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Joint Meeting of the RID Safety Committee and the
Working Party on the Transport of Dangerous Goods

**REPORT OF THE SESSION
Held in Geneva from 13 to 24 March 2000**

Addendum 2

Chapter 2 of the draft restructured ADR

CLASSIFICATION

Text adopted by the Joint Meeting

The secretariat reproduces hereunder the text adopted by the Joint Meeting for Chapter 2 of restructured ADR. The corresponding text of Chapter 2 of RID will be reproduced by the Central Office for International Carriage by Rail (OCTI) under the symbol OCTI/RID/GT/III/2000-A/Add.2.

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PART 2

Classification

CHAPTER 2.1

GENERAL PROVISIONS

2.1.1 Introduction

2.1.1.1 The classes of dangerous goods according to ADR are the following:

- Class 1 Explosive substances and articles
- Class 2 Gases
- Class 3 Flammable liquids
- Class 4.1 Flammable solids, self-reactive substances and solid desensitized explosives
- Class 4.2 Substances liable to spontaneous combustion
- Class 4.3 Substances which, in contact with water, emit flammable gases
- Class 5.1 Oxidizing substances
- Class 5.2 Organic peroxides
- Class 6.1 Toxic substances
- Class 6.2 Infectious substances
- Class 7 Radioactive material
- Class 8 Corrosive substances
- Class 9 Miscellaneous dangerous substances and articles

2.1.1.2 Each entry in the different classes has been assigned a UN number. The following types of entries are used:

- A. Single entries for well defined substances or articles including entries for substances covering several isomers, e.g.:

UN No. 1090 ACETONE
UN No. 1104 AMYL ACETATES
UN No. 1194 ETHYL NITRITE SOLUTION

- B. Generic entries for a well defined group of substances or articles, which are not n.o.s. entries, e.g.:

UN No. 1133 ADHESIVES
UN No. 1266 PERFUMERY PRODUCTS
UN No. 2757 CARBAMATE PESTICIDE, SOLID, TOXIC
UN No. 3101 ORGANIC PEROXIDE TYPE B, LIQUID

- C. Specific n.o.s. entries covering a group of substances or articles of a particular chemical or technical nature, not otherwise specified, e.g.:

UN No. 1477 NITRATES, INORGANIC, N.O.S.
UN No. 1987 ALCOHOLS, FLAMMABLE, N.O.S.

2.1.1.2 D. General n.o.s. entries covering a group of substances or articles having one or more (cont'd) dangerous properties, not otherwise specified, e.g.:

UN No. 1325 FLAMMABLE SOLID, ORGANIC, N.O.S.

UN No. 1993 FLAMMABLE LIQUID, N.O.S.

The entries defined under B., C. and D. are defined as collective entries.

2.1.1.3 For packing purposes, certain substances may be assigned to packing groups in accordance with their degree of danger. The packing groups have the following meanings:

Packing group I	:	Substances presenting high danger
Packing group II	:	Substances presenting medium danger
Packing group III	:	Substances presenting low danger

2.1.2 Principles of classification

2.1.2.1 The dangerous goods covered by the heading of a class are defined on the basis of their properties according to sub-section 2.2.x.1 of the relevant class. Assignment of dangerous goods to a class and a packing group is made according to the criteria mentioned in the same sub-section 2.2.x.1. Assignment of one or several subsidiary risk(s) to a dangerous substance or article is made according to the criteria of the class or classes corresponding to those risks, as mentioned in the appropriate sub-section(s) 2.2.x.1.

2.1.2.2 All dangerous goods entries are listed in table A of Chapter 3.2 in the numerical order of their UN Number. This table contains relevant information on the goods listed, such as name, class, packing group(s), label(s) to be affixed, packing and carriage provisions. An alphabetical list of these entries is given in table B of Chapter 3.2.

2.1.2.3 Dangerous goods which are listed or defined in sub-section 2.2.x.2 of each class are not to be accepted from carriage.

2.1.2.4 Goods not mentioned by name, i.e. goods not listed as single entries in table A of Chapter 3.2 and not listed or defined in one of the above-mentioned sub-sections 2.2.x.2 shall be assigned to the relevant class in accordance with the procedure of section 2.1.3. In addition, the subsidiary risk (if any) and the packing group shall be determined. Once the class, subsidiary risk (if any) and packing group have been established the relevant UN number shall be determined. The decision trees in sub-sections 2.2.x.3 (list of collective entries) at the end of each class indicate the relevant parameters for selecting the relevant collective entry (UN number). In all cases the most specific collective entry covering the properties of the substance or article shall be selected, according to the hierarchy indicated in 2.1.1.2 by the letters B, C and D respectively. If the substance or article cannot be classified under entries of type B or C according to 2.1.1.2, then, and only then shall it be classified under an entry of type D.

2.1.2.5 On the basis of the test procedures of Chapter 2.3 and the criteria set out in sub-sections 2.2.x.1 of classes when it is so specified, it may be determined that a substance, solution or mixture of a certain class, mentioned by name in Table A of Chapter 3.2, does not meet the criteria of that class. In such a case, the substance, solution or mixture is deemed not to belong to that class.

2.1.2.6 For the purposes of classification, substances with a melting point or initial melting point of 20 °C or lower at a pressure of 101.3 kPa shall be considered to be liquids. A viscous substance for which a specific melting point cannot be determined shall be subjected to the ASTM D 4359-90 test or to the test for determining fluidity (penetrometer test) prescribed in 2.3.4.

2.1.3 Classification of substances including solutions and mixtures (such as preparations and wastes) not mentioned by name

2.1.3.1 Substances including solutions and mixtures not mentioned by name shall be classified according to their degree of danger on the basis of the criteria mentioned in sub-section 2.2.x.1 of the various classes. The danger(s) presented by a substance shall be determined on the basis of its physical and chemical characteristics and physiological properties. Such characteristics and properties shall also be taken into account when such experience leads to a more stringent assignment.

2.1.3.2 A substance not mentioned by name in table A of Chapter 3.2 presenting a single hazard shall be classified in the relevant class under a collective entry listed in sub-section 2.2.x.3 of that class.

2.1.3.3 A solution or mixture containing only one dangerous substance mentioned by name in table A of Chapter 3.2, together with one or more non-dangerous substance(s), shall be regarded as the dangerous substance listed by name, unless:

- (a) The solution or mixture is specifically mentioned by name in table A of Chapter 3.2; or
- (b) It is quite clear from the entry for the dangerous substance that it is applicable only to the pure or technically pure substance; or
- (c) The class, physical state or packing group of the solution or mixture is different from that of the dangerous substance.

In such cases the solution or mixture shall be classified in the relevant class under a collective entry according to sub-section 2.2.x.3 of that class taking account of the subsidiary risks presented by that solution or mixture.

2.1.3.4 Solutions and mixtures containing one of the following substances mentioned by name shall always be classified under the same entry as the substance they contain, provided they do not have the hazard characteristics as indicated in 2.1.3.5:

- Class 3

UN No. 1921 PROPYLENEIMINE, INHIBITED; UN No. 2481 ETHYL ISOCYANATE; UN No. 3064 NITROGLYCERIN SOLUTION IN ALCOHOL with more than 1% but not more than 5% nitroglycerin

- Class 6.1

UN No. 1051 HYDROGEN CYANIDE, STABILIZED, containing not more than 3% water; UN No. 1185 ETHYLENEIMINE, INHIBITED; UN No. 1259 NICKEL CARBONYL; UN No. 1613 HYDROGEN CYANIDE, AQUEOUS SOLUTION (hydrocyanic acid), with not more than 20% hydrogen cyanide; UN No. 1614

HYDROGEN CYANIDE, STABILIZED, containing not more than 3% water and absorbed in a porous inert material; UN No. 1994 IRON PENTACARBONYL; UN No. 2480 METHYL ISOCYANATE; UN No. 3294 HYDROGEN CYANIDE, SOLUTION IN ALCOHOL, with not more than 45% hydrogen cyanide

- Class 8

UN No. 1052 HYDROGEN FLUORIDE, ANHYDROUS; UN No. 1744 BROMINE or UN No. 1744 BROMINE SOLUTION; UN No. 1790 HYDROFLUORIC ACID with more than 85% hydrogen fluoride; UN No. 2576 PHOSPHORUS OXYBROMIDE, MOLTEN

- Class 9

UN No. 2315 POLYCHLORINATED BIPHENYLS; UN No. 3151 POLY-HALOGENATED BIPHENYLS, LIQUID or UN No. 3151 POLYHALOGENATED TERPHENYLS, LIQUID;
UN No. 3152 POLYHALOGENATED BIPHENYLS, SOLID or UN No. 3152 POLYHALOGENATED TERPHENYLS, SOLID, unless they contain one of the substances of Class 3 or Class 6.1 or Class 8 listed above; in which case they shall be classified accordingly.

2.1.3.5 Substances not mentioned by name in table A of Chapter 3.2, having more than one hazard characteristic and solutions or mixtures containing several dangerous substances shall be classified under a collective entry (see 2.1.2.4) and packing group of the appropriate class in accordance with their hazard characteristics. Such classification according to the hazard characteristics shall be carried out as follows:

2.1.3.5.1 The physical and chemical characteristics and physiological properties shall be determined by measurement or calculation and the substance, solution or mixture shall be classified according to the criteria mentioned in sub-section 2.2.x.1 of the various classes.

2.1.3.5.2 If this determination is not possible without disproportionate cost or effort (as for some kinds of wastes), the substance, solution or mixture shall be classified in the class of the component presenting the major hazard.

2.1.3.5.3 If the hazard characteristics of the substance, solution or mixture fall within more than one class or group of substances listed below then the substance, solution or mixture shall be classified in the class or group of substances corresponding to the major hazard on the basis of the following order of precedence:

- (a) Material of Class 7 (apart from radioactive material in excepted packages where the other hazardous properties take precedence);
- (b) Substances of Class 1;
- (c) Substances of Class 2;
- (d) Liquid desensitized explosives of Class 3;
- (e) Self-reactive substances and solid desensitized explosives of Class 4.1;
- (f) Pyrophoric substances of Class 4.2;
- (g) Substances of Class 5.2;

- (h) Substances of Class 6.1 or Class 3 which, on the basis of their inhalation toxicity, are to be classified under Packing group I [Substances meeting the classification criteria of Class 8 and having an inhalation toxicity of dust and mist (LC_{50}) in the range of Packing group I and a toxicity through oral ingestion or dermal contact only in the range of Packing group III or less, shall be allocated to Class 8];
- (i) Infectious substances of Class 6.2.

2.1.3.5.4 If the hazard characteristics of the substance fall within more than one class or group of substances not listed in 2.1.3.5.3 above, the substance shall be classified in accordance with the same procedure but the relevant class shall be selected according to the precedence of hazards table in 2.1.3.9.

2.1.3.6 The most specific applicable collective entry (see 2.1.2.4) shall always be used, i.e. a general n.o.s. entry shall only be used if a generic entry or a specific n.o.s. entry cannot be used.

2.1.3.7 Solutions and mixtures of oxidizing substances or substances with an oxidizing subsidiary risk may have explosive properties. In such a case they are not to be accepted for carriage unless they meet the requirements for Class 1.

2.1.3.8 For the purposes of ADR, substances, solutions and mixtures (such as preparations and wastes) which cannot be assigned to Classes 1 to 8 or Class 9 entries other than UN Nos. 3077 and 3082, but which may be assigned to UN Nos. 3077 or 3082 on the basis of the test methods and criteria of section 2.3.5 shall be considered to be pollutant to the aquatic environment. Solutions and mixtures (such as preparations and wastes) for which no data conforming to the classification criteria are available shall be considered to be pollutant to the aquatic environment if the LC_{50} (see definition in 2.3.4.7) evaluated according to the following formula:



is equal to or lower than:

- (a) 1 mg/l; or
- (b) 10 mg/l if the pollutant is not readily biodegradable or, being biodegradable, has a $\log P_{ow} \leq 3.0$.

(see also 2.3.5.6)

2.1.3.9 Table of precedence of hazards

Class and packing group	4.1, II	4.1, III	4.2, II	4.2, III	4.3, I	4.3, II	4.3, III	5.1, I	5.1, II	5.1, III	6.1, I DERMAL	6.1, I ORAL	6.1, II	6.1, III	8, I	8, II	8, III	9
3, I	SOL LIQ 4.1 3, I	SOL LIQ 4.1 3, I	SOL LIQ 4.2 3, I	SOL LIQ 4.2 3, I	4.3, I	4.3, I	4.3, I	SOL LIQ 5.1, I 3, I	SOL LIQ 5.1, I 3, I	SOL LIQ 5.1, I 3, I	3, I	3, I	3, I	3, I	3, I	3, I	3, I	3, I
3, II	SOL LIQ 4.1 3, II	SOL LIQ 4.1 3, II	SOL LIQ 4.2 3, II	SOL LIQ 4.2 3, II	4.3, I	4.3, II	4.3, II	SOL LIQ 5.1, I 3, I	SOL LIQ 5.1, II 3, II	SOL LIQ 5.1, II 3, II	3, I	3, I	3, II	3, II	8, I	3, II	3, II	3, II
3, III	SOL LIQ 4.1 3, II	SOL LIQ 4.1 3, III	SOL LIQ 4.2 3, II	SOL LIQ 4.2 3, III	4.3, I	4.3, II	4.3, III	SOL LIQ 5.1, I 3, I	SOL LIQ 5.1, II 3, II	SOL LIQ 5.1, III 3, III	6.1, I	6.1, I	6.1, II	3, III */	8, I	8, II	3, III	3, III
4.1, II			4.2, II	4.2, II	4.3, I	4.3, II	4.3, II	5.1, I	4.1, II	4.1, II	6.1, I	6.1, I	SOL LIQ 4.1, II 6.1, II	SOL LIQ 4.1, II 6.1, II	8, I	SOL LIQ 4.1, II 8, II	SOL LIQ 4.1, II 8, II	4.1, II
4.1, III			4.2, II	4.2, III	4.3, I	4.3, II	4.3, III	5.1, I	4.1, II	4.1, III	6.1, I	6.1, I	6.1, II	SOL LIQ 4.1, III 6.1, III	8, I	8, II	SOL LIQ 4.1, III 8, III	4.1, III
4.2, II					4.3, I	4.3, II	4.3, II	5.1, I	4.2, II	4.2, II	6.1, I	6.1, I	4.2, II	4.2, II	8, I	4.2, II	4.2, II	4.2, II
4.2, III					4.3, I	4.3, II	4.3, III	5.1, I	5.1, II	4.2, III	6.1, I	6.1, I	6.1, II	4.2, III	8, I	8, II	4.2, III	4.2, III
4.3, I								5.1, I	4.3, I	4.3, I	6.1, I	4.3, I	4.3, I	4.3, I	4.3, I	4.3, I	4.3, I	4.3, I
4.3, II								5.1, I	4.3, II	4.3, II	6.1, I	4.3, I	4.3, II	4.3, II	8, I	4.3, II	4.3, II	4.3, II
4.3, III								5.1, I	5.1, II	4.3, III	6.1, I	6.1, I	6.1, II	4.3, III	8, I	8, II	4.3, III	4.3, III
5.1, I											5.1, I	5.1, I	5.1, I	5.1, I	5.1, I	5.1, I	5.1, I	5.1, I
5.1, II											6.1, I	5.1, I	5.1, II	5.1, II	8, I	5.1, II	5.1, II	5.1, II
5.1, III											6.1, I	6.1, I	6.1, II	5.1, III	8, I	8, II	5.1, III	5.1, III
6.1, I DERMAL															SOL LIQ 6.1, I 8, I	6.1, I	6.1, I	6.1, I
6.1, I ORAL															SOL LIQ 6.1, I 8, I	6.1, I	6.1, I	6.1, I
6.1, II INHAL															SOL LIQ 6.1, I 8, I	6.1, II	6.1, II	6.1, II
6.1, II DERMAL															SOL LIQ 6.1, I 8, I	SOL LIQ 6.1, II 8, II	6.1, II	6.1, II
6.1, II ORAL															8, I	SOL LIQ 6.1, II 8, II	6.1, II	6.1, II
6.1, III															8, I	8, II	8, III	6.1, III
8, I																		8, I
8, II																		8, II
8, III																		8, III

SOL = Solid substances and mixtures
 LIQ = Liquid substances, mixtures and solutions
 DERMAL = Dermal toxicity
 ORAL = Oral toxicity
 INHAL= Inhalation toxicity
 */ Class 6.1 for pesticides

NOTE 1: Examples to explain the use of the table

Classification of a single substance

Description of the substance to be classified:

An amine not mentioned by name meeting the criteria for Class 3, packing group II as well as those for Class 8, packing group I.

Procedure:

*The intersection of line 3 II with column 8 I gives 8 I.
This amine has therefore to be classified in Class 8 under:*

*UN No. 2734 AMINES LIQUID, CORROSIVE, FLAMMABLE, N.O.S. or UN No. 2734
POLYAMINES, LIQUID, CORROSIVE, FLAMMABLE, N.O.S.
packing group I*

Classification of a mixture

Description of the mixture to be classified:

Mixture consisting of a flammable liquid classified in Class 3, packing group III, a toxic substance in Class 6.1, packing group II and a corrosive substance in Class 8, packing group I.

Procedure

*The intersection of line 3 III with column 6.1 II gives 6.1 II.
The intersection of line 6.1 II with column 8 I LIQ gives 8 I.
This mixture not further defined has therefore to be classified in Class 8 under:*

*UN No. 2922 CORROSIVE LIQUID, TOXIC, N.O.S.
packing group I.*

NOTE 2: Examples for the classification of mixtures and solutions under a class and a packing group:

A phenol solution of Class 6.1, (II), in benzene of Class 3, (II) is to be classified in Class 3, (II); this solution is to be classified under UN No. 1992 FLAMMABLE LIQUID, TOXIC, N.O.S., Class 3, (II), by virtue of the toxicity of the phenol.

A solid mixture of sodium arsenate of Class 6.1, (II) and sodium hydroxide of Class 8, (II) is to be classified under UN No. 3290 TOXIC SOLID, CORROSIVE, INORGANIC, N.O.S., in Class 6.1 (II).

A solution of crude or refined naphthalene of Class 4.1, (III) in petrol of Class 3, (II), is to be classified under UN No. 3295 HYDROCARBONS, LIQUID, N.O.S. in Class 3, (II).

A mixture of hydrocarbons of Class 3, (III), and of polychlorinated biphenyls (PCB) of Class 9, (II), is to be classified under UN No. 2315 POLYCHLORINATED BIPHENYLS in Class 9, (II).

