

# Dangerous goods transport: IMDG and ADR

9 classes, UN numbers, packing groups and declarations: how are dangerous goods shipped?

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Online interactive version: <https://ozgurkonakci.com/en/guide/dangerous-goods-imdg-adr/>

## SHORT ANSWER

Dangerous goods are substances and articles that pose a risk to people, the environment or the means of transport, and they are grouped into 9 classes under the UN system. Each is identified by a four-digit UN number and usually a packing group. The IMDG Code applies at sea, ADR on the road, RID on rail and the IATA Dangerous Goods Regulations in the air. Amendment 42-24 of the IMDG Code has been mandatory since 1 January 2026.

## What are dangerous goods?

Dangerous goods (DG) are substances and articles that pose a risk to health, the environment or the means of transport while being carried. Many everyday products, such as paint, perfume, aerosols, batteries and cleaning chemicals, travel as dangerous goods. So the topic concerns almost every exporter, not just the chemical industry.

The rules for every mode are based on the UN Recommendations on the Transport of Dangerous Goods (the UN Model Regulations):

| Mode | Rules                                  | Published by |
|------|----------------------------------------|--------------|
| Sea  | IMDG Code                              | IMO          |
| Road | ADR                                    | UNECE        |
| Rail | RID                                    | OTIF         |
| Air  | ICAO Technical Instructions / IATA DGR | ICAO / IATA  |

The IMDG Code is updated every two years. **Amendment 42-24 has been mandatory since 1 January 2026.** In practice, always work with the edition currently in force.

## The 9 classes

The labels are simplified; the official label dimensions and symbols are defined in the relevant rules.

| Class                                                                                    | Name                                       | Divisions                                                                            | Examples                                                          |
|------------------------------------------------------------------------------------------|--------------------------------------------|--------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| <br>1   | Explosives                                 | 1.1–1.6 (from mass explosion hazard to extremely insensitive)                        | Fireworks, ammunition, flares                                     |
| <br>2   | Gases                                      | 2.1 flammable · 2.2 non-flammable, non-toxic · 2.3 toxic                             | Aerosols, LPG, fire extinguishers                                 |
| <br>3   | Flammable liquids                          | —                                                                                    | Paint, perfume, fuel, solvents                                    |
| <br>4   | Flammable solids                           | 4.1 flammable solids · 4.2 liable to spontaneous combustion · 4.3 dangerous when wet | Matches, sulphur, calcium carbide                                 |
| <br>5  | Oxidising substances and organic peroxides | 5.1 oxidising substances · 5.2 organic peroxides                                     | Pool chlorine (calcium hypochlorite), some fertilisers, hardeners |
| <br>6 | Toxic and infectious substances            | 6.1 toxic · 6.2 infectious                                                           | Pesticides, some chemicals, medical samples                       |
| <br>7 | Radioactive material                       | —                                                                                    | Medical isotopes, some gauges                                     |
| <br>8 | Corrosive substances                       | —                                                                                    | Battery acid, some cleaning chemicals, sodium hydroxide           |
| <br>9 | Miscellaneous dangerous goods              | —                                                                                    | Lithium batteries, dry ice, environmentally hazardous substances  |

## UN number and packing group

- **UN number:** Every dangerous substance or group of substances is identified by a four-digit number. For example, UN 1263 covers paint and paint-related material.
- **Proper shipping name:** The official name that goes with the UN number, used instead of the trade name.
- **Packing group:** Indicates the degree of danger: I high, II medium, III low. The required strength of the packaging depends on it.

## Which documents are needed?

- **Safety data sheet (SDS, formerly MSDS):** Prepared by the manufacturer; describes the substance's properties and transport information. The first reference for classification.
- **Dangerous goods declaration (DGD):** Signed by the shipper; states the UN number, proper shipping name, class, packing group, quantity and packaging.
- **Container packing certificate:** At sea, confirms that the container was packed and marked in line with the rules.

## Segregation

Some dangerous goods can react with each other, so carrying them in the same container, vehicle or near each other on board may be prohibited or require a minimum distance. Segregation is decided using the tables in the IMDG Code and needs expert assessment; it should never be guessed.

## Consequences of undeclared or misdeclared cargo

Undeclared or misclassified dangerous goods are a known cause of ship fires. The consequences are severe:

- Loss of life and major damage to the ship and other cargo
- The shipper's liability towards the carrier and other cargo owners
- Heavy penalties applied by carriers and sanctions under national law

If you are unsure about a product, look at section 14 (transport information) of its SDS and share it with your forwarder.

## Limited quantity

Some dangerous goods packed in small inner packagings can be carried under the "limited quantity" provisions with fewer documents and markings. This is a simplified regime, not an exemption; packaging and marking rules still apply.

## Test yourself

1. Perfume is being exported. Why might it be dangerous goods? *(Answer: Perfumes contain alcohol, so they usually fall under Class 3, flammable liquids.)*
2. What is the difference between packing group I and III? *(Answer: I indicates high danger and III low danger; the required packaging strength depends on it.)*
3. Where do you first find out whether a product is dangerous goods? *(Answer: In the manufacturer's safety data sheet (SDS), especially the transport information in section 14.)*

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## Frequently asked questions

### How many classes of dangerous goods are there?

Nine: 1 explosives, 2 gases, 3 flammable liquids, 4 flammable solids, 5 oxidising substances and organic peroxides, 6 toxic and infectious substances, 7 radioactive material, 8 corrosive substances, 9 miscellaneous dangerous goods. Some classes are split into divisions (e.g. 2.1, 2.2, 2.3).

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### What is the difference between IMDG and ADR?

Both are based on the UN Recommendations on the Transport of Dangerous Goods. The IMDG Code applies to sea transport (IMO) and ADR to road transport (UNECE). Classification is largely the same; packaging, labelling, vehicle and stowage rules differ by mode.

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### Are lithium batteries dangerous goods?

Yes. Lithium batteries and equipment containing them are generally carried under Class 9 (miscellaneous dangerous goods), with different UN numbers depending on the battery type and whether it is packed with or in equipment. Air transport has particularly strict rules.

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## SOURCES

IMO — International Maritime Dangerous Goods (IMDG) Code — <https://www.imo.org/en/publications/pages/imdg%20code.aspx>

TT Club — IMDG Code Amendment 42-24 (mandatory from 1 January 2026) — <https://www.ttclub.com/news-and-resources/news/article/tt-talk-imdg-code-amendment-42-24-november-2025/>

CASA (Civil Aviation Safety Authority, Australia) — Dangerous goods classes and hazard labels —

<https://www.casa.gov.au/operations-safety-and-travel/safety-advice/dangerous-goods-and-air-freight/dangerous-goods-classes-and-hazard-labels>

UNECE — ADR (Agreement concerning the International Carriage of Dangerous Goods by Road) —

<https://unece.org/transport/publications/agreement-concerning-international-carriage-dangerous-goods-road-adr-2025>

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