackle the blaze correctly.
3. Find out whether cargo owner's liability insurance can fill the gaps between your traditional general liability insurance and a standard cargo insurance policy, help

eliminate ambiguity, and respond to third party damage and its consequences, thereby offering the necessary insurance protection to prudent cargo owners.

For more information, please contact your Marsh Specialty Marine & Cargo advisor.