A mixture of propyleneimine of Class 3, and polychlorinated biphenyls (PCB) of Class 9, (II), is to be classified under UN No. 1921 PROPYLENEIMINE, INHIBITED in Class 3.

2.1.4 Classification of samples

2.1.4.1 When the class of a substance is uncertain and it is being transported for further testing, a tentative class, proper shipping name and UN number shall be assigned on the basis of the consignor's knowledge of the substance and application of:

- (a) the classification criteria of Chapter 2.2; and
- (b) the requirements of this Chapter.

The most severe packing group possible for the proper shipping name chosen shall be used.

Where this provision is used the proper shipping name shall be supplemented with the word "sample" (e.g., FLAMMABLE LIQUID, N.O.S. Sample). In certain instances, where a specific proper shipping name is provided for a sample of a substance considered to meet certain classification criteria (e.g., GAS SAMPLE, NON-PRESSURIZED, FLAMMABLE, UN 3167) that proper shipping name shall be used. When an N.O.S. entry is used to transport the sample, the proper shipping name need not be supplemented with the technical name as required by special provision 274.

2.1.4.2 Samples of the substance shall be transported in accordance with the requirements applicable to the tentative assigned proper shipping name provided:

- (a) The substance is not considered to be a substance prohibited for transport by sections 2.2.x.3 of Chapter 2.2 or by Chapter 3.2;
- (b) The substance is not considered to meet the criteria for Class 1 or considered to be an infectious substance or a radioactive material;
- (c) The substance is in compliance with 2.2.41.1.14 or 2.2.52.1.9 if it is a self-reactive substance or an organic peroxide, respectively;
- (d) The sample is transported in a combination packaging with a net mass per package not exceeding 2.5 kg; and
- (e) The sample is not packed together with other goods.

CHAPTER 2.2

CLASS SPECIFIC PROVISIONS

2.2.1 Class 1 Explosive substances and articles

2.2.1.1 Criteria

2.2.1.1.1 The heading of Class 1 covers:

- (a) Explosive substances: solid or liquid substances (or mixtures of substances) capable by chemical reaction of producing gases at such a temperature and pressure and at such a speed as to cause damage to the surroundings.

Pyrotechnic substances: substances or mixtures of substances designed to produce an effect by heat, light, sound, gas or smoke or a combination of these as the result of non-detonating self-sustaining exothermic chemical reactions.

NOTE 1: Substances which are not themselves explosive but which may form an explosive mixture of gas, vapour or dust are not substances of Class 1.

NOTE 2: Also excluded from Class 1 are: water- or alcohol-wetted explosives of which the water or alcohol content exceeds the limits specified and those containing plasticizers - these explosives are assigned to Class 3 or Class 4.1 - and those explosives which, on the basis of their predominant hazard, are assigned to Class 5.2.

- (b) Explosive articles: articles containing one or more explosive substances and or pyrotechnic substances.

NOTE: Devices containing explosive and or pyrotechnic substances in such small quantity or of such a character that their inadvertent or accidental ignition or initiation during carriage would not cause any manifestation external to the device by projection, fire, smoke, heat or loud noise are not subject to the requirements of Class 1.

- (c) Substances and articles not mentioned above which are manufactured with a view to producing a practical effect by explosion or a pyrotechnic effect.

2.2.1.1.2 Any substance or article having or suspected of having explosive properties shall be considered for assignment to Class 1 in accordance with the tests, procedures and criteria prescribed in Part I, Manual of Tests and Criteria.

A substance or article assigned to Class 1 can only be accepted for carriage when it has been assigned to a name or n.o.s. entry listed in table A of Chapter 3.2 and meets the criteria of the Manual of Tests and Criteria.

2.2.1.1.3 The substances and articles of Class 1 shall be assigned to a UN Number and a name or n.o.s. entry listed in table A of Chapter 3.2. Interpretation of the names of substances and articles in table A of Chapter 3.2 shall be based upon the glossary in 2.2.1.1.7.

Samples of new or existing explosive substances or articles carried for purposes including: testing, classification, research and development quality control, or as a commercial sample, other than initiating explosive, may be assigned to UN No. 0190 SAMPLES, EXPLOSIVE.

The assignment of explosive substances and articles not mentioned by name as such in table A of Chapter 3.2 to an n.o.s entry of Class 1 or UN No. 0190 SAMPLES, EXPLOSIVE as well as the assignment of certain substances the carriage of which is subject to a specific authorization by the competent authority according to the special provisions referred to in column (6) of table A of Chapter 3.2 shall be made by the competent authority of the country of origin. This competent authority shall also approve in writing the conditions of carriage of these substances and articles. If the country of origin is not a party to ADR, the classification and the conditions of carriage shall be recognized by the competent authority of the first ADR country reached by the consignment.

2.2.1.1.4 Substances and articles of Class 1 shall have been assigned to a division in accordance with 2.2.1.1.5 and to a compatibility group in accordance with 2.2.1.1.6. The division shall be based on the results of the tests described in section 2.3.1 applying the definitions in 2.2.1.1.5. The compatibility group shall be determined in accordance with the definitions in 2.2.1.1.6. The classification code shall consist of the division number and the compatibility group letter.

2.2.1.1.5 *Definition of divisions*

- Division 1.1 Substances and articles which have a mass explosion hazard (a mass explosion is an explosion which affects almost the entire load virtually instantaneously).
- Division 1.2 Substances and articles which have a projection hazard but not a mass explosion hazard.
- Division 1.3 Substances and articles which have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard:
- (a) combustion of which gives rise to considerable radiant heat; or
 - (b) which burn one after another, producing minor blast or projection effects or both.
- Division 1.4 Substances and articles which present only a slight risk of explosion in the event of ignition or initiation during carriage. The effects are largely confined to the package and no projection of fragments of appreciable size or range is to be expected. An external fire shall not cause virtually instantaneous explosion of almost the entire contents of the package.
- Division 1.5 Very insensitive substances having a mass explosion hazard which are so insensitive that there is very little probability of initiation or of transition from burning to detonation under normal conditions of carriage. As a minimum requirement they must not explode in the external fire test.
- Division 1.6 Extremely insensitive articles which do not have a mass explosion hazard. The articles contain only extremely insensitive detonating substances and demonstrate a negligible probability of accidental initiation or propagation.

NOTE: *The risk from articles of Division 1.6 is limited to the explosion of a single article.*

2.2.1.1.6 *Definition of compatibility groups of substances and articles*

- A Primary explosive substance
- B Article containing a primary explosive substance and not having two or more effective protective features. Some articles, such as detonators for blasting, detonator assemblies for blasting and primers, cap-type, are included, even though they do not contain primary explosives.
- C Propellant explosive substance or other deflagrating explosive substance or article containing such explosive substance.
- D Secondary detonating explosive substance or black powder or article containing a secondary detonating explosive substance, in each case without means of initiation and without a propelling charge, or article containing a primary explosive substance and having two or more effective protective features.
- E Article containing a secondary detonating explosive substance, without means of initiation, with a propelling charge (other than one containing a flammable liquid or gel or hypergolic liquids).
- F Article containing a secondary detonating explosive substance with its own means of initiation, with a propelling charge (other than one containing a flammable liquid or gel or hypergolic liquids) or without a propelling charge.
- G Pyrotechnic substance, or article containing a pyrotechnic substance, or article containing both an explosive substance and an illuminating, incendiary, tear- or smoke-producing substance (other than a water-activated article or one which contains white phosphorus, phosphides, a pyrophoric substance, a flammable liquid or gel or hypergolic liquids).
- H Article containing both an explosive substance and white phosphorus.
- J Article containing both an explosive substance and a flammable liquid or gel.
- K Article containing both an explosive substance and a toxic chemical agent.
- L Explosive substance or article containing an explosive substance and presenting a special risk (e.g. due to water activation or the presence of hypergolic liquids, phosphides or a pyrophoric substance) necessitating isolation of each type.
- N Articles containing only extremely insensitive detonating substances.
- S Substance or article so packed or designed that any hazardous effects arising from accidental functioning are confined within the package unless the package has been degraded by fire, in which case all blast or projection effects are limited to the extent that they do not significantly hinder or prevent fire-fighting or other emergency response efforts in the immediate vicinity of the package.

NOTE 1: Each substance or article, packed in a specified packaging, may be assigned to one compatibility group only. Since the criterion of compatibility group S is empirical, assignment to this group is necessarily linked to the tests for assignment of a classification code.

NOTE 2: Articles of compatibility groups D and E may be fitted or packed together with their own means of initiation provided that such means have at least two effective protective features designed to prevent an explosion in the event of accidental functioning of the means of initiation. Such packages shall be assigned to compatibility groups D or E.

NOTE 3: Articles of compatibility groups D and E may be packed together with their own means of initiation, which do not have two effective protective features (i.e. means of initiation assigned to compatibility group B), provided that they comply with mixed packing provision MP 21 of section 4.1.10. Such packages shall be assigned to compatibility groups D or E.

NOTE 4: Articles may be fitted or packed together with their own means of ignition provided that the means of ignition cannot function during normal conditions of carriage.

NOTE 5: Articles of compatibility groups C, D and E may be packed together. Such packages shall be assigned to compatibility group E.

2.2.1.1.7 Glossary of names

NOTE 1: The descriptions in the glossary are not intended to replace the test procedures, nor to determine the hazard classification of a substance or article of Class 1. Assignment to the correct division and a decision on whether Compatibility Group S is appropriate shall be based on testing of the product in accordance with the Manual of Tests and Criteria, Part I or by analogy with similar products which have already been tested and assigned in accordance with the procedures of the Manual of Tests and Criteria.

NOTE 2: The figures given after the names refer to the relevant UN numbers (Column 2 of table A of Chapter 3.2). For the classification code, see 2.2.1.1.4.

AMMUNITION, ILLUMINATING, with or without burster, expelling charge or propelling charge:
UN Nos. 0171, 0254, 0297.

Ammunition designed to produce a single source of intense light for lighting up an area. The term includes illuminating cartridges, grenades and projectiles; and illuminating and target identification bombs.

NOTE: The following articles: CARTRIDGES, SIGNAL; SIGNAL DEVICES HAND; SIGNALS, DISTRESS; FLARES, AERIAL; FLARES, SURFACE are not included in this definition. They are listed separately.

AMMUNITION, INCENDIARY, liquid or gel, with burster, expelling charge or propelling charge: UN No. 0247.

Ammunition containing liquid or gelatinous incendiary substance. Except when the incendiary substance is an explosive per se, it also contains one or more of the following: a propelling charge with primer and igniter charge; a fuze with burster or expelling charge.

AMMUNITION, INCENDIARY, WHITE PHOSPHORUS with burster, expelling charge or propelling charge: UN Nos. 0243, 0244.

Ammunition containing white phosphorus as incendiary substance. It also contains one or more of the following: a propelling charge with primer and igniter charge; a fuze with burster or expelling charge.

AMMUNITION, INCENDIARY with or without burster, expelling charge or propelling charge:
UN Nos. 0009, 0010, 0300.

Ammunition containing incendiary composition. Except when the composition is an explosive per se, it also contains one or more of the following: a propelling charge with primer and igniter charge; a fuze with burster or expelling charge.

AMMUNITION, PRACTICE: UN Nos. 0362, 0488

Ammunition without a main bursting charge, containing a burster or expelling charge. Normally it also contains a fuze and a propelling charge.

NOTE: GRENADES, PRACTICE are not included in this definition. They are listed separately.

AMMUNITION, PROOF: UN No. 0363

Ammunition containing pyrotechnic substances, used to test the performance or strength of new ammunition, weapon components or assemblies.

AMMUNITION, SMOKE, WHITE PHOSPHORUS, with burster, expelling charge or propelling charge: UN Nos. 0245, 0246

Ammunition containing white phosphorus as a smoke-producing substance. It also contains one or more of the following: a propelling charge with primer and igniter charge; a fuze with burster or expelling charge. The term includes grenades, smoke.

AMMUNITION, SMOKE with or without burster, expelling charge or propelling charge: UN Nos. 0015, 0016, 0303

Ammunition containing a smoke-producing substance such as chlorosulphonic acid mixture or titanium tetrachloride; or a smoke-producing pyrotechnic composition based on hexachloroethane or red phosphorus. Except when the substance is an explosive per se, the ammunition also contains one or more of the following: a propelling charge with primer and igniter charge; a fuze with burster or expelling charge. The term includes grenades, smoke.

NOTE: SIGNALS, SMOKE are not included in this definition. They are listed separately.

AMMUNITION, TEAR-PRODUCING, with burster, expelling charge or propelling charge: UN Nos. 0018, 0019, 0301

Ammunition containing a tear-producing substance. It also contains one or more of the following: a pyrotechnic substance; a propelling charge with primer and igniter charge; a fuze with burster or expelling charge.

ARTICLES, EXPLOSIVE, EXTREMELY INSENSITIVE (ARTICLES EEI): UN No. 0486

Articles containing only extremely insensitive detonating substances (EIDS) which demonstrate a negligible probability of accidental initiation or propagation under normal conditions of transport, and which have passed Test Series 7.

ARTICLES, PYROPHORIC: UN No. 0380

Articles which contain a pyrophoric substance (capable of spontaneous ignition when exposed to air) and an explosive substance or component. The term excludes articles containing white phosphorus.

ARTICLES, PYROTECHNIC, for technical purposes: UN Nos. 0428, 0429, 0430, 0431, 0432

Articles which contain pyrotechnic substances and are used for technical purposes such as heat generation, gas generation, theatrical effects, etc.

NOTE: The following articles: all ammunition; CARTRIDGES, SIGNAL; CUTTERS, CABLE, EXPLOSIVE; FIREWORKS; FLARES, AERIAL; FLARES, SURFACE; RELEASE DEVICES, EXPLOSIVE; RIVETS, EXPLOSIVE; SIGNAL DEVICES, HAND; SIGNALS, DISTRESS; SIGNALS, RAILWAY TRACK, EXPLOSIVES; SIGNALS, SMOKE are not included in this definition. They are listed separately.

BLACK POWDER (GUNPOWDER), COMPRESSED or BLACK POWDER (GUNPOWDER), IN PELLETS: UN No. 0028

Substance consisting of a pelletized form of black powder.

BLACK POWDER (GUNPOWDER), granular or as meal: UN No. 0027

Substance consisting of an intimate mixture of charcoal or other carbon and either potassium nitrate or sodium nitrate, with or without sulphur.

BOMBS, WITH FLAMMABLE LIQUID, with bursting charge: UN Nos. 0399, 0400

Articles which are dropped from aircraft, consisting of a tank filled with inflammable liquid and bursting charge.

BOMBS, PHOTO-FLASH: UN No. 0038

Explosive articles which are dropped from aircraft to provide brief, intense illumination for photography. They contain a charge of detonating explosive without means of initiation or with means of initiation containing two or more effective protective features.

BOMBS, PHOTO-FLASH: UN No. 0037

Explosive articles which are dropped from aircraft to provide brief, intense illumination for photography. They contain a charge of detonating explosive with means of initiation not containing two or more effective protective features.

BOMBS, PHOTO-FLASH: UN Nos. 0039, 0299

Explosive articles which are dropped from aircraft to provide brief, intense illumination for photography. They contain a photo-flash composition.

BOMBS, with bursting charge: UN Nos. 0034; 0035

Explosive articles which are dropped from aircraft, without means of initiation or with means of initiation containing two or more effective protective features.

BOMBS with bursting charge: UN Nos. 0033, 0291

Explosive articles which are dropped from aircraft, with means of initiation not containing two or more effective protective features.

BOOSTERS, WITH DETONATOR: UN Nos. 0225, 0268

Articles consisting of a charge of detonating explosive with means of initiation. They are used to increase the initiating power of detonators or detonating cord.

BOOSTERS, without detonator: UN Nos. 0042, 0283

Articles consisting of a charge of detonating explosive without means of initiation. They are used to increase the initiating power of detonators or detonating cord.

BURSTERS, explosive: UN No. 0043

Articles consisting of a small charge of explosive used to open projectiles or other ammunition in order to disperse their contents.

CARTRIDGES, FLASH: UN Nos. 0049, 0050

Articles consisting of a casing, a primer and flash powder, all assembled in one piece ready for firing.

CARTRIDGES FOR WEAPONS, BLANK: UN Nos. 0326, 0413, 0327, 0338, 0014

Ammunition consisting of a closed cartridge case with a centre or rim fire primer and a charge of smokeless or black powder but no projectile. It produces a loud noise and is used for training, saluting, propelling charge, starter pistols, etc. The term includes ammunition, blank.

CARTRIDGES FOR WEAPONS, INERT PROJECTILE: UN Nos. 0328, 0417, 0339, 0012

Ammunition consisting of a projectile without bursting charge but with a propelling charge with or without a primer. The articles may include a tracer, provided that the predominant hazard is that of the propelling charge.

CARTRIDGES FOR WEAPONS, with bursting charge: UN Nos. 0006, 0321, 0412

Ammunition consisting of a projectile with a bursting charge without means of initiation or with means of initiation containing two or more effective protective features; and a propelling charge with or without a primer. The term includes fixed (assembled) ammunition, semi-fixed (partially assembled) ammunition and separate loading ammunition when the components are packed together.

CARTRIDGES FOR WEAPONS, with bursting charge: UN Nos. 0005, 0007, 0348

Ammunition consisting of a projectile with a bursting charge with means of initiation not containing two or more effective protective features; and a propelling charge with or without a primer. The term includes fixed (assembled) ammunition, semi-fixed (partially assembled) ammunition and separate loading ammunition when the components are packed together.

CARTRIDGES, OIL WELL: UN Nos. 0277, 0278

Articles consisting of a thin casing of fibreboard, metal or other material containing only propellant powder which projects a hardened projectile to perforate an oil well casing.

NOTE: CHARGES, SHAPED are not included in this definition. They are listed separately.

CARTRIDGES, POWER DEVICE: UN Nos. 0275, 0276, 0323, 0381

Articles designed to accomplish mechanical actions. They consist of a casing with a charge of deflagrating explosive and a means of ignition. The gaseous products of the deflagration produce inflation, linear or rotary motion or activate diaphragms, valves or switches or project fastening devices or extinguishing agents.

CARTRIDGES, SIGNAL: UN Nos. 0054, 0312, 0405

Articles designed to fire coloured flares or other signals from signal pistols, etc.

CARTRIDGES SMALL ARMS: UN Nos. 0417, 0339, 0012

Ammunition consisting of a cartridge case fitted with a centre or rim fire primer and containing both a propelling charge and solid projectile. They are designed to be fired in weapons of calibre not larger than 19.1 mm. Shot-gun cartridges of any calibre are included in this description.

NOTE: CARTRIDGES, SMALL ARMS, BLANK, are not included in this definition. They are listed separately. Some military small arms cartridges are not included in this definition. They are listed under CARTRIDGES FOR WEAPONS, INERT PROJECTILE.

CARTRIDGES, SMALL ARMS, BLANK: UN Nos. 0014, 0327, 0338

Ammunition consisting of a closed cartridge case with a centre or rim fire primer and a charge of smokeless or black powder. The cartridge cases contain no projectiles. The cartridges are designed to be fired from weapons with a calibre of at most 19.1 mm and serve to produce a loud noise and are used for training, saluting, propelling charge, starter pistols, etc.

CASES, CARTRIDGE, EMPTY, WITH PRIMER: UN Nos. 0379; 0055

Articles consisting of a cartridge case made from metal, plastics or other non-inflammable material, in which the only explosive component is the primer.

CASES, COMBUSTIBLE, EMPTY, WITHOUT PRIMER: UN Nos. 0447, 0446

Articles consisting of a cartridge case made partly or entirely from nitrocellulose.

CHARGES, BURSTING, PLASTICS BONDED: UN Nos. 0457, 0458, 0459, 0460

Articles consisting of a charge of detonating explosive, plastics bonded, manufactured in a specific form without a casing and without means of initiation. They are designed as components of ammunition such as warheads.

CHARGES, DEMOLITION: UN No. 0048

Articles containing a charge of a detonating explosive in a casing of fibreboard, plastics, metal or other material. The articles are without means of initiation or with means of initiation containing two or more effective protective features.

NOTE: The following articles: BOMBS; MINES; PROJECTILES are not included in this definition. They are listed separately.

CHARGES, DEPTH: UN No. 0056

Articles consisting of a charge of detonating explosive contained in a drum or projectile without means of initiation or with means of initiation containing two or more effective protective features. They are designed to detonate under water.

CHARGES, EXPLOSIVE without detonator: UN Nos. 0442, 0443, 0444, 0445

Articles consisting of a charge of detonating explosive without means of initiation, used for explosive welding, jointing, forming and other metallurgical processes.

CHARGES, PROPELLING, FOR CANNON: UN Nos. 0242, 0279, 0414

Charges of propellant in any physical form for separate-loading ammunition for cannon.

CHARGES, PROPELLING: UN Nos. 0271, 0272, 0415, 0491

Articles consisting of a charge of a propellant charge in any physical form, with or without a casing, as a component of rocket motors or for reducing the drag of projectiles.

CHARGES, SHAPED, COMMERCIAL, without detonator: UN Nos. 0059, 0439, 0440, UN 0441

Articles consisting of a casing containing a charge of detonating explosive with a cavity lined with rigid material, without means of initiation. They are designed to produce a powerful, penetrating jet effect.

CHARGES, SHAPED, FLEXIBLE, LINEAR: UN Nos. 0237, 0288

Articles consisting of a V-shaped core of a detonating explosive clad by a flexible sheath.

CHARGES, SUPPLEMENTARY, EXPLOSIVE: UN No. 0060

Articles consisting of a small removable booster placed in the cavity of a projectile between the fuze and the bursting charge.

COMPONENTS, EXPLOSIVE TRAIN, N.O.S.: UN Nos. 0382, 0383, 0384, 0461

Articles containing an explosive designed to transmit detonation or deflagration within an explosive train.

CONTRIVANCES, WATER-ACTIVATED with burster, expelling charge or propelling charge: UN Nos. 0248, 0249

Articles whose functioning depends upon physico-chemical reaction of their contents with water.

CORD, DETONATING, flexible: UN Nos. 0065, 0289

Article consisting of a core of detonating explosive enclosed in spun fabric and a plastics or other covering. The covering is not necessary if the spun fabric is sift-proof.

CORD (FUSE) DETONATING, metal clad: UN Nos. 0102, 0290

Article consisting of a core of detonating explosive clad by a soft metal tube with or without protective covering.

CORD (FUSE) DETONATING, MILD EFFECT, metal clad: UN No. 0104

Article consisting of a core of detonating explosive clad by a soft metal tube with or without a protective covering. The quantity of explosive substance is so small that only a mild effect is manifested outside the cord.

CORD, IGNITER: UN No. 0066

Article consisting of textile yarns covered with black powder or another fast burning pyrotechnic composition and of a flexible protective covering; or it consists of a core of black powder surrounded by a flexible woven fabric. It burns progressively along its length with an external flame and is used to transmit ignition from a device to a charge or primer.

CUTTERS, CABLE, EXPLOSIVE: UN No. 0070

Articles consisting of a knife-edged device which is driven by a small charge of deflagrating explosive into an anvil.

DETONATOR ASSEMBLIES, NON-ELECTRIC, for blasting: UN Nos. 0360, 0361, 0500

Non-electric detonators assembled with and activated by such means as safety fuse, shock tube, flash tube or detonating cord. They may be of instantaneous design or incorporate delay elements. Detonating relays incorporating detonating cord are included.

DETONATORS, ELECTRIC, for blasting: UN Nos. 0030, 0255, 0456

Articles specially designed for the initiation of blasting explosives. These detonators may be constructed to detonate instantaneously or may contain a delay element. Electric detonators are activated by an electric current.

DETONATORS FOR AMMUNITION: UN Nos. 0073, 0364, 0365, 0366

Articles consisting of a small metal or plastics tube containing explosives such as lead azide, PETN or combinations of explosives. They are designed to start a detonation train.

DETONATORS, NON-ELECTRIC, for blasting: UN Nos. 0029, 0267, 0455

Articles specially designed for the initiation of blasting explosives. These detonators may be constructed to detonate instantaneously or may contain a delay element. Non-electric detonators are activated

by such means as shock tube, flash tube, safety fuse, other igniferous device or flexible detonating cord. Detonating relays without detonating cord are included.

EXPLOSIVE, BLASTING, TYPE A: UN No. 0081

Substances consisting of liquid organic nitrates such as nitroglycerine or a mixture of such ingredients with one or more of the following: nitrocellulose; ammonium nitrate or other inorganic nitrates; aromatic nitro-derivatives, or combustible materials, such as wood-meal and aluminium powder. They may contain inert components such as kieselguhr, and additives such as colouring agents and stabilizers. Such explosives shall be in powdery, gelatinous or elastic form. The term includes dynamite; gelatine, blasting and gelatine dynamites.

EXPLOSIVE, BLASTING, TYPE B: UN Nos. 0082, 0331

Substances consisting of

- (a) a mixture of ammonium nitrate or other inorganic nitrates with an explosive such as trinitrotoluene, with or without other substances such as wood-meal and aluminium powder; or
- (b) a mixture of ammonium nitrate or other inorganic nitrates with other combustible substances which are not explosive ingredients. In both cases they may contain inert components such as kieselguhr, and additives such as colouring agents and stabilizers. Such explosives must not contain nitroglycerine, similar liquid organic nitrates or chlorates.

EXPLOSIVE, BLASTING, TYPE C: UN No. 0083

Substances consisting of a mixture of either potassium or sodium chlorate or potassium, sodium or ammonium perchlorate with organic nitro-derivatives or combustible materials such as wood-meal or aluminium powder or a hydrocarbon. They may contain inert components such as kieselguhr and additives such as colouring agents and stabilizers. Such explosives must not contain nitroglycerine or similar liquid organic nitrates.

EXPLOSIVE, BLASTING, TYPE D: UN No. 0084

Substances consisting of a mixture of organic nitrated compounds and combustible materials such as hydrocarbons and aluminium powder. They may contain inert components such as kieselguhr and additives such as colouring agents and stabilizers. Such explosives must not contain nitroglycerine, similar liquid organic nitrates, chlorates and ammonium nitrate. The term generally includes plastic explosives.

EXPLOSIVES, BLASTING, TYPE E: UN Nos. 0241, 0332

Substances consisting of water as an essential ingredient and high proportions of ammonium nitrate or other oxidizers, some or all of which are in solution. The other constituents may include nitro-derivatives such as trinitrotoluene, hydrocarbons or aluminium powder. They may contain inert components such as kieselguhr and additives such as colouring agents and stabilizers. The term includes explosives, emulsion, explosives, slurry and explosives, wattergel.

FIREWORKS: UN Nos. 0333, 0334, 0335, 0336, 0337

Pyrotechnic articles designed for entertainment.

FLARES, AERIAL: UN Nos. 0093, 0403, 0404, 0420, 0421;

Articles containing pyrotechnic substances which are designed to be dropped from an aircraft to illuminate, identify, signal or warn.

FLARES, SURFACE: UN Nos. 0092, 0418, 0419

Articles containing pyrotechnic substances which are designed for use on the surface to illuminate, identify, signal or warn.

FLASH POWDER: UN Nos. 0094, 0305

Pyrotechnic substance which, when ignited, produces an intense light.

FRACTURING DEVICES, EXPLOSIVE, without detonator, for oil wells: UN No. 0099

Articles consisting of a charge of detonating explosive contained in a casing without means of initiation. They are used to fracture the rock around a drill shaft to assist the flow of crude oil from the rock.

FUSE, IGNITER, tubular, metal clad: UN No. 0103

Article consisting of a metal tube with a core of deflagrating explosive.

FUSE, INSTANTANEOUS, NON-DETONATING: UN No. 0101

Article consisting of cotton yarns impregnated with fine black powder. It burns with an external flame and is used in ignition trains for fireworks, etc. It can be enclosed in a paper tube to obtain an instantaneous or quickmatch effect.

FUSE, SAFETY: UN No. 0105

Article consisting of a core of fine grained black powder surrounded by a flexible woven fabric with one or more protective outer coverings. When ignited, it burns at a predetermined rate without any external explosive effect.

FUZES, DETONATING: UN Nos. 0106, 0107, 0257, 0367

Articles with explosive components designed to produce a detonation in ammunition. They incorporate mechanical, electrical, chemical or hydrostatic components to initiate the detonation. They generally incorporate protective features.

FUZES, DETONATING, with protective features: UN Nos. 0408, 0409, 0410

Articles with explosive components designed to produce a detonation in ammunition. They incorporate mechanical, electrical, chemical or hydrostatic components to initiate the detonation. The detonating fuze must incorporate two or more effective protective features.

FUZES, IGNITING: UN Nos. 0316, 0317, 0368

Articles with primary explosive components designed to produce a deflagration in ammunition. They incorporate mechanical, electrical, chemical or hydrostatic components to start the deflagration. They generally incorporate protective features.

GRENADES, hand or rifle, with bursting charge: UN Nos. 0284, 0285

Articles which are designed to be thrown by hand or to be projected by a rifle. They are without means of initiation or with means of initiation containing two or more effective protective features.

GRENADES, hand or rifle, with bursting charge: UN Nos. 0292, 0293

Articles which are designed to be thrown by hand or to be projected by a rifle. They are with means of initiation not containing two or more effective protective features.

GRENADES, PRACTICE, hand or rifle: UN Nos. 0110, 0372, 0318, 0452

Articles without a main bursting charge which are designed to be thrown by hand or to be projected by a rifle. They contain the priming device and may contain a spotting charge.

HEXOTONAL: UN No. 0393

Substance consisting of an intimate mixture of cyclotrimethylene-trinitramine (RDX), trinitrotoluene (TNT) and aluminium.

HEXOLITE (HEXOTOL), dry or wetted with less than 15 % water, by mass: UN No. 0118

Substance consisting of an intimate mixture of cyclotrimethylene-trinitramine (RDX) and trinitrotoluene (TNT). The term includes "Composition B".

IGNITERS: UN Nos. 0121, 0314, 0315, 0325, 0454

Articles containing one or more explosive substances designed to produce a deflagration in an explosive train. They may be actuated chemically, electrically or mechanically.

NOTE: The following articles: CORD, IGNITER; FUSE, IGNITER; FUSE, INSTANTANEOUS,

NON-DETONATING; FUZES, IGNITING; LIGHTERS, FUSE; PRIMERS, CAP TYPE; PRIMERS, TUBULAR are not included in this definition. They are listed separately.

JET PERFORATING GUNS, CHARGED, oil well, without detonator: UN Nos. 0124, 0494

Articles consisting of a steel tube or metallic strip, into which are inserted shaped charges connected by detonating cord, without means of initiation.

LIGHTERS, FUSE: UN No. 0131

Articles of various design actuated by friction, percussion or electricity and used to ignite safety fuse.

MINES, with bursting charge: UN Nos. 0137, 0138

Articles consisting normally of metal or composition receptacles filled with a detonating explosive, without means of initiation or with means of initiation containing two or more effective protective features. They are designed to be operated by the passage of ships, vehicles or personnel. The term includes "Bangalore torpedoes".

MINES, with bursting charge: UN Nos. 0136, 0294

Articles consisting normally of metal or composition receptacles filled with a detonating explosive, with means of initiation not containing two or more effective protective features. They are designed to be operated by the passage of ships, vehicles or personnel. The term includes "Bangalore torpedoes".

OCTOLITE (OCTOL), dry or wetted with less than 15 % water, by mass: UN No. 0266

Substance consisting of an intimate mixture of cyclotetramethylene-tetranitramine (HMX) and trinitrotoluene (TNT).

OCTONAL: UN No. 0496

Substance consisting of an intimate mixture of cyclotetramethylenetetranitramine (HMX), trinitrotoluene (TNT) and aluminium.

PENTOLITE, dry or wetted with less than 15 % water, by mass: UN No. 0151

Substance consisting of an intimate mixture of pentaerythrite tetranitrate (PETN) and trinitrotoluene (TNT).

POWDER CAKE (POWDER PASTE), WETTED with not less than 17 % alcohol, by mass. POWDER CAKE (POWDER PASTE), WETTED with not less than 25 % water, by mass: UN Nos. 0433, 0159

Substance consisting of nitrocellulose impregnated with not more than 60 % of nitroglycerine or other liquid organic nitrates or a mixture of these.

POWDER, SMOKELESS: UN Nos. 0160, 0161

Substance based on nitrocellulose used as propellant. The term includes propellants with a single base (nitrocellulose (NC) alone), those with a double base (such as NC and nitroglycerine/(NG)) and those with a triple base (such as NC/NG/nitroguanidine).

NOTE: Cast, pressed or bag-charges of smokeless powder are listed under CHARGES, PROPELLING.

PRIMERS, CAP TYPE: UN Nos. 0044, 0377, 0378

Articles consisting of a metal or plastics cap containing a small amount of primary explosive mixture that is readily ignited by impact. They serve as igniting elements in small arms cartridges and in percussion primers for propelling charges.

PRIMERS, TUBULAR: UN Nos. 0319, 0320, 0376

Articles consisting of a primer for ignition and an auxiliary charge of deflagrating explosive such as black powder used to ignite the propelling charge in a cartridge case for cannon, etc.

PROJECTILES, inert with tracer: UN Nos. 0345, 0424, 0425

Articles such as a shell or bullet, which are projected from a cannon or other gun, rifle or other small arm.

PROJECTILES, with burster or expelling charge: UN Nos. 0346, 0347

Articles such as a shell or bullet, which are projected from a cannon or other gun. They are without means of initiation or with means of initiation containing two or more effective protective features. They are used to scatter dyes for spotting or other inert materials.

PROJECTILES, with burster or expelling charge: UN Nos. 0426, 0427

Articles such as a shell or bullet, which are projected from a cannon or other gun. They are with means of initiation not containing two or more effective protective features. They are used to scatter dyes for spotting or other inert materials.

PROJECTILES, with burster or expelling charge: UN Nos. 0434, 0435

Articles such as a shell or bullet, which are projected from a cannon or other gun, rifle or other small arm. They are used to scatter dyes for spotting or other inert materials.

PROJECTILES, with bursting charge: UN Nos. 0168, 0169, 0344

Articles such as a shell or bullet, which are projected from a cannon or other gun. They are without means of initiation or with means of initiation containing two or more effective protective features.

PROJECTILES, with bursting charge: UN Nos. 0167, 0324

Articles such as a shell or bullet, which are projected from a cannon or other gun. They are with means of initiation not containing two or more effective protective features.

PROPELLANT, LIQUID: UN Nos. 0495, 0497

Substance consisting of a deflagrating liquid explosive, used for propulsion.

PROPELLANT, SOLID: UN Nos. 0498, 0499

Substance consisting of a deflagrating solid explosive, used for propulsion.

RELEASE DEVICES, EXPLOSIVE: UN No. 0173

Articles consisting of a small charge of explosive with means of initiation and rods or links. They sever the rods or links to release equipment quickly.

RIVETS, EXPLOSIVE: UN No. 0174

Articles consisting of a small charge of explosive inside a metallic rivet.

ROCKET MOTORS: UN Nos. 0186, 0280, 0281

Articles consisting of a charge of explosive, generally a solid propellant, contained in a cylinder fitted with one or more nozzles. They are designed to propel a rocket or a guided missile.

ROCKET MOTORS, LIQUID FUELLED: UN Nos. 0395, 0396

Articles consisting of a liquid fuel within a cylinder fitted with one or more nozzles. They are designed to propel a rocket or a guided missile.

ROCKET MOTORS WITH HYPERGOLIC LIQUIDS with or without expelling charge: UN Nos. 0322, 0250

Articles consisting of a hypergolic fuel contained in a cylinder fitted with one or more nozzles. They are designed to propel a rocket or a guided missile.

ROCKETS, LINE THROWING: UN Nos. 0238, 0240, 0453

Articles consisting of a rocket motor which is designed to extend a line.

ROCKETS, LIQUID FUELLED, with bursting charge: UN Nos. 0397, 0398

Articles consisting of a liquid fuel within a cylinder fitted with one or more nozzles and fitted with a warhead. The term includes guided missiles.

ROCKETS with bursting charge: UN Nos. 0181, 0182

Articles consisting of a rocket motor and a warhead without means of initiation or with means of initiation containing two or more effective protective features. The term includes guided missiles.

ROCKETS, with bursting charge: UN Nos. 0180, 0295

Articles consisting of a rocket motor and a warhead with means of initiation not containing two or more effective protective features. The term includes guided missiles.

ROCKETS, with expelling charge: UN Nos. 0436, 0437, 0438

Articles consisting of a rocket motor and a charge to expel the payload from a rocket head. The term includes guided missiles.

ROCKETS, with inert head: UN No. 0183

Articles consisting of a rocket motor and an inert head. The term includes guided missiles.

SAMPLES, EXPLOSIVE, other than initiating explosive UN No. 0190

New or existing explosive substances or articles, not yet assigned to a name in table A of Chapter 3.2 and carried in conformity with the instructions of the competent authority and generally in small quantities, inter alia, for the purposes of testing, classification, research and development, or quality control, or as commercial samples.

NOTE: *Explosive substances or articles already assigned to another name in table A of Chapter 3.2 are not included in this definition.*

SIGNAL DEVICES, HAND: UN Nos. 0191, 0373

Portable articles containing pyrotechnic substances which produce visual signals or warnings. The term includes small surface flares such as highway or railway flares and small distress flares.

SIGNALS, DISTRESS, ship: UN Nos. 0194, 0195

Articles containing pyrotechnic substances designed to produce signals by means of sound, flame or smoke or any combination thereof.

SIGNALS, RAILWAY TRACK, EXPLOSIVE: UN Nos. 0192, 0193, 0492, 0493

Articles containing a pyrotechnic substance which explodes with a loud report when the article is crushed. They are designed to be placed on a rail.

SIGNALS, SMOKE: UN Nos. 0196, 0197, 0313, 0487

Articles containing pyrotechnic substances which emit smoke. In addition they may contain devices for emitting audible signals.

SOUNDING DEVICES, EXPLOSIVE: UN Nos. 0374, 0375

Articles consisting of a charge of detonating explosive, without means of initiation or with means of initiation containing two or more effective protective features. They are dropped from ships and function when they reach a predetermined depth or the sea bed.

SOUNDING DEVICES, EXPLOSIVE: UN Nos. 0204, 0296

Articles consisting of a charge of detonating explosive with means of initiation not containing two or more effective protective features. They are dropped from ships and function when they reach a predetermined depth or the sea bed.

SUBSTANCES, EXPLOSIVE, VERY INSENSITIVE (Substances, EVI), N.O.S.: UN No. 0482

Substances presenting a mass explosion hazard but which are so insensitive that there is very little probability of initiation or of transition from burning to detonation under normal conditions of transport, and which have passed Test Series 5.

TORPEDOES, LIQUID FUELLED, with inert head: UN No. 0450

Articles consisting of a liquid explosive system to propel the torpedo through the water, with an inert head.

TORPEDOES, LIQUID FUELLED, with or without bursting charge: UN No. 0449

Articles consisting of either a liquid explosive system to propel the torpedo through the water, with or without a warhead; or a liquid non-explosive system to propel the torpedo through the water, with a warhead.

TORPEDOES, with bursting charge: UN No. 0451

Articles consisting of a non-explosive system to propel the torpedo through the water, and a warhead without means of initiation or with means of initiation containing two or more effective protective features.

TORPEDOES, with bursting charge: UN No. 0329

Articles consisting of an explosive system to propel the torpedo through the water, and a warhead without means of initiation or with means of initiation containing two or more effective protective features.

TORPEDOES, with bursting charge: UN No. 0330

Articles consisting of an explosive or non-explosive system to propel the torpedo through the water, and a warhead with means of initiation not containing two or more effective protective features.

TRACERS FOR AMMUNITION: UN Nos. 0212, 0306

Sealed articles containing pyrotechnic substances, designed to reveal the trajectory of a projectile.

TRITONAL: UN No. 0390

Substance consisting of trinitrotoluene (TNT) mixed with aluminium.

WARHEADS, ROCKET, with burster or expelling charge: UN No. 0370

Articles consisting of an inert payload and a small charge of detonating or deflagrating explosive, without means of initiation or with means of initiation containing two or more effective protective features. They are designed to be fitted to a rocket motor to scatter inert material. The term includes warheads for guided missiles.

WARHEADS, ROCKET, with burster or expelling charge: UN No. 0371

Articles consisting of an inert payload and a small charge of detonating or deflagrating explosive, with means of initiation not containing two or more effective protective features. They are designed to be fitted to a rocket motor to scatter inert material. The term includes warheads for guided missiles.

WARHEADS, ROCKET, with bursting charge: UN Nos. 0286, 0287

Articles consisting of a detonating explosive, without means of initiation or with means of initiation containing two or more effective protective features. They are designed to be fitted to a rocket. The term includes warheads for guided missiles.

WARHEADS, ROCKET, with bursting charge: UN No. 0369

Articles consisting of a detonating explosive, with means of initiation not containing two or more effective protective features. They are designed to be fitted to a rocket. The term includes warheads for guided missiles.

WARHEADS, TORPEDO, with bursting charge: UN No. 0221

Articles consisting of a detonating explosive, without means of initiation or with means of initiation containing two or more effective protective features. They are designed to be fitted to a torpedo.

2.2.1.2 Substances and articles not accepted for carriage

2.2.1.2.1 Explosive substances which are unduly sensitive according to the criteria of the Manual of Tests and Criteria, Part I, or are liable to spontaneous reaction, as well as explosive substances and articles

which cannot be assigned to a name or n.o.s. entry listed in table A of Chapter 3.2, shall not be accepted for carriage.

2.2.1.2.2 Articles of compatibility group K shall not be accepted for carriage (1.2K, UN No. 0020 and 1.3K, UN No. 0021).

2.2.1.3 List of collective entries

Classification code (see 2.2.1.1.4)	UN No	Name of the substance or article
1.1A	0473	SUBSTANCES, EXPLOSIVE, N.O.S.
1.1B	0461	COMPONENTS, EXPLOSIVE TRAIN, N.O.S.
1.1C	0474	SUBSTANCES, EXPLOSIVE, N.O.S.
	0497	PROPELLANT, LIQUID
	0498	PROPELLANT, SOLID
	0462	ARTICLES, EXPLOSIVE, N.O.S.
1.1D	0475	SUBSTANCES, EXPLOSIVE, N.O.S.
	0463	ARTICLES, EXPLOSIVE, N.O.S.
1.1E	0464	ARTICLES, EXPLOSIVE, N.O.S.
1.1F	0465	ARTICLES, EXPLOSIVE, N.O.S.
1.1G	0476	SUBSTANCES, EXPLOSIVE, N.O.S.
1.1L	0357	SUBSTANCES, EXPLOSIVE, N.O.S.
	0354	ARTICLES, EXPLOSIVE, N.O.S.
1.2B	0382	COMPONENTS, EXPLOSIVE TRAIN, N.O.S.
1.2C	0466	ARTICLES, EXPLOSIVE, N.O.S.
1.2D	0467	ARTICLES, EXPLOSIVE, N.O.S.
1.2E	0468	ARTICLES, EXPLOSIVE, N.O.S.
1.2F	0469	ARTICLES, EXPLOSIVE, N.O.S.
1.2L	0358	SUBSTANCES, EXPLOSIVE, N.O.S.
	0248	CONTRIVANCES, WATER-ACTIVATED with burster, expelling charge or propelling charge
	0355	ARTICLES, EXPLOSIVE, N.O.S.
1.3C	0132	DEFLAGRATING METAL SALTS OF AROMATIC NITRO- DERIVATIVES, N.O.S.
	0477	SUBSTANCES, EXPLOSIVE, N.O.S.
	0495	PROPELLANT, LIQUID
	0499	PROPELLANT, SOLID
	0470	ARTICLES, EXPLOSIVE, N.O.S.
1.3G	0478	SUBSTANCES, EXPLOSIVE, N.O.S.
1.3L	0359	SUBSTANCES, EXPLOSIVE, N.O.S.
	0249	CONTRIVANCES, WATER-ACTIVATED with burster, expelling charge or propelling charge
	0356	ARTICLES, EXPLOSIVE, N.O.S.
1.4B	0350	ARTICLES, EXPLOSIVE, N.O.S.
	0383	COMPONENTS, EXPLOSIVE TRAIN, N.O.S.
1.4C	0479	SUBSTANCES, EXPLOSIVE, N.O.S.
	0351	ARTICLES, EXPLOSIVE, N.O.S.

Classification code (see 2.2.1.1.4)	UN No	Name of the substance or article
1.4D	0480	SUBSTANCES, EXPLOSIVE, N.O.S.
	0352	ARTICLES, EXPLOSIVE, N.O.S.
1.4E	0471	ARTICLES, EXPLOSIVE, N.O.S.
1.4F	0472	ARTICLES, EXPLOSIVE, N.O.S.
1.4G	0485	SUBSTANCES, EXPLOSIVE, N.O.S.
	0353	ARTICLES, EXPLOSIVE, N.O.S.
1.4S	0481	SUBSTANCES, EXPLOSIVE, N.O.S.
	0349	ARTICLES, EXPLOSIVE, N.O.S.
	0384	COMPONENTS, EXPLOSIVE TRAIN, N.O.S.
1.5D	0482	SUBSTANCES, EXPLOSIVE, VERY INSENSITIVE (SUBSTANCES, EVI) N.O.S.
1.6N	0486	ARTICLES, EXPLOSIVE, EXTREMELY INSENSITIVE (ARTICLES, EEI)
	0190	SAMPLES, EXPLOSIVE other than initiating explosive <i>NOTE: Division and Compatibility Group shall be defined as directed by the competent authority and according to the principles in 2.2.1.1.4.</i>

2.2.2 Class 2 Gases

2.2.2.1 Criteria

2.2.2.1.1 The heading of Class 2 covers pure gases, mixtures of gases, mixtures of one or more gases with one or more other substances and articles containing such substances.

A gas is a substance which:

- (a) at 50 °C has a vapour pressure greater than 300 kPa (3 bar); or
- (b) is completely gaseous at 20° C at the standard pressure of 101.3 kPa .

NOTE 1: *UN No. 1052 HYDROGEN FLUORIDE is nevertheless classified in Class 8.*

NOTE 2: *A pure gas may contain other components deriving from its production process or added to preserve the stability of the product, provided that the level of these components does not change its classification or its conditions of carriage, such as filling ratio, filling pressure, test pressure.*

NOTE 3: *N.O.S. entries in 2.2.2.3 may cover pure gases as well as mixtures.*

2.2.2.1.2 The substances and articles of Class 2 are subdivided as follows:

1. Compressed gases: gases having a critical temperature below 20 °C;
2. Liquefied gases: gases having a critical temperature of 20 °C or above;
3. Refrigerated liquefied gases: gases which when carried are partially liquid because of their low temperature;
4. Gases dissolved under pressure: gases which when carried are dissolved in a solvent;
5. Aerosol dispensers and receptacles, small, containing gas (gas cartridges);
6. Other articles containing gas under pressure;
7. Non-pressurized gases subject to special requirements (gas samples).

2.2.2.1.3 Substances and articles, classified under an entry in 2.2.2.3 are assigned to one of the following groups according to their hazardous properties, as follows:

A	asphyxiant
O	oxidizing
F	flammable
T	toxic
TF	toxic, flammable
TC	toxic, corrosive
TO	toxic, oxidizing
TFC	toxic, flammable, corrosive
TOC	toxic, oxidizing, corrosive

For gases and gas mixtures presenting hazardous properties associated with more than one group according to the criteria, the groups designated by letter T take precedence over all other groups. The groups designated by letter F take precedence over the groups designated by letters A or O.

NOTE 1: *In the UN Model Regulations, the IMDG Code and the ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air, gases are assigned to one of the following three divisions, based on the primary hazard:*

- Division 2.1: flammable gases (corresponding to the groups designated by the capital letter F);*
- Division 2.2: non-flammable, non-toxic gases (corresponding to the groups designated by the capital letters A or O);*
- Division 2.3: toxic gases (corresponding to the groups designated by the capital letter T (i.e. T, TF, TC, TO, TFC and TOC)).*

NOTE 2: *Aerosols and receptacles, small, containing gas shall be assigned, according to the hazard of the contents, to the letters A to TOC. The contents are considered to be flammable if they include more than 45% by mass, or more than 250 g, of flammable components. Flammable components are gases which are flammable in air at normal pressure or substances or preparations in liquid form which have a flash-point less than or equal to 100 °C.*

NOTE 3: *Corrosive gases are considered to be toxic, and are therefore assigned to the group TC, TFC or TOC.*

NOTE 4: *Mixtures containing more than 21% oxygen by volume shall be classified as oxidizing.*

2.2.2.1.4 If a mixture of Class 2 mentioned by name in table A of Chapter 3.2 meets different criteria as mentioned in 2.2.2.1.2 and 2.2.2.1.5, this mixture shall be classified according to the criteria and assigned to an appropriate N.O.S. entry.

2.2.2.1.5 Substances and articles of Class 2 which are not mentioned by name in table A of Chapter 3.2 shall be classified under a collective entry listed in 2.2.2.3 in accordance with 2.2.2.1.2 and 2.2.2.1.3. The following criteria shall apply:

Asphyxiant gases

Gases which are non-oxidizing, non-flammable and non-toxic and which dilute or replace oxygen normally in the atmosphere.

Flammable gases

Gases which at 20 °C and a standard pressure of 101.3 kPa:

- (a) are ignitable when in a mixture of 13% or less by volume with air; or
- (b) have a flammable range with air of at least 12 percentage points regardless of the lower flammable limit.

Flammability shall be determined by tests or by calculation, in accordance with methods adopted by ISO (see ISO 10156:1996).

Where insufficient data are available to use these methods, tests by a comparable method recognized by the competent authority of the country of origin may be used.

If the country of origin is not party to ADR these methods shall be recognized by the competent authority of the first ADR country reached by the consignment.

Oxidizing gases

Gases, which may, generally by providing oxygen, cause or contribute to the combustion of other material more than air does. Oxidizing ability is determined either by tests or by calculation methods adopted by ISO (see ISO 10156:1996).

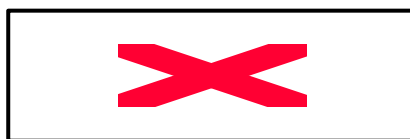
Toxic gases

NOTE: *Gases meeting the criteria for toxicity in part or completely owing to their corrosivity are to be classified as toxic. See also the criteria under the heading "Corrosive gases" for a possible subsidiary corrosivity risk.*

Gases which:

- (a) are known to be so toxic or corrosive to humans as to pose a hazard to health; or
- (b) are presumed to be toxic or corrosive to humans because they have a LC_{50} value for acute toxicity equal to or less than 5000 ml/m^3 (ppm) when tested in accordance with 2.2.61.1.

In the case of gas *mixtures* (including vapours of substances from other classes) the following formula may be used:



where f_i = mole fraction of the i^{th} component substance of the mixture.

T_i = toxicity index of the i^{th} component substance of the mixture.

The T_i equals the LC_{50} value as found in ISO 10298:1995.

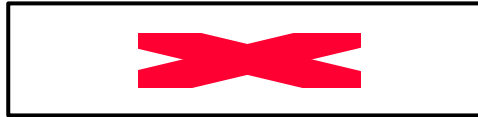
When no LC_{50} value is listed in ISO 10298:1995, a LC_{50} value available in scientific literature shall be used.

When the LC_{50} value is unknown, the toxicity index is determined by using the lowest LC_{50} value of substances of similar physiological and chemical effects, or through testing if this is the only practical possibility.

Corrosive gases

Gases or gas mixtures meeting the criteria for toxicity completely owing to their corrosivity are to be classified as toxic with a subsidiary corrosivity risk.

A gas mixture that is considered to be toxic due to the combined effects of corrosivity and toxicity has a subsidiary risk of corrosivity when the mixture is known by human experience to be destructive to the skin, eyes or mucous membranes or when the LC_{50} value of the corrosive components of the mixture is equal to or less than 5000 ml/m^3 (ppm) when the LC_{50} is calculated by the formula:



where fc_i = mole fraction of the i^{th} corrosive component substance of the mixture

Tc_i = toxicity index of the i^{th} corrosive component substance of the mixture.

The Tc_i equals the LC_{50} value as found in ISO10298:1995.

When no LC_{50} value is listed in ISO 10298:1995, a LC_{50} value available in scientific literature shall be used.

When the LC_{50} value is unknown the toxicity index is determined by using the lowest LC_{50} value of substances of similar physiological and chemical effects, or through testing if this is the only practical possibility.

2.2.2.2 Gases not accepted for carriage

2.2.2.2.1 Chemically unstable substances of Class 2 shall not be accepted for carriage, unless the necessary steps have been taken to prevent all possibility of a dangerous reaction e.g. decomposition, dismutation or polymerisation under normal conditions during transport. To this end particular care shall be taken to ensure that receptacles and tanks do not contain any substances liable to promote these reactions.

2.2.2.2.2 The following substances and mixtures shall not be accepted for carriage:

- UN No. 2186 HYDROGEN CHLORIDE, REFRIGERATED LIQUID;
- UN No. 2421 NITROGEN TRIOXIDE;
UN No. 2455 METHYL NITRITE;
- Refrigerated gases which cannot be assigned to classification codes 3A, 3O or 3F;
- Gases dissolved under pressure which cannot be classified under UN Nos. 1001, 2073 or 3318.

2.2.2.3 List of collective entries

Compressed gases		
Classification code (see 2.2.1.1.4)	UN No	Name of the substance or article
1 A	1979	RARE GASES MIXTURE, COMPRESSED
	1980	RARE GASES AND OXYGEN MIXTURE, COMPRESSED
	1981	RARE GASES AND NITROGEN MIXTURE, COMPRESSED
	1956	COMPRESSED GAS, N.O.S.
1 O	3156	COMPRESSED GAS, OXIDIZING, N.O.S.
1 F	1964	HYDROCARBON GAS MIXTURE, COMPRESSED, N.O.S.
	1954	COMPRESSED GAS, FLAMMABLE, N.O.S.
1 T	1955	COMPRESSED GAS, TOXIC, N.O.S.
1 TF	1953	COMPRESSED GAS, TOXIC, FLAMMABLE, N.O.S.
1 TC	3304	COMPRESSED GAS, TOXIC, CORROSIVE, N.O.S.
1 TO	3303	COMPRESSED GAS, TOXIC, OXIDIZING, N.O.S.
1 TFC	3305	COMPRESSED GAS, TOXIC, FLAMMABLE, CORROSIVE, N.O.S.
1 TOC	3306	COMPRESSED GAS, TOXIC, OXIDIZING, CORROSIVE, N.O.S.

Liquefied gases		
Classification code (see 2.2.1.1.4)	UN No	Name of the substance or article
2 A	1058	LIQUEFIED GASES, non-flammable, charged with nitrogen, carbon dioxide or air
	1078	REFRIGERANT GAS, N.O.S. such as mixtures of gases, Indicated by the letter R., which as: MIXTURE F 1, have a vapour pressure at 70 °C not exceeding 1.3 MPa (13 bar) and a density at 50 °C not lower than that of dichlorofluoromethane (1.30 kg/l); MIXTURE F 2, have a vapour pressure at 70 °C not exceeding 1.9 MPa (19 bar) and a density at 50 °C not lower than that of dichlorodifluoromethane (1.21 kg/l); MIXTURE F 3, have a vapour pressure at 70 °C not exceeding 3 MPa (30 bar) and a density at 50 °C not lower than that of chlorodifluoromethane (1.09 kg/l). <i>NOTE: Trichlorofluoromethane (REFRIGERANT GAS R 11), 1,1,2-trichloro-1,2,2-trifluoroethane (REFRIGERANT GAS R 113), 1,1,1-trichloro-2,2,2-trifluoroethane (REFRIGERANT GAS R 113a), 1-chloro-1,2,2-trifluoroethane (REFRIGERANT GAS R 133) and 1-chloro-1,1,2-trifluoroethane (REFRIGERANT GAS R 133b) are not substances of Class 2. They may, however, enter into the composition of mixtures F 1 to F 3.</i>
	1968	INSECTICIDE GAS, N.O.S.
	3163	LIQUEFIED GAS, N.O.S.

Liquefied gases (cont'd)		
Classification code (see 2.2.1.1.4)	UN No	Name of the substance or article
2 O	3157	LIQUEFIED GAS, OXIDIZING, N.O.S.
2 F	1010	MIXTURES OF 1,3-BUTADIENE AND HYDROCARBONS, STABILIZED, having a vapour pressure at 70 °C not exceeding 1.1 MPa (11 bar) and a density at 50 °C not lower than 0.525 kg/l. <i>NOTE: 1,2-butadiene, stabilized and 1,3-butadiene, stabilized are classified under UN No. 1010, see table A of chapter 3.2</i>
	1060	METHYLACETYLENE AND PROPADIENE MIXTURE, STABILIZED such as mixtures of methylacetylene and propadiene with hydrocarbons, which as: MIXTURE P1, contain not more than 63% methylacetylene and propadiene by volume and not more than 24% propane and propylene by volume, the percentage of C ₄ - saturated hydrocarbons being not less than 14% by volume; and as MIXTURE P2, contain not more than 48% methylacetylene and propadiene by volume and not more than 50% propane and propylene by volume, the percentage of C ₄ - saturated hydrocarbons being not less than 5% by volume, as well as mixtures of propadiene with 1 to 4% methylacetylene
	1965	HYDROCARBON GAS MIXTURE, LIQUEFIED, N.O.S such as mixtures, which as: MIXTURE A, have a vapour pressure at 70 °C not exceeding 1.1 MPa (11 bar) and a density at 50 °C not lower than 0.525 kg/l; MIXTURE A01, have a vapour pressure at 70 °C not exceeding 1.6 MPa (16 bar) and a relative density at 50 °C not lower than 0.516 kg/l; MIXTURE A02, have a vapour pressure at 70 °C not exceeding 1.6 MPa (16 bar) and a relative density at 50 °C not lower than 0.505 kg/l; MIXTURE A 0, have a vapour pressure at 70 °C not exceeding 1.6 MPa (16 bar) and a density at 50 °C not lower than 0.495 kg/l; MIXTURE A 1, have a vapour pressure at 70 °C not exceeding 2.1 MPa (21 bar) and a density at 50 °C not lower than 0.485 kg/l; MIXTURE B1 have a vapour pressure at 70 °C not exceeding 2.6 MPa (26 bar) and a relative density at 50 °C not lower than 0.474 kg/l; MIXTURE B2 have a vapour pressure at 70 °C not exceeding 2.6 MPa (26 bar) and a relative density at 50 °C not lower than 0.463 kg/l; MIXTURE B, have a vapour pressure at 70 °C not exceeding 2.6 MPa (26 bar) and a density at 50 °C not lower than 0.450 kg/l; MIXTURE C, have a vapour pressure at 70 °C not exceeding 3.1 MPa (31 bar) and a relative density at 50 °C not lower than 0.440 kg/l; <i>NOTE 1: In the case of the foregoing mixtures, the use of the following names customary in the trade is permitted for describing these substances: for mixture A01, A02 and A0: BUTANE; for mixture C: PROPANE.</i> <i>NOTE 2: UN No. 1075 PETROLEUM GASES, LIQUEFIED may be used as an alternative entry for UN No. 1965 HYDROCARBON GAS MIXTURE LIQUEFIED, N.O.S. for carriage prior to or following maritime or air carriage.</i>

Liquefied gases (cont'd)		
Classification code (see 2.2.1.1.4)	UN No	Name of the substance or article
2 F (cont'd)	3354	INSECTICIDE GAS, FLAMMABLE, N.O.S.
	3161	LIQUEFIED GAS, FLAMMABLE, N.O.S.
2 T	1967	INSECTICIDE GAS, TOXIC, N.O.S.
	3162	LIQUEFIED GAS, TOXIC, N.O.S.
2 TF	3355	INSECTICIDE GAS, TOXIC, FLAMMABLE, N.O.S.
	3160	LIQUEFIED GAS, TOXIC, FLAMMABLE, N.O.S.
2 TC	3308	LIQUEFIED GAS, TOXIC, CORROSIVE, N.O.S.
2 TO	3307	LIQUEFIED GAS, TOXIC, OXIDIZING, N.O.S.
2 TFC	3309	LIQUEFIED GAS, TOXIC, FLAMMABLE, CORROSIVE, N.O.S.
2 TOC	3310	LIQUEFIED GAS, TOXIC, OXIDIZING, CORROSIVE, N.O.S.

Refrigerated gases		
3 A	3158	GAS, REFRIGERATED LIQUID, N.O.S.
3 O	3311	GAS, REFRIGERATED LIQUID, OXIDIZING, N.O.S.
3 F	3312	GAS, REFRIGERATED LIQUID, FLAMMABLE, N.O.S.

Gases, dissolved under pressure	
4	Only substances listed in table A of Chapter 3.2 are to be accepted for carriage.

Aerosols and receptacles, small, containing gas		
5	1950	AEROSOLS
	2037	RECEPTACLES, SMALL CONTAINING GAS (GAS CARTRIDGES) without a release device, non-refillable

Other articles containing gas under pressure		
6A	3164	ARTICLES, PRESSURIZED, PNEUMATIC (containing non-flammable gas) or
	3164	ARTICLES, PRESSURIZED, HYDRAULIC (containing non-flammable gas)
6F	3150	DEVICES, SMALL, HYDROCARBON GAS POWERED or
	3150	HYDROCARBON GAS REFILLS FOR SMALL DEVICES, with release device

Gas samples		
7 F	3167	GAS SAMPLE, NON-PRESSURIZED, FLAMMABLE, N.O.S., not refrigerated liquid
7 T	3169	GAS SAMPLE, NON-PRESSURIZED, TOXIC, N.O.S., not refrigerated liquid
7 TF	3168	GAS SAMPLE, NON-PRESSURIZED, TOXIC, FLAMMABLE, N.O.S., not refrigerated liquid

2.2.3 Class 3 Flammable liquids

2.2.3.1 Criteria

2.2.3.1.1 The heading of Class 3 covers substances and articles containing substances of this Class which:

- are liquids according to subparagraph (a) of the definition for "liquid" in 1.2.1;
- have at 50 °C a vapour pressure of not more than 300 kPa (3 bar) and are not completely gaseous at 20 °C and at standard pressure of 101.3 kPa; and
- have a flash-point of not more than 61 °C (see 2.3.2 for the relevant test).

The heading of Class 3 also covers liquid substances and molten solid substances with a flash-point of more than 61°C and which are carried or handed over for carriage whilst heated at temperatures equal to or higher than their flash-point. These substances are assigned to UN No. 3256.

The heading of Class 3 also covers liquid desensitized explosives. Liquid desensitized explosives are explosive substances which are dissolved or suspended in water or other liquid substances, to form an homogeneous liquid mixture to suppress their explosive properties. Such entries in table A of Chapter 3.2 are UN Nos. 1204, 2059, 3064 and 3343.

***NOTE 1:** Substances having a flash-point above 35 °C, non-toxic and non-corrosive, which, under the sustained combustibility test conditions given in sub-section 32.5.2 of Part III of the Manual of Tests and Criteria do not contain combustion are not substances of Class 3; if, however, these substances are handed over for carriage and carried whilst heated at temperatures equal to or higher than their flash-point, they are substances of Class 3.*

***NOTE 2:** By derogation from paragraph 2.2.3.1.1 above, diesel fuel, gasoil, heating oil (light) having a flash-point above 61 °C and not more than 100 °C shall be deemed substances of Class 3, UN No. 1202.*

***NOTE 3:** Liquids which are highly toxic on inhalation, having a flash-point below 23 °C and toxic substances, having a flash-point of 23 °C or above are substances of Class 6.1 (see 2.2.61.1).*

***NOTE 4:** Flammable liquid substances and preparations, used as pesticides, which are highly toxic, toxic or slightly toxic and have a flash-point of 23 °C or above are substances of Class 6.1 (see 2.2.61.1).*

***NOTE 5:** Corrosive liquids having a flash-point of 23 °C or above are substances of Class 8 (see 2.2.8.1).*

***NOTE 6:** UN No. 2734 AMINES, LIQUID, CORROSIVE, FLAMMABLE, N.O.S., UN No. 2734 POLYAMINES, LIQUID, CORROSIVE, FLAMMABLE, N.O.S. and UN No. 2920 CORROSIVE LIQUID, FLAMMABLE, N.O.S. are substances of Class 8 (see 2.2.8.1).*

***NOTE 7:** Pharmaceutical products ready for use, e.g. cosmetics, drugs and medicines, which are substances manufactured and packed in packagings of a type intended for retail sale or distribution for personal or household consumption are not subject to the provisions of ADR.*

2.2.3.1.2 The substances and articles of Class 3 are subdivided as follows:

- F Flammable liquids, without subsidiary risk:
 - F1 Flammable liquids having a flash-point of or below 61 °C
 - F2 Flammable liquids having a flash-point above 61 °C which are carried or handed over for carriage at or above their flash-point (elevated temperature substances);
- FT Flammable liquids, toxic:
 - FT1 Flammable liquids, toxic
 - FT2 Pesticides
- FC Flammable liquids, corrosive
- FTC Flammable liquids, toxic, corrosive
- D Liquid desensitized explosives.

2.2.3.1.3 Substances and articles classified in Class 3 are listed in table A of Chapter 3.2. Substances not mentioned by name in table A of Chapter 3.2 can be assigned to the relevant entry of 2.2.3.3 and the relevant packing group in accordance with the provisions of this section. Flammable liquids shall be assigned to one of the following packing groups according to the degree of danger they present for transport:

- Packing group I: substances presenting high danger: flammable liquids having a boiling point or initial boiling point not exceeding 35 °C, and flammable liquids having a flash-point below 23 °C, which are either highly toxic according to the criteria of 2.2.61.1 or highly corrosive according to the criteria of 2.2.8.1;
- Packing group II: substances presenting medium danger: flammable liquids having a flash-point below 23 °C which are not classified under I, with the exception of substances of 2.2.3.1.4;
- Packing group III: substances presenting low danger: flammable liquids having a flash-point of 23 °C to 61 °C inclusive and substances of 2.2.3.1.4.

2.2.3.1.4 Liquid or viscous mixtures and preparations, including those containing no more than 20% nitrocellulose with a nitrogen content not exceeding 12.6% (by dry mass), shall be assigned to packing group III only if the following requirements are met:

- (a) the height of the separated layer of solvent is less than 3 % of the total height of the sample in the solvent-separation test (see Manual of Tests and Criteria, Part III, sub-section 32.5.1); and
- (b) the viscosity¹ and flash-point are in accordance with the following table:

¹ Viscosity determination: Where the substance concerned is non-Newtonian, or where a flow cup method of viscosity determination is otherwise unsuitable, a variable shear-rate viscometer shall be used to determine the dynamic viscosity coefficient of the substance, at 23 °C, at a number of shear rates. The values obtained are plotted against shear rate and then extrapolated to zero shear rate. The dynamic viscosity thus obtained, divided by the density, gives the apparent kinematic viscosity at near-zero shear rate.

Kinematic viscosity (extrapolated) < (at near-zero shear rate) mm ² /s at 23 °C	Flow time t in accordance with ISO 2431:1984		Flash-point in °C
	in s	Jet diameter in mm	
20 < < # 80	20 < t 60	4	above 17
80 < < # 135	60 < t # 100	4	above 10
135 < < # 220	20 < t # 32	6	above 5
220 < < # 300	32 < t # 44	6	above -1
300 < < # 700	44 < t # 100	6	above -5
700 < <	100 < t	6	-5 and below

NOTE: Mixtures containing more than 20% but not more than 55% nitrocellulose with a nitrogen content not exceeding 12.6% by dry mass are substances assigned to UN No. 2059.

Mixtures having a flash-point below 23 °C and containing:

- more than 55 % nitrocellulose, whatever their nitrogen content; or
- not more than 55 % nitrocellulose with a nitrogen content above 12.6 % by dry mass,

are substances of Class 1 (UN No. 0340 or UN No. 0342) or of Class 4.1 (UN Nos. 2555, 2556 or 2557).

2.2.3.1.5 Non-toxic and non-corrosive solutions and homogeneous mixtures having a flash-point of 23 °C or above (viscous substances, such as paints or varnishes, excluding substances containing more than 20 % nitrocellulose) packed in receptacles of less than 450 litres capacity, are not subject to ADR if, in the solvent-separation test (see Manual of Tests and Criteria, Part III, sub-section 32.5.1), the height of the separated layer of solvent is less than 3 % of the total height, and if the substances at 23 °C have, in the flow cup conforming to ISO 2431:1984 having a jet 6 mm in diameter, a flow time of:

- (a) not less than 60 seconds, or
- (b) not less than 40 seconds and contain not more than 60 % of substances of Class 3.

2.2.3.1.6 If substances of Class 3, as a result of admixtures, come into categories of risk different from those to which the substances mentioned by name in table A of Chapter 3.2 belong, these mixtures or solutions shall be assigned to the entries to which they belong on the basis of their actual degree of danger.

NOTE: For the classification of solutions and mixtures (such as preparations and wastes) see also 2.1.3.

2.2.3.1.7 On the basis of the test procedures in accordance with section 2.3.2, and the criteria set out in 2.2.3.1.1, it may also be determined whether the nature of a solution or a mixture mentioned by name or containing a substance mentioned by name is such that the solution or mixture is not subject to the provisions for this Class (see also 2.1.3).

2.2.3.2 Substances not accepted for carriage

2.2.3.2.1 Substances of Class 3 which are liable to form peroxides easily (as happens with ethers or with certain heterocyclic oxygenated substances) shall not be accepted for carriage if their peroxide content, calculated as hydrogen peroxide (H₂O₂), exceeds 0.3%. The peroxide content shall be determined as indicated in 2.3.3.2.

2.2.3.2.2 The chemically unstable substances of Class 3 shall not be accepted for carriage unless the necessary steps have been taken to prevent their dangerous decomposition or polymerization during carriage. To this end, it shall be ensured in particular that receptacles and tanks do not contain any substance liable to promote these reactions.

2.2.3.2.3 Liquid desensitized explosives other than those listed in table A of Chapter 3.2 shall not be accepted for carriage as substances of Class 3.

2.2.3.3 List of collective entries

Without subsidiary risk F	F1	1133 ADHESIVES containing flammable liquid 1136 COAL TAR DISTILLATES, FLAMMABLE 1139 COATING SOLUTION (includes surface treatments or coatings used for industrial or other purposes such as vehicle undercoating, drum or barrel lining) 1169 EXTRACTS, AROMATIC, LIQUID 1197 EXTRACTS, FLAVOURING, LIQUID 1210 PRINTING INK, flammable 1263 PAINT (including paint, lacquer, enamel, stain, shellac, varnish, polish, liquid filler and liquid lacquer base) or 1263 PAINT RELATED MATERIAL (in cluding paint thinning or reducing compound) 1266 PERFUMERY PRODUCTS with flammable solvents 1293 TINCTURES, MEDICINAL 1306 WOOD PRESERVATIVES, LIQUID 1866 RESIN SOLUTION, flammable 1999 TARS, LIQUID, including road asphalt and oils, bit umen and cut backs 3065 ALCOHOLIC BEVERAGES 3269 POLYESTER RESIN KITS 1224 KETONES, LIQUID, N.O.S. 1268 PETROLEUM DISTILLATES, N.O.S. or 1268 PETROLEUM PRODUCTS, N.O.S. 1987 ALCOHOLS, FLAMMABLE, N.O.S. 1989 ALDEHYDES, FLAMMABLE, N.O.S. 2319 TERPENE HYDROCARBONS, N.O.S. 3271 ETHERS, N.O.S. 3272 ESTERS, N.O.S. 3295 HYDROCARBONS, LIQUID, N.O.S. 3336 MERCAPTANS, LIQUID, FLAMMABLE, N.O.S. or 3336 MERCAPTANS MIXTURE, LIQUID, FLAMMABLE, N.O.S. 1993 FLAMMABLE LIQUID, N.O.S.
	F2 elevated temperature	3256 ELEVATED TEMPERATURE LIQUID, FLAMMABLE, N.O.S., with flash-point above 61 °C, at or above its flash-point

2.2.3.3 (cont'd)

		<p>1228 MERCAPTANS, LIQUID, FLAMMABLE, TOXIC, N.O.S. or 1228 MERCAPTAN MIXTURE, LIQUID, FLAMMABLE, TOXIC, N.O.S. 1986 ALCOHOLS, FLAMMABLE, TOXIC, N.O.S. 1988 ALDEHYDES, FLAMMABLE, TOXIC, N.O.S. 2478 ISOCYANATES, FLAMMABLE, TOXIC, N.O.S. or 2478 ISOCYANATE SOLUTION, FLAMMABLE, TOXIC, N.O.S. 3248 MEDICINE, LIQUID, FLAMMABLE, TOXIC, N.O.S. 3273 NITRILES, FLAMMABLE, TOXIC, N.O.S. 1992 FLAMMABLE LIQUID, TOXIC, N.O.S.</p>
Toxic	FT1	
	FT	<p>2758 CARBAMATE PESTICIDE, LIQUID, FLAMMABLE, TOXIC 2760 ARSENICAL PESTICIDE, LIQUID, FLAMMABLE, TOXIC 2762 ORGANOCHLORINE PESTICIDE, LIQUID, FLAMMABLE, TOXIC 2764 TRIAZINE PESTICIDE, LIQUID, FLAMMABLE, TOXIC 2772 DITHIOCARBAMATE PESTICIDE, LIQUID, FLAMMABLE, TOXIC 2776 COPPER BASED PESTICIDE, LIQUID, FLAMMABLE, TOXIC 2778 MERCURY BASED PESTICIDE, LIQUID, FLAMMABLE, TOXIC 2780 SUBSTITUTED NITROPHENOL PESTICIDE, LIQUID, FLAMMABLE, TOXIC 2782 BIPYRIDILIUM PESTICIDE, LIQUID, FLAMMABLE, TOXIC 2784 ORGANOPHOSPHORUS PESTICIDE, LIQUID, FLAMMABLE, TOXIC 2787 ORGANOTIN PESTICIDE, LIQUID, FLAMMABLE, TOXIC 3024 COUMARIN DERIVATIVE PESTICIDE, LIQUID, FLAMMABLE, TOXIC 3346 PHENOXYACETIC ACID DERIVATIVE PESTICIDE, LIQUID, FLAMMABLE, TOXIC 3350 PYRETHROID PESTICIDE, LIQUID, FLAMMABLE TOXIC 3021 PESTICIDE, LIQUID, FLAMMABLE, TOXIC, N.O.S.</p> <p><i>NOTE : The classification of a pesticide under an entry shall be effected on the basis of the active ingredient, of the physical state of the pesticide and any subsidiary risks it may exhibit.</i></p>
Corrosive		
	FC	<p>2733 AMINES, FLAMMABLE, CORROSIVE, N.O.S. or 2733 POLYAMINES, FLAMMABLE, CORROSIVE, N.O.S. 2985 CHLOROSILANES, FLAMMABLE, CORROSIVE, N.O.S. 3274 ALCOHOLATES SOLUTION, N.O.S., in alcohol 2924 FLAMMABLE LIQUID, CORROSIVE, N.O.S.</p>
Toxic, corrosive	FTC	<p>3286 FLAMMABLE LIQUID, TOXIC, CORROSIVE, N.O.S.</p>
Liquid desensitized explosive	D	<p>Only those listed in table A of Chapter 3.2 are to be accepted for carriage as substances of Class 3</p>

2.2.41 Class 4.1 Flammable solids, self-reactive substance and solid desensitized explosives

2.2.41.1 Criteria

2.2.41.1.1 The heading of Class 4.1 covers flammable substances and articles, desensitized explosives which are solids according to subparagraph (a) of the definition "solid" in 1.2.1 and self-reactive liquids or solids.

The following are assigned to Class 4.1:

- readily flammable solid substances and articles (see paragraphs 2.2.41.1.3 to 2.2.41.1.7);
- self-reactive solids or liquids (see paragraphs 2.2.41.1.10 to 2.2.41.1.17));
- solid desensitized explosives (see paragraph 2.2.41.1.18).

2.2.41.1.2 The substances and articles of Class 4.1 are subdivided as follows:

F Flammable solids, without subsidiary risk

- F1 Organic
- F2 Organic, molten
- F3 Inorganic

FO Flammable solids, oxidizing

FT Flammable solids, toxic

- FT1 Organic, toxic
- FT2 Inorganic, toxic

FC Flammable solids, corrosive

- FC1 Organic, corrosive
- FC2 Inorganic, corrosive

D Solid desensitized explosives

- D1 Without subsidiary risk
- DT2 With subsidiary risk toxic

SR Self-reactive substances

- SR1 Not requiring temperature control
- SR2 Requiring temperature control

Flammable solids

Definition and properties

2.2.41.1.3 *Flammable solids* are readily combustible solids and solids which may cause fire through friction.

Readily combustible solids are powdered, granular, or pasty substances which are dangerous if they can be easily ignited by brief contact with an ignition source, such as a burning match, and if the flame spreads rapidly. The danger may come not only from the fire but also from toxic combustion products. Metal powders are especially dangerous because of the difficulty of extinguishing a fire since normal extinguishing agents such as carbon dioxide or water can increase the hazard.

Classification

2.2.41.1.4 Substances and articles classified as flammable solids of Class 4.1 are listed in table A of Chapter 3.2. The assignment of organic substances and articles not mentioned by name in table A of Chapter 3.2 to the relevant entry of sub-section 2.2.41.3 in accordance with the provisions of Chapter 2.1 can be based on experience or on the results of the test procedures in accordance with Part III, sub-section 33.2.1 of the Manual of Tests and Criteria. The assignment of inorganic substances not mentioned by name shall be based on the results of the test procedures in accordance with Part III, sub-section 33.2.1 of the Manual of Tests and Criteria; experience shall also be taken into account when it leads to a more stringent assignment.

2.2.41.1.5 When substances not mentioned by name are assigned to one of the entries listed in 2.2.41.3 on the basis of the test procedures in accordance with the Manual of Tests and Criteria, Part III, sub-section 33.2.1, the following criteria apply:

- (a) With the exception of metal powders or powders of metal alloys, powdery, granular or pasty substances shall be classified as readily flammable substances of Class 4.1 if they can be easily ignited by brief contact with an ignition source (e.g. a burning match), or if, in the event of ignition, the flame spreads rapidly, the burning time is less than 45 seconds for a measured distance of 100 mm or the rate of burning is greater than 2.2 mm/s.
- (b) Metal powders or powders of metal alloys shall be assigned to Class 4.1 if they can be ignited by a flame and the reaction spreads over the whole length of the sample in 10 minutes or less.

Solids which may cause fire through friction shall be classified in Class 4.1 by analogy with existing entries (e.g. matches) or in accordance with any appropriate special provision.

2.2.41.1.6 On the basis of the test procedure in accordance with the Manual of Tests and Criteria, Part III, Section 33.2.1 and the criteria set out in 2.2.41.1.4 and 2.2.41.1.5, it may also be determined whether the nature of a substance mentioned by name is such that the substance is not subject to the provisions for this Class.

2.2.41.1.7 If substances of Class 4.1, as a result of admixtures, come into different categories of risk from those to which the substances mentioned by name in table A of Chapter 3.2 belong, these mixtures shall be assigned to the entries to which they belong on the basis of their actual degree of danger.

NOTE: For the classification of solutions and mixtures (such as preparations and wastes) see also 2.1.3.

Assignment of packing groups

2.2.41.1.8 Flammable solids classified under the various entries in table A of Chapter 3.2 shall be assigned to packing groups II or III on the basis of test procedures of the Manual of Tests and Criteria, Part III, subsection 33.2.1, in accordance with the following criteria:

- (a) Readily flammable solids which, when tested, have a burning time of less than 45 seconds over a measured distance of 100 mm shall be assigned to:

Packing group II: if the flame passes the wetted zone;

Packing group III: if the wetted zone stops the flame for at least four minutes;

- (b) Metal powders or powders of metal alloys shall be assigned to:

Packing group II: if, when tested, the reaction spreads over the whole length of the sample in five minutes or less;

Packing group III: if, when tested, the reaction spreads over the whole length of the sample in more than five minutes.

For solids which may cause fire through friction, the packing group shall be assigned by analogy with existing entries or in accordance with any special provision.

Self-reactive substances

Definitions

2.2.41.1.9 For the purposes of ADR, *Self-reactive substances* are thermally unstable substances liable to undergo a strongly exothermic decomposition even without participation of oxygen (air). Substances are not considered to be self-reactive substances of Class 4.1, if:

- (i) they are explosives according to the criteria of Class 1;
- (ii) they are oxidizing substances according to the assignment procedure of Class 5.1 (see 2.2.51.1);
- (iii) they are organic peroxides according to the criteria of Class 5.2 (see 2.2.52.1);
- (iv) their heat of decomposition is less than 300 J/g; or
- (v) their self-accelerating decomposition temperature (SADT) (see NOTE 2 below) is greater than 75 °C for a 50 kg package.

NOTE 1: The heat of decomposition can be determined using any internationally recognised method e.g. differential scanning calorimetry and adiabatic calorimetry.

NOTE 2: *The self-accelerating decomposition temperature (SADT) is the lowest temperature at which self-accelerating decomposition may occur with a substance in the packaging as used during carriage. Requirements for the determination of the SADT are given in the Manual of Tests and Criteria, Part II, Chapter 20 and section 28.4.*

NOTE 3: *Any substance which shows the properties of a self-reactive substance shall be classified as such, even if this substance gives a positive test result according to 2.2.42.1.5 for inclusion in Class 4.2.*

Properties

2.2.41.1.10 The decomposition of self-reactive substances can be initiated by heat, contact with catalytic impurities (e.g. acids, heavy-metal compounds, bases), friction or impact. The rate of decomposition increases with temperature and varies with the substance. Decomposition, particularly if no ignition occurs, may result in the evolution of toxic gases or vapours. For certain self-reactive substances, the temperature shall be controlled. Some self-reactive substances may decompose explosively, particularly if confined. This characteristic may be modified by the addition of diluents or by the use of appropriate packagings. Certain self-reactive substances burn vigorously. Self-reactive substances are, for example, some compounds of the types listed below:

aliphatic azo compounds (-C-N=N-C-);
organic azides (-C-N₃);
diazonium salts (-CN₂⁺ Z);
N-nitroso compounds (-N-N=O); and
aromatic sulphonylhydrazides (-SO₂-NH-NH₂).

This list is not exhaustive and substances with other reactive groups and some mixtures of substances may have similar properties.

Classification

2.2.41.1.11 Self-reactive substances are classified into seven types according to the degree of danger they present. The types of self-reactive substances range from type A, which is not accepted for carriage in the packaging in which it is tested, to type G, which is not subject to the provisions for self-reactive substances of Class 4.1. The classification of types B to F is directly related to the maximum quantity allowed in one packaging. The principles to be applied for classification as well as the applicable classification procedures, test methods and criteria and an example of a suitable test report are given in Part II of the Manual of Tests and Criteria.

2.2.41.1.12 Substances which have already been classified and assigned to the appropriate collective entry are listed in 2.2.41.4 together with the applicable UN number, packing method and, where appropriate, control and emergency temperatures.

The collective entries specify:

- self-reactive substances types B to F, see 2.2.41.1.11 above;
- physical state (liquid/solid); and
- temperature control (when required), see 2.2.41.1.17 below.

The classification of the self-reactive substances listed in 2.2.41.4 is based on the technically pure substance (except where a concentration of less than 100% is specified).

2.2.41.1.13 Classification of self-reactive substances or formulations of self-reactive substances not listed in 2.2.41.4 and assignment to a collective entry shall be made by the competent authority of the country of origin on the basis of a test report. The statement of approval shall contain the classification and the relevant transport conditions. If the country of origin is not a party to ADR, the classification and the conditions of carriage shall be recognized by the competent authority of the first ADR country reached by the consignment.

2.2.41.1.14 Activators, such as zinc compounds, may be added to some self-reactive substances to change their reactivity. Depending on both the type and the concentration of the activator, this may result in a decrease in thermal stability and a change in explosive properties. If either of these properties is altered, the new formulation shall be assessed in accordance with the classification procedure.

2.2.41.1.15 Samples of self-reactive substances or formulations of self-reactive substances not listed in 2.2.41.4, for which a complete set of test results is not available and which are to be carried for further testing or evaluation, shall be assigned to one of the appropriate entries for self-reactive substances type C provided the following conditions are met:

- the available data indicates that the sample would be no more dangerous than self-reactive substances type B;
- the sample is packaged in accordance with packing method OP2 and the quantity per transport unit is limited to 10 kg;
- the available data indicate that the control temperature, if any, is sufficiently low to prevent any dangerous decomposition and sufficiently high to prevent any dangerous phase separation.

Desensitization

2.2.41.1.16 In order to ensure safety during carriage, self-reactive substances are in many cases desensitized by use of a diluent. Where a percentage of a substance is stipulated, this refers to the percentage by mass, rounded to the nearest whole number. If a diluent is used, the self-reactive substance shall be tested with the diluent present in the concentration and form used in carriage. Diluents which may allow a self-reactive substance to concentrate to a dangerous extent in the event of leakage from a packaging shall not be used. Any diluent shall be compatible with the self-reactive substance. In this regard, compatible diluents are those solids or liquids which have no detrimental influence on the thermal stability and hazard type of the self-reactive substance. Liquid diluents in formulations requiring temperature control (see 2.2.41.1.14) shall have a boiling point of at least 60 °C and a flash-point not less than 5 °C. The boiling point of the liquid shall be at least 50 °C higher than the control temperature of the self-reactive substance.

Temperature control requirements

2.2.41.1.17 Certain self-reactive substances may only be carried under temperature controlled conditions. The control temperature is the maximum temperature at which the self-reactive substance can be safely carried. It is assumed that the temperature of the immediate surroundings of a package only exceeds 55 °C during carriage for a relatively short time in a 24 hour period. In the event of loss of temperature control, it may be necessary to implement emergency procedures. The emergency temperature is the temperature at which such procedures shall be implemented. The control and emergency temperatures are derived from the SADT (see table 1). The SADT shall be determined in order to decide whether a substance shall be subjected to temperature control during carriage. Provisions for the determination of the SADT are given in the Manual of Tests and Criteria, Part II, Chapter 20 and Section 28.4.

Table 1: Derivation of control and emergency temperatures

SADT	Control temperature	Emergency temperature
20 °C or less	20 °C below SADT	10 °C below SADT
over 20 °C to 35 °C	15 °C below SADT	10 °C below SADT
over 35 °C	10 °C below SADT	5 °C below SADT

Self-reactive substances with an SADT not greater than 55 °C shall be subject to temperature control during carriage. Where applicable, control and emergency temperatures are listed in 2.2.41.4. The actual temperature during carriage may be lower than the control temperature but shall be selected so as to avoid dangerous separation of phases.

Solid desensitized explosives

2.2.41.1.18 Solid desensitized explosives are substances which are wetted with water or alcohols or are diluted with other substances to suppress their explosive properties. Such entries in table A of Chapter 3.2 are: UN Nos. 1310, 1320, 1321, 1322, 1336, 1337, 1344, 1347, 1348, 1349, 1354, 1355, 1356, 1357, 1517, 1571, 2555, 2556, 2557, 2852, 2907, 3270, 3317 and 3319; and, if special provision 15 of Chapter 3.3 is complied with: UN Nos. 0154, 0155, 0209, 0214, 0215, 0234; and, if special provision 18 of Chapter 3.3 is complied with: UN No. 0220.

2.2.41.2 Substances not accepted for carriage

2.2.41.2.1 The chemically unstable substances of Class 4.1 shall not be accepted for carriage unless the necessary steps have been taken to prevent their dangerous decomposition or polymerization during carriage. To this end, it shall in particular be ensured that receptacles and tanks do not contain any substance liable to promote these reactions.

2.2.41.2.2 Flammable solids, oxidizing, assigned to UN No. 3097 shall not be accepted for carriage unless they meet the requirements for Class 1 (see also 2.1.3.7).

2.2.41.2.3 The following substances shall not be accepted for carriage:

- Self-reactive substances of type A [see Manual of Tests and Criteria, Part II, paragraph 20.4.2 (a)];
- Phosphorus sulphides which are not free from yellow and white phosphorus;
- Solid desensitized explosives other than those listed in table A of Chapter 3.2;
- Inorganic flammable substances in the molten form other than UN No. 2448 SULPHUR, MOLTEN;
- Barium azide with a water content less than 50% (mass).

2.2.41.3 List of collective entries

Flammable solids F	without subsidiary risk	organic	F1	3175 SOLIDS CONTAINING FLAMMABLE LIQUID, N.O.S. 1353 FIBRES IMPREGNATED WITH WEAKLY NITRATED NITROCELLULOSE, N.O.S. or 1353 FABRICS IMPREGNATED WITH WEAKLY NITRATED NITROCELLULOSE, N.O.S. 1325 FLAMMABLE SOLID, ORGANIC, N.O.S.
		organic molten	F2	3176 FLAMMABLE SOLID, ORGANIC, MOLTEN, N.O.S.
		inorganic	F3	3089 METAL POWDER, FLAMMABLE, N.O.S. ^{2 3} 3181 METAL SALTS OF ORGANIC COMPOUNDS, FLAMMABLE, N.O.S. 3182 METAL HYDRIDES, FLAMMABLE, N.O.S. ⁴ 3178 FLAMMABLE SOLID, INORGANIC, N.O.S.
	oxidizing	F0	3097 FLAMMABLE SOLID, OXIDIZING, N.O.S. (not allowed, see para. 2.2.41.2.2)	
	toxic	organic	FT1	2926 FLAMMABLE SOLID, TOXIC, ORGANIC, N.O.S.
		inorganic	FT2	3179 FLAMMABLE SOLID, TOXIC, INORGANIC, N.O.S.
		organic	FC1	2925 FLAMMABLE SOLID, CORROSIVE, ORGANIC, N.O.S.
		inorganic	FC2	3180 FLAMMABLE SOLID, CORROSIVE, INORGANIC, N.O.S.
	Solid desensitized explosives D	without subsidiary risk	D	Only those listed in table A of Chapter 3.2 are to be accepted for carriage as substances of Class 4.1
		toxic	DT	Only those listed in table A of Chapter 3.2 are to be accepted for carriage as substances of Class 4.1
Self-reactive substances SR	not temperature controlled	SR1	3221 SELF-REACTIVE LIQUID TYPE B	
			3222 SELF-REACTIVE SOLID TYPE B	
			3223 SELF-REACTIVE LIQUID TYPE C	
			3224 SELF-REACTIVE SOLID TYPE C	
			3225 SELF-REACTIVE LIQUID TYPE D	
			3226 SELF-REACTIVE SOLID TYPE D	
			3227 SELF-REACTIVE LIQUID TYPE E	
			3228 SELF-REACTIVE SOLID TYPE E	
			3229 SELF-REACTIVE LIQUID TYPE F	
			3230 SELF-REACTIVE SOLID TYPE F	
temperature controlled	SR2	3231 SELF-REACTIVE LIQUID TYPE B, TEMPERATURE CONTROLLED		
		3232 SELF-REACTIVE SOLID TYPE B, TEMPERATURE CONTROLLED		
		3233 SELF-REACTIVE LIQUID TYPE C, TEMPERATURE CONTROLLED		
		3234 SELF-REACTIVE SOLID TYPE C, TEMPERATURE CONTROLLED		
		3235 SELF-REACTIVE LIQUID TYPE D, TEMPERATURE CONTROLLED		
		3236 SELF-REACTIVE SOLID TYPE D, TEMPERATURE CONTROLLED		
		3237 SELF-REACTIVE LIQUID TYPE E, TEMPERATURE CONTROLLED		
		3238 SELF-REACTIVE SOLID TYPE E, TEMPERATURE CONTROLLED		
		3239 SELF-REACTIVE LIQUID TYPE F, TEMPERATURE CONTROLLED		
		3240 SELF-REACTIVE SOLID TYPE F, TEMPERATURE CONTROLLED		

2.2.41.4 List of self-reactive substances

² Metals and metal alloys in powdered or other flammable form, liable to spontaneous combustion, are substances of Class 4.2.

³ Metals and metal alloys in powdered or other flammable form, which in contact with water, emit flammable gases, are substances of Class 4.3.

⁴ Metals hydrides which, in contact with water, emit flammable gases, are substances of Class 4.3. Aluminium borohydride or aluminium borohydride in devices are substances of Class 4.2, UN No. 2870.

SELF-REACTIVE SUBSTANCE	Concentration (%)	Packing method	Control temperature (°C)	Emergency temperature (°C)	UN generic entry	Remarks
AZODICARBONAMIDE FORMULATION TYPE B, TEMPERATURE CONTROLLED	< 100	OP5			3232	(1) (2)
AZODICARBONAMIDE FORMULATION TYPE C	< 100	OP6			3224	(3)
AZODICARBONAMIDE FORMULATION TYPE C, TEMPERATURE CONTROLLED	< 100	OP6			3234	(4)
AZODICARBONAMIDE FORMULATION TYPE D	< 100	OP7			3226	(5)
AZODICARBONAMIDE FORMULATION TYPE D, TEMPERATURE CONTROLLED	< 100	OP7			3236	(6)
2,2' -AZODI(2,4-DIMETHYL-4-METHOXYVALERONITRILE)	100	OP7	-5	+5	3236	
2,2' -AZODI(2,4-DIMETHYL-VALERONITRILE)	100	OP7	+10	+15	3236	
2,2' -AZODI(ETHYL-2-METHYLPROPIONATE)	100	OP7	+20	+25	3235	
1,1-AZODI(HEXAHYDROBENZONITRILE)	100	OP7			3226	
2,2' -AZODI(ISOBUTYRONITRILE)	100	OP6	+40	+45	3234	
2,2' -AZODI(ISOBUTYRONITRILE) as a water based paste	# 50%	OP6			3224	
2,2' -AZODI(2-METHYLBUTYRONITRILE)	100	OP7	+35	+40	3236	
BENZENE-1,3-DISULPHOHYDRAZIDE, as a paste	52	OP7			3226	
BENZENE SULPHOHYDRAZIDE	100	OP7			3226	
4-(BENZYL(ETHYL)AMINO)-3-ETHOXYBENZENEDIAZONIUM ZINC CHLORIDE	100	OP7			3226	
4-(BENZYL(METHYL)AMINO)-3-ETHOXYBENZENEDIAZONIUM ZINC CHLORIDE	100	OP7	+40	+45	3236	
3-CHLORO-4-DIETHYLAMINO BENZENE-DIAZONIUM ZINC CHLORIDE	100	OP7			3226	
2-DIAZO-1-NAPHTHOL-4-SULPHOCHLORIDE	100	OP5			3222	(2)

2.2.41.4 List of self-reactive substances (cont'd)

SELF-REACTIVE SUBSTANCE	Concentration (%)	Packing method	Control temperature (°C)	Emergency temperature (°C)	UN generic entry	Remarks
2-DIAZO-1-NAPHTHOL-5-SULPHOCHLORIDE	100	OP5			3222	(2)
2,5-DIETHOXY-4-MORPHOLINO-BENZENEDIAZONIUM ZINC CHLORIDE	67-100	OP7	+35	+40	3236	
2,5-DIETHOXY-4-MORPHOLINO-BENZENEDIAZONIUM ZINC CHLORIDE	66	OP7	+40	+45	3236	
2,5-DIETHOXY-4-MORPHOLINO-BENZENEDIAZONIUM TETRAFLUOROBORATE	100	OP7	+30	+35	3236	
2,5-DIETHOXY-4-(PHENYLSULPHONYL)-BENZENEDIAZONIUM ZINC CHLORIDE	67	OP7	+40	+45	3236	
DIETHYLENEGLYCOL BIS (ALLYL CARBONATE) + DI-ISOPROPYLPEROXYDICARBONATE	\$ 88 + # 12	OP8	-10	0	3237	
2,5-DIMETHOXY-4-(4-METHYL-PHENYLSULPHONYL)BENZENE-DIAZONIUM ZINC CHLORIDE	79	OP7	+40	+45	3236	
4-DIMETHYLAMINO-6-(2-DIMETHYL-AMINOETHOXY) TOLUENE-2-DIAZONIUM ZINC CHLORIDE	100	OP7	+40	+45	3236	
N,N'-DINITROSO-N,N'- DIMETHYL TEREPHTHALAMIDE, as a paste	72	OP6			3224	
N,N'-DINITROSOPENTAMETHYLENE-TETRAMINE	82	OP6			3224	(7)
DIPHENYLOXIDE-4,4'-DI-SULPHOHYDRAZIDE	100	OP7			3226	
4-DIPROPYLAMINO BENZENE-DIAZONIUM ZINC CHLORIDE	100	OP7			3226	
2-(N,N-ETHOXYCARBONYL-PHENYLAMINO)-3-METHOXY-4-(N-METHYL-N-CYCLOHEXYLAMINO) BENZENEDIAZONIUM ZINC CHLORIDE	63-92	OP7	+ 40	+ 45	3236	
2-(N,N-ETHOXYCARBONYL-PHENYLAMINO)-3-METHOXY-4-(N-METHYL-N-CYCLOHEXYLAMINO) BENZENEDIAZONIUM ZINC CHLORIDE	62	OP7	+ 35	+ 40	3236	

2.2.41.4 List of self-reactive substances (cont'd)

SELF-REACTIVE SUBSTANCE	Concentration (%)	Packing method	Control temperature (°C)	Emergency temperature (°C)	UN generic entry	Remarks
N-FORMYL-2-(NITROMETHYLENE)-1,3-PERHYDROTHIAZINE	100	OP7	+45	+50	3236	
2-(2-HYDROXYETHOXY)-1-(PYRROLIDIN-1-YL)BENZENE-4-DIAZONIUM ZINC CHLORIDE	100	OP7	+ 45	+ 50	3236	
3-(2-HYDROXYETHOXY)-4-(PYRROLIDIN-1-YL)BENZENE DIAZONIUM ZINC CHLORIDE	100	OP7	+40	+45	3236	
2-(N,N-METHYLAMINOETHYL-CARBONYL)-4-(3,4-DIMETHYL-PHENYLSULPHONYL)BENZENE-DIAZONIUM HYDROGEN SULPHATE	96	OP7	+45	+50	3236	
4-METHYLBENZENESULPHONYL-HYDRAZIDE	100	OP7			3226	
3-METHYL-4-(PYRROLIDIN-1-YL) BENZENEDIAZONIUM TETRAFLUOROBORATE	95	OP6	+45	+50	3234	
4-NITROSOPHENOL	100	OP7	+35	+40	3236	
SELF-REACTIVE LIQUID, SAMPLE		OP2			3223	(8)
SELF-REACTIVE LIQUID, SAMPLE, TEMPERATURE CONTROLLED		OP2			3233	(8)
SELF-REACTIVE SOLID, SAMPLE		OP2			3224	(8)
SELF-REACTIVE SOLID, SAMPLE, TEMPERATURE CONTROLLED		OP2			3234	(8)
SODIUM 2-DIAZO-1-NAPHTHOL-4-SULPHONATE	100	OP7			3226	
SODIUM 2-DIAZO-1-NAPHTHOL-5-SULPHONATE	100	OP7			3226	
TETRAMINE PALLADIUM (II) NITRATE	100	OP6	+30	+35	3234	

Remarks

- (1) Azodicarbonamide formulations which fulfil the criteria of paragraph 20.4.2 (b) of the Manual of Tests and Criteria. The control and emergency temperatures shall be determined by the procedure given in 2.2.41.1.17.
- (2) "EXPLOSIVE" subsidiary risk label required (Model No. 1, see 5.2.2.2.2).
- (3) Azodicarbonamide formulations which fulfil the criteria of paragraph 20.4.2 (c) of the Manual of Tests and Criteria.
- (4) Azodicarbonamide formulations which fulfil the criteria of paragraph 20.4.2 (c) of the Manual of Tests and Criteria. The control and emergency temperatures shall be determined by the procedure given in 2.2.41.1.17.
- (5) Azodicarbonamide formulations which fulfil the criteria of paragraph 20.4.2 (d) of the Manual of Tests and Criteria.
- (6) Azodicarbonamide formulations which fulfil the criteria of paragraph 20.4.2 (d) of the Manual of Tests and Criteria. The control and emergency temperatures shall be determined by the procedure given in 2.2.41.1.17.
- (7) With a compatible diluent having a boiling point of not less than 150 °C.
- (8) See 2.2.41.1.16.

2.2.42 Class 4.2 Substances liable to spontaneous combustion

2.2.42.1 Criteria

2.2.42.1.1 The heading of Class 4.2 covers:

- *Pyrophoric substances* which are substances, including mixtures and solutions (liquid or solid), which even in small quantities ignite on contact with air within five minutes. These are the Class 4.2 substances the most liable to spontaneous combustion; and
- *Self-heating substances and articles* which are substances and articles, including mixtures and solutions, which, on contact with air, without energy supply, are liable to self-heating. These substances will ignite only in large amounts (kilogrammes) and after long periods of time (hours or days).

2.2.42.1.2 The substances and articles of Class 4.2 are subdivided as follows:

S Substances liable to spontaneous combustion, without subsidiary risk

- S1 Organic, liquid
- S2 Organic, solid
- S3 Inorganic, liquid
- S4 Inorganic, solid

SW Substances liable to spontaneous combustion, which, in contact with water, emit flammable gases

SO Substances liable to spontaneous combustion, oxidizing

ST Substances liable to spontaneous combustion, toxic

- ST1 Organic, toxic, liquid
- ST2 Organic, toxic, solid
- ST3 Inorganic, toxic, liquid
- ST4 Inorganic, toxic, solid

SC Substances liable to spontaneous combustion, corrosive

- SC1 Organic, corrosive, liquid
- SC2 Organic, corrosive, solid
- SC3 Inorganic, corrosive, liquid
- SC4 Inorganic, corrosive, solid

Properties

2.2.42.1.3 Self-heating of these substances, leading to spontaneous combustion, is caused by reaction of the substance with oxygen (in the air) and the heat developed not being conducted away rapidly enough to the surroundings. Spontaneous combustion occurs when the rate of heat production exceeds the rate of heat loss and the auto-ignition temperature is reached.

Classification

2.2.42.1.4 Substances and articles classified in Class 4.2 are listed in table A of Chapter 3.2. The assignment of substances and articles not mentioned by name in table A of Chapter 3.2 to the the relevant specific N.O.S. entry of 2.2.42.3 in accordance with the provisions of Chapter 2.1 can be based on experience or the results of the test procedures in accordance with the Manual of Tests and Criteria, Part III, Section 33.3. Assignment to general N.O.S. entries of Class 4.2 shall be based on the results of the test procedures in accordance with the Manual of Tests and Criteria, Part III, section 33.3; experience shall also be taken into account when it leads to a more stringent assignment.

2.2.42.1.5 When substances or articles not mentioned by name are assigned to one of the entries listed in 2.2.42.3 on the basis of the test procedures in accordance with the Manual of Tests and Criteria, Part III, section 33.3, the following criteria shall apply:

- (a) Solids liable to spontaneous combustion (pyrophoric) shall be assigned to Class 4.2 when they ignite on falling from a height of 1 m or within five minutes;
- (b) Liquids liable to spontaneous combustion (pyrophoric) shall be assigned to Class 4.2 when:
 - (i) on being poured on an inert carrier, they ignite within five minutes, or
 - (ii) in the event of a negative result of the test according to (i), when poured on a dry, indented filter paper (Whatman No. 3 filter), they ignite or carbonize it within five minutes;
- (c) Substances in which, in a 10 cm sample cube, at 140 °C test temperature, spontaneous combustion or a rise in temperature to over 200 °C is observed within 24 hours shall be assigned to Class 4.2. This criterion is based on the temperature of the spontaneous combustion of charcoal, which is at 50 °C for a sample cube of 27 m³. Substances with a temperature of spontaneous combustion higher than 50 °C for a volume of 27 m³ are not to be assigned to Class 4.2.

***NOTE 1:** Substances carried in packages with a volume of not more than 3m³ are exempted from Class 4.2 if, tested with a 10 cm sample cube at 120 °C, no spontaneous combustion nor a rise in temperature to over 180 °C is observed within 24 hours.*

***NOTE 2:** Substances carried in packages with a volume of not more than 450 litres are exempted from Class 4.2 if, tested with a 10 cm sample cube at 100 °C, no spontaneous combustion nor a rise in temperature to over 160 °C is observed within 24 hours.*

2.2.42.1.6 If substances of Class 4.2, as a result of admixtures, come into different categories of risk from those to which the substances mentioned by name in table A of Chapter 3.2 belong, these mixtures shall be assigned to the entries to which they belong on the basis of their actual degree of danger.

***NOTE:** For the classification of solutions and mixtures (such as preparations and wastes), see also 2.1.3.*

2.2.42.1.7 On the basis of the test procedure in the Manual of Tests and Criteria, Part III, section 33.3 and the criteria set out in 2.2.42.1.5, it may also be determined whether the nature of a mentioned by name substance is such that the substance is not subject to the provisions for this Class.

Assignment of packing groups

2.2.42.1.8 Substances and articles classified under the various entries in table A of Chapter 3.2 shall be assigned to packing groups I, II or III on the basis of test procedures of the Manual of Tests and Criteria, Part III, section 33.3, in accordance with the following criteria:

- (a) Substances liable to spontaneous combustion (pyrophoric) shall be assigned to packing group I;
- (b) Self-heating substances and articles in which, in a 2.5 cm sample cube, at 140 °C test temperature, spontaneous combustion or a rise in temperature to over 200 °C is observed within 24 hours, shall be assigned to packing group II;
Substances with a temperature of spontaneous combustion higher than 50 °C for a volume of 450 litres are not to be assigned to packing group II;
- (c) Slightly self-heating substances in which, in a 2.5 cm sample cube, the phenomena referred to under (b) are not observed, in the given conditions, but in which in a 10 cm sample cube at 140 °C test temperature spontaneous combustion or a rise in temperature to over 200 °C is observed within 24 hours, shall be assigned to packing group III.

2.2.42.2 Substances not accepted for carriage

The following substances shall not be accepted for carriage:

- UN No. 3255 tert-BUTYL HYPOCHLORITE; and
- Self-heating solids, oxidizing, assigned to UN No. 3127 unless they meet the requirements for Class 1 (see 2.1.3.7).

2.2.42.3 List of collective entries

Without subsidiary risk	organic	liquid	S1	2845 PYROPHORIC LIQUID, ORGANIC, N.O.S. 3183 SELF-HEATING LIQUID, ORGANIC, N.O.S.
		solid	S2	1373 FIBRES or FABRICS, ANIMAL or 1373 VEGETABLE or SYNTHETIC, N.O.S. with oil 2006 PLASTICS, NITROCELLULOSE-BASED, SELF-HEATING, N.O.S. 3313 ORGANIC PIGMENTS, SELF HEATING 2846 PYROPHORIC SOLID, ORGANIC, N.O.S. 3088 SELF-HEATING SOLID, ORGANIC, N.O.S.
S	inorganic	liquid	S3	3194 PYROPHORIC LIQUID, INORGANIC, N.O.S. 3186 SELF-HEATING LIQUID, INORGANIC, N.O.S.
		solid	S4	1383 PYROPHORIC METAL, N.O.S. or 1383 PYROPHORIC ALLOY, N.O.S. 1378 METAL CATALYST, WETTED with a visible excess of liquid 2881 METAL CATALYST, DRY 3189 ¹ METAL POWDER, SELF-HEATING, N.O.S. 3205 ALKALINE EARTH METAL ALCOHOLATES, N.O.S. 3200 PYROPHORIC SOLID, INORGANIC, N.O.S. 3190 SELF-HEATING SOLID, INORGANIC, N.O.S.
Water-reactive			SW	2445 LITHIUM ALKYL (no N.O.S. entry available) 3051 ALUMINIUM ALKYL 3052 ALUMINIUM ALKYL HALIDES 3053 MAGNESIUM ALKYL 3076 ALUMINIUM ALKYL HYDRIDES 2003 METAL ALKYL, N.O.S. or 2003 METAL ARYL, N.O.S. 3049 METAL ALKYL HALIDES, N.O.S. or 3049 METAL ARYL HALIDES, N.O.S. 3050 ^{2,3} METAL ALKYL HYDRIDES, N.O.S. or 3050 METAL ARYL HYDRIDES, N.O.S. 3203 ⁴ PYROPHORIC ORGANOMETALLIC COMPOUND, N.O.S.
Oxidizing			SO	3127 SELF-HEATING SOLID, OXIDIZING, N.O.S. (not allowed, see 2.2.42.2)
Toxic ST	organic	liquid	ST1	3184 SELF-HEATING LIQUID, TOXIC, ORGANIC, N.O.S.
		solid	ST2	3128 SELF-HEATING SOLID, TOXIC, ORGANIC, N.O.S.
	inorganic	liquid	ST3	3187 SELF-HEATING LIQUID, TOXIC, INORGANIC, N.O.S.
		solid	ST4	3191 SELF-HEATING SOLID, TOXIC, INORGANIC, N.O.S.
Corrosive SC	organic	liquid	SC1	3185 SELF-HEATING LIQUID, CORROSIVE, ORGANIC, N.O.S.
		solid	SC2	3126 SELF-HEATING SOLID, CORROSIVE, ORGANIC, N.O.S.
	inorganic	liquid	SC3	3188 SELF-HEATING LIQUID, CORROSIVE, INORGANIC, N.O.S.
		solid	SC4	3206 ALKALI METAL ALCOHOLATES, SELF-HEATING, CORROSIVE, N.O.S. 3192 SELF-HEATING SOLID, CORROSIVE, INORGANIC, N.O.S.

NOTES:

¹ *Dust and powder of metals, non toxic in a non-spontaneous combustible form which nevertheless, in contact with water, emit flammable gases, are substances of Class 4.3.*

² *Metal hydrides other than UN No. 2870 in flammable form are substances of Class 4.1.*

³ *Metal hydrides which, in contact with water, emit flammable gases, are substances of Class 4.3.*

⁴ *Flammable solutions with organometallic compounds which are not liable to spontaneous combustion and, in contact with water, do not emit flammable gases, are substances of Class 3. Organometallic compounds and their solutions which are liable to spontaneous combustion but, in contact with water, emit flammable gases, are substances of Class 4.3.*

2.2.43 Class 4.3 Substances which, in contact with water, emit flammable gases

2.2.43.1 Criteria

2.2.43.1.1 The heading of Class 4.3 covers substances which react with water to emit flammable gases liable to form explosive mixtures with air, and articles containing such substances.

2.2.43.1.2 Substances and articles of Class 4.3 are subdivided as follows:

W Substances which, in contact with water, emit flammable gases, without subsidiary risk, and articles containing such substances

W1 Liquid

W2 Solid

W3 Articles

WF1 Substances which, in contact with water, emit flammable gases, liquid, flammable

WF2 Substances which, in contact with water, emit flammable gases, solid, flammable

WS Substances which, in contact with water, emit flammable gases, liable to spontaneous combustion

WO Substances which, in contact with water, emit flammable gases, oxidizing, solid

WT Substances which, in contact with water, emit flammable gases, toxic

WT1 Liquid

WT2 Solid

WC Substances which, in contact with water, emit flammable gases, corrosive

WC1 Liquid

WC2 Solid

WFC Substances which, in contact with water, emit flammable gases, flammable, corrosive

Properties

2.2.43.1.3 Certain substances in contact with water may emit flammable gases that can form explosive mixtures with air. Such mixtures are easily ignited by all ordinary sources of ignition, for example naked lights, sparking handtools or unprotected light bulbs. The resulting blast wave and flames may endanger people and the environment. The test method referred to in 2.2.43.1.4 below is used to determine whether the reaction of a substance with water leads to the development of a dangerous amount of gases which may be flammable. This test method shall not be applied to pyrophoric substances.

Classification

2.2.43.1.4 Substances and articles classified in Class 4.3 are listed in table A of Chapter 3.2. The assignment of substances and articles not mentioned by name in table A of Chapter 3.2 to the relevant entry of 2.2.43.3 in accordance with the provisions of Chapter 2.1 shall be based on the results of the test procedure in accordance with the Manual of Tests and Criteria, Part III, Section 33.4; experience shall also be taken into account when it leads to a more stringent assignment.

2.2.43.1.5 When substances not mentioned by name are assigned to one of the entries listed in 2.2.43.3 on the basis of the test procedure in accordance with the Manual of Tests and Criteria, Part III, Section 33.4, the following criteria shall apply:

A substance shall be assigned to Class 4.3 if:

- (a) spontaneous ignition of the gas emitted takes place in any step of the test procedure; or
- (b) there is an evolution of flammable gas at a rate greater than 1 litre per kilogramme of the substance to be tested per hour.

2.2.43.1.6 If substances of Class 4.3, as a result of admixtures, come into different categories of risk from those to which the substances mentioned by name in table A of Chapter 3.2 belong, these mixtures shall be assigned to the entries to which they belong on the basis of their actual degree of danger.

NOTE: *For the classification of solutions and mixtures (such as preparations and wastes) see also 2.1.3.*

2.2.43.1.7 On the basis of the test procedures in accordance with the Manual of Tests and Criteria, Part III, Section 33.4, and the criteria set out in paragraph 2.2.43.1.5, it may also be determined whether the nature of a substance mentioned by name is such that the substance is not subject to the provisions for this Class.

Assignment of packing groups

2.2.43.1.8 Substances and articles classified under the various entries in table A of Chapter 3.2 shall be assigned to packing groups I, II or III on the basis of test procedures of the Manual of Tests and Criteria, Part III, section 33.4, in accordance with the following criteria:

- (a) Packing group I shall be assigned to any substance which reacts vigorously with water at ambient temperature and generally demonstrates a tendency for the gas produced to ignite spontaneously, or one which reacts readily with water at ambient temperatures such that the rate of evolution of flammable gas is equal to or greater than 10 litres per kilogramme of substance over any one minute period;
- (b) Packing group II shall be assigned to any substance which reacts readily with water at ambient temperature such that the maximum rate of evolution of flammable gas is equal to or greater than 20 litres per kilogramme of substance per hour, and which does not meet the criteria of packing group I;

- (c) Packing group III shall be assigned to any substance which reacts slowly with water at ambient temperature such that the maximum rate of evolution of flammable gas is greater than 1 litre per kilogramme of substance per hour, and which does not meet the criteria of packing groups I or II.

2.2.43.2 Substances not accepted for carriage

Water-reactive solids, flammable, assigned to UN No. 3132, water-reactive solids, oxidizing, assigned to UN No. 3133 and water-reactive solids, self-heating, assigned to UN No.3135 shall not be accepted for carriage unless they meet the requirements for Class 1 (see also 2.1.3.7).

2.2.43.3 List of collective entries

	liquid	W1	1391 ALKALI METAL DISPERSION or 1391 ALKALINE EARTH METAL DISPERSION 1421 ALKALI METAL ALLOY, LIQUID, N.O.S. 3148 WATER-REACTIVE LIQUID, N.O.S.
Without subsidiary risk	solid	W2¹	1389 ALKALI METAL AMALGAM 1390 ALKALI METAL AMIDES 1392 ALKALINE EARTH METAL AMALGAM 1393 ALKALINE EARTH METAL ALLOY, N.O.S. 1409 METAL HYDRIDES, WATER-REACTIVE, N.O.S. 3170 ALUMINIUM SMELTING BY-PRODUCTS or 3170 ALUMINIUM REMELTING BY-PRODUCTS 3208 METALLIC SUBSTANCE, WATER-REACTIVE, N.O.S. 2813 WATER-REACTIVE SOLID, N.O.S.
W	articles	W3	3292 BATTERIES, CONTAINING SODIUM or 3292 CELLS, CONTAINING SODIUM
Liquid, flammable		WF1²	3207 ORGANOMETALLIC COMPOUND, WATER-REACTIVE, FLAMMABLE, N.O.S., or 3207 ORGANOMETALLIC COMPOUND SOLUTION, WATER-REACTIVE, FLAMMABLE, N.O.S. or 3207 ORGANOMETALLIC COMPOUND DISPERSION, WATER-REACTIVE, FLAMMABLE, N.O.S.
Solid, flammable		WF2	3132 WATER-REACTIVE SOLID, FLAMMABLE, N.O.S. (not allowed, see 2.2.43.2)
Solid, self-heating		WS³	3209 METALLIC SUBSTANCE, WATER-REACTIVE, SELF-HEATING, N.O.S. 3135 WATER-REACTIVE SOLID, SELF-HEATING, N.O.S. (not allowed, see 2.2.43.2)
Solid, oxidizing		WO	3133 WATER-REACTIVE SOLID, OXIDIZING, N.O.S. (not allowed, see 2.2.43.2)
Toxic WT	liquid	WT1	3130 WATER-REACTIVE LIQUID, TOXIC, N.O.S.
	solid	WT2	3134 WATER-REACTIVE SOLID, TOXIC, N.O.S.
Corrosive WC	liquid	WC1	3129 WATER-REACTIVE LIQUID, CORROSIVE, N.O.S.
	solid	WC2	3131 WATER-REACTIVE SOLID, CORROSIVE, N.O.S.
Flammable, corrosive		WFC⁴	2988 CHLOROSILANES, WATER-REACTIVE, FLAMMABLE, CORROSIVE, NO.S. (no general N.O.S entry available, classification according to the table of precedence of hazard in 2.1.3.9)

¹ Metals and metal alloys which, in contact with water, do not emit flammable gases and are not pyrophoric or self-heating, but which are readily flammable, are substances of Class 4.1. Alkaline-earth metals and alkaline-earth metal alloys in pyrophoric form are substances of Class 4.2. Dust and powders of metals in pyrophoric form are substances of Class 4.2. Metals and metal alloys in pyrophoric form are substances of Class 4.2. Compounds of phosphorus with heavy metals such as iron, copper, etc. are not subject to the provisions of ADR.

² Flammable solutions with organometallic compounds in concentrations which, in contact with water, neither emit flammable gases in dangerous quantities, or ignite spontaneously, are substances of Class 3. Organometallic compounds and their solutions, which ignite spontaneously, are substances of Class 4.2.

³ Metals and metal alloys in pyrophoric form are substances of Class 4.2.

⁴ Chlorosilanes, having a flash-point of less than 23 °C and which, in contact with water, do not emit flammable gases, are substances of Class 3. Chlorosilanes, having a flash-point equal to or greater than 23 °C and which, in contact with water, do not emit flammable gases, are substances of Class 8.

2.2.51 Class 5.1 Oxidizing substances

2.2.51.1 Criteria

2.2.51.1.1 The heading of Class 5.1 covers substances which, while in themselves not necessarily combustible, may, generally by yielding oxygen, cause or contribute to the combustion of other material, and articles containing such substances.

2.2.51.1.2 The substances of Class 5.1 and articles containing such substances are subdivided as follows:

O Oxidizing substances without subsidiary risk or articles containing such substances

- O1 Liquid
- O2 Solid
- O3 Articles

OF Oxidizing substances, solid, flammable

OS Oxidizing substances, solid, liable to spontaneous combustion

OW Oxidizing substances, solid which, in contact with water, emit flammable gases

OT Oxidizing substances, toxic

- OT1 Liquid
- OT2 Solid

OC Oxidizing substances, corrosive

- OC1 Liquid
- OC2 Solid

OTC Oxidizing substances, toxic, corrosive

2.2.51.1.3 Substances and articles classified in Class 5.1 are listed in table A of Chapter 3.2. The assignment of substances and articles not mentioned by name in table A of Chapter 3.2 to the relevant entry of 2.2.51.3 in accordance with the provisions of Chapter 2.1 can be based on the tests, methods and criteria in paragraphs 2.2.51.1.6-2.2.51.1.9 below and the Manual of Tests and Criteria, Part III, Section 34.4. In the event of divergence between test results and known experience, judgement based on known experience shall take precedence over test results.

2.2.51.1.4 If substances of Class 5.1, as a result of admixtures, come into different categories of risk from those to which the substances mentioned by name in table A of Chapter 3.2 belong, these mixtures or solutions shall be assigned to the entries to which they belong on the basis of their actual degree of danger.

NOTE: For the classification of solutions and mixtures (such as preparations and wastes) see also section 2.1.3.

2.2.51.1.5 On the basis of the test procedures in the Manual of Tests and Criteria, Part III, section 34.4, and the criteria set out in 2.2.51.1.6-2.2.51.1.9 it may also be determined whether the nature of a substance mentioned by name in table A of Chapter 3.2 is such that the substance is not subject to the provisions for this class.

Oxidizing solids

Classification

2.2.51.1.6 When oxidizing solid substances not mentioned by name in table A of Chapter 3.2 are assigned to the relevant entry in 2.2.51.3 on the basis of the test procedure in accordance with the Manual of Tests and Criteria, Part III, sub-section 34.4.1, the following criteria shall apply:

A solid substance shall be assigned to Class 5.1 if, in the 4:1 or the 1:1 sample-to-cellulose ratio (by mass) tested, it ignites or burns or exhibits mean burning times equal to or less than that of a 3:7 mixture (by mass) of potassium bromate and cellulose.

Assignment of packing groups

2.2.51.1.7 Oxidizing solids classified under the various entries in table A of Chapter 3.2 shall be assigned to packing groups I, II or III on the basis of test procedures of the Manual of Tests and Criteria, Part III, sub-section 34.4.1, in accordance with the following criteria:

- (a) Packing group I: any substance which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning time less than the mean burning time of a 3:2 mixture, by mass, of potassium bromate and cellulose;
- (b) Packing group II: any substance which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning time equal to or less than the mean burning time of a 2:3 mixture (by mass) of potassium bromate and cellulose and the criteria for packing group I are not met;
- (c) Packing group III: any substance which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning time equal to or less than the mean burning time of a 3:7 mixture (by mass) of potassium bromate and cellulose and the criteria for packing groups I and II are not met.

Oxidizing liquids

Classification

2.2.51.1.8 When oxidizing liquid substances not mentioned by name in table A of Chapter 3.2 are assigned to the relevant entry in sub-section 2.2.51.3 on the basis of the test procedure in accordance with the Manual of Tests and Criteria, Part III, sub-section 34.4.2, the following criteria shall apply:

A liquid substance shall be assigned to Class 5.1 if, in the 1:1 mixture, by mass, of substance and cellulose tested, it exhibits a pressure rise of 2070 kPa gauge or more and a mean pressure rise time equal to or less than the mean pressure rise time of a 1:1 mixture, by mass, of 65% aqueous nitric acid and cellulose.

Assignment of packing groups

2.2.51.1.9 Oxidizing liquids classified under the various entries in table A of Chapter 3.2 shall be assigned to packing groups I, II or III on the basis of test procedures of the Manual of Tests and Criteria, Part III, section 34.4.2, in accordance with the following criteria:

- (a) Packing group I: any substance which, in the 1:1 mixture, by mass, of substance and cellulose tested, spontaneously ignites; or the mean pressure rise time of a 1:1 mixture, by mass, of substance and cellulose is less than that of a 1:1 mixture, by mass, of 50% perchloric acid and cellulose;
- (b) Packing group II: any substance which, in the 1:1 mixture, by mass, of substance and cellulose tested, exhibits a mean pressure rise time less than or equal to the mean pressure rise time of a 1:1 mixture, by mass, of 40% aqueous sodium chlorate solution and cellulose; and the criteria for packing group I are not met;
- (c) Packing group III: any substance which, in the 1:1 mixture, by mass, of substance and cellulose tested, exhibits a mean pressure rise time less than or equal to the mean pressure rise time of a 1:1 mixture, by mass, of 65% aqueous nitric acid and cellulose; and the criteria for packing groups I and II are not met.

2.2.51.2 Substances not accepted for carriage

2.2.51.2.1 The chemically unstable substances of Class 5.1 shall not be accepted for carriage unless the necessary steps have been taken to prevent their dangerous decomposition or polymerization during carriage. To this end it shall in particular be ensured that receptacles do not contain any material liable to promote these reactions.

2.2.51.2.2 The following substances and mixtures shall not be accepted for carriage:

- oxidizing solids, self-heating, assigned to UN No. 3100, oxidizing solids, water-reactive, assigned to UN No. 3121 and oxidizing solids, flammable, assigned to UN No. 3137, unless they meet the requirements for Class 1 (see also 2.1.3.7);
- hydrogen peroxide, not stabilized or hydrogen peroxide, aqueous solutions, not stabilized containing more than 60 % hydrogen peroxide;
- tetranitromethane not free from combustible impurities;
- perchloric acid solutions containing more than 72 % (mass) acid, or mixtures of perchloric acid with any liquid other than water;
- chloric acid solution containing more than 10 % chloric acid or mixtures of chloric acid with any liquid other than water;
- halogenated fluor compounds other than UN Nos. 1745 BROMINE PENTAFLUORIDE; 1746 BROMINE TRIFLUORIDE and 2495 IODINE PENTAFLUORIDE of Class 5.1 as well as UN Nos. 1749 CHLORINE TRIFLUORIDE and 2548 CHLORINE PENTAFLUORIDE of Class 2;

- ammonium chlorate and its aqueous solutions and mixtures of a chlorate with an ammonium salt;
- ammonium chlorite and its aqueous solutions and mixtures of a chlorite with an ammonium salt;
- mixtures of a hypochlorite with an ammonium salt;
- ammonium bromate and its aqueous solutions and mixtures of a bromate with an ammonium salt;
- ammonium permanganate and its aqueous solutions and mixtures of a permanganate with an ammonium salt;
- ammonium nitrate containing more than 0.2 % combustible substances (including any organic substance calculated as carbon) unless it is a constituent of a substance or article of Class 1;
- fertilizers having an ammonium nitrate content (in determining the ammonium nitrate content, all nitrate ions for which a molecular equivalent of ammonium ions is present in the mixture shall be calculated as ammonium nitrate) or a content in combustible substances exceeding the values specified for the various AMMONIUM NITRATE FERTILIZER grades listed under UN Nos 2067 to 2070 except under the conditions applicable to Class 1;
- ammonium nitrate fertilizers which are assigned to the collective entry UN No. 2072 AMMONIUM NITRATE FERTILIZER, N.O.S.;
- ammonium nitrite and its aqueous solutions and mixtures of an inorganic nitrite with an ammonium salt;
- mixtures of potassium nitrate, sodium nitrite and an ammonium salt.

2.2.51.3 List of collective entries

	liquid	O1	3210 CHLORATES, INORGANIC, AQUEOUS SOLUTION, N.O.S. 3211 PERCHLORATES, INORGANIC, AQUEOUS SOLUTION, N.O.S. 3213 BROMATES, INORGANIC, AQUEOUS SOLUTION, N.O.S. 3214 PERMANGANATES, INORGANIC, AQUEOUS SOLUTION, N.O.S. 3216 PERSULPHATES, INORGANIC, AQUEOUS SOLUTION, N.O.S. 3218 NITRATES, INORGANIC, AQUEOUS SOLUTION, N.O.S. 3219 NITRITES, INORGANIC, AQUEOUS SOLUTION, N.O.S. 3139 OXIDIZING LIQUID, N.O.S.
			1450 BROMATES, INORGANIC, N.O.S 1461 CHLORATES, INORGANIC, N.O.S. 1462 CHLORITES, INORGANIC, N.O.S. 1477 NITRATES, INORGANIC, N.O.S 1481 PERCHLORATES, INORGANIC, N.O.S. 1482 PERMANGANATES, INORGANIC, N.O.S. 1483 PEROXIDES, INORGANIC, N.O.S
Without subsidiary risk	solid	O2	2072 AMMONIUM NITRATE FERTILIZER, N.O.S. <i>NOTE: not to be accepted for carriage. See however UN Nos. 2067, 2068, 2069 and 2070.</i> 2627 NITRITES, INORGANIC, N.O.S. 3212 HYPOCHLORITES, INORGANIC, N.O.S. 3215 PERSULPHATES, INORGANIC, N.O.S. 1479 OXIDIZING SOLID, N.O.S.
O			
	articles	O3	3356 OXYGEN GENERATOR, CHEMICAL
Solid, flammable		OF	3137 OXIDIZING SOLID, FLAMMABLE, N.O.S. (not allowed, see 2.2.51.2)
Solid, self-heating		OS	3100 OXIDIZING SOLID, SELF-HEATING, N.O.S. (not allowed, see 2.2.51.2)
Solid, water reactive		OW	3121 OXIDIZING SOLID, WATER REACTIVE, N.O.S. (not allowed, see 2.2.51.2)
Toxic OT	liquid	OT1	3099 OXIDIZING LIQUID, TOXIC, N.O.S.
	solid	OT2	3087 OXIDIZING SOLID, TOXIC, N.O.S.
Corrosive OC	liquid	OC1	3098 OXIDIZING LIQUID, CORROSIVE, N.O.S.
	solid	OC2	3085 OXIDIZING SOLID, CORROSIVE, N.O.S.
Toxic, corrosive		OTC	(no collective entry available, classification according to the table of precedence of hazard in 2.1.3.9)