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Propylene and butadiene for industrial use — Sampling in the liquid phase

Propylène et butadiène à usage industriel — Échantillonnage en phase liquide

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Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 8563 was prepared by Technical Committee ISO/TC 47, *Chemistry*.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

Propylene and butadiene for industrial use – Sampling in the liquid phase

WARNING – Safety precautions

In all sampling and testing operations with liquefied propylene and butadiene, certain safety precautions must be scrupulously adhered to.

When even small quantities of these products are vaporized, significant quantities of extremely combustible gas are produced which can form explosive mixtures with air. When liquefied propylene and butadiene evaporate from a metallic surface, intense cooling occurs which can cause burns if the surface is touched. To aid handling of cylinders, these can be fitted with a foot (see figure 1) or handles.

When vessels containing liquefied propylene and butadiene are emptied, a considerable volume of vapour is produced which immediately spreads out in the surrounding atmosphere. This vapour has a high density and can accumulate at low levels.

It is thus essential to observe rigorously the following rules for the handling of liquefied propylene and butadiene, especially if the quantities are relatively large (e.g., 1 litre) :

- a) Use vessels, plant and equipment conforming to the current official decrees and regulations. Have the vessels periodically pressure tested by an approved organization.
- b) Bond the sample containers and cylinders together and (perhaps) connect such bonding to earth in order to discharge static electrically during emptying and transfer of liquefied gases.
- c) Operate in premises separated from the work-room and in the absence of naked flames, sparks, sources of heat, and non-explosion-protected electrical equipment.
- d) Ensure that there is good ventilation at both high and low levels by using a high-flow fume hood if the sampling is not carried out in an open-air environment.
- e) Verify that the electrical equipment, lighting, fume hood fan motors, etc., are explosion-protected and conform to the current official regulations.

It is recommended that operators wear safety glasses and gloves and that they expose as little of their bodies as possible to danger from splashing (arms, forearms, etc.).

Propylene is classified as a simple asphyxiant but butadiene has a TLV (Threshold Limit Value) of 10 mg/kg.

1 Scope and field of application

This International Standard describes the procedures and the precautions to be taken in drawing representative samples of propylene and butadiene, in the liquid phase, for the purpose of their analysis.

It also sets out, in annex A, a diagrammatic representation of a system for the disposal of the portion of the sample not used in the analysis, and, in annex B, the sequence of operations for filling a sample cylinder.

2 Apparatus

2.1 Sampling cylinders (see figures 1 and 2), capable of withstanding a pressure of 3,4 MPa* for liquid propylene, which has a vapour pressure of 1,1 MPa at 25 °C, or capable of withstanding a vapour pressure of 1,4 MPa if used only for liquid butadiene, which has a vapour pressure of 0,3 MPa at 25 °C.

The sampling cylinders should preferably be composed of 18/10 stainless steel and fitted with two stainless steel needle valves capable of withstanding a pressure equal to or greater than that of the sampling cylinder. One of the valves shall be fitted with a dip pipe in order to ensure an unfilled space of 20 % and it shall be marked in a suitable way.

The sampling cylinders shall be checked at frequent intervals and tested according to the legislation in force in each country.

2.2 Connecting pipe

A passivated stainless steel 18/10 pipe with couplings capable of withstanding the operating pressure shall be used.

3 Procedure (See sequence of operations in annex B)

Empty all liquid from the sampling cylinder (2.1) and connect it with couplings R₁ and R₂, in a vertical position, via the sampling line to the source of propylene or butadiene, at a point at least 10 cm below the level of the liquid, so that the latter can occupy the lower part of the sampling cylinder.

Close the inlet and drainage valves (V₂ and V₁ respectively) of the sampling cylinder and open the discharge valve (V₅) of the vessel to be sampled and then the sampling valve (V₄) and the drainage valve (V₃) for the sampling line. As soon as the liquid hydrocarbon appears, close the drainage valve (V₃) of the sampling line. Open the inlet and drainage valves (V₂ and V₁) of the sampling cylinder. Close the drainage valve (V₁) followed by the inlet valve (V₂), then purge through the drainage valve (V₁). Repeat this last operation three times and then close the drainage valve (V₁). To fill, open the inlet valve (V₂) and the drainage valve (V₁) and as soon as the liquid appears, close the drainage valve (V₁), then the inlet valve (V₂). To obtain a safe volume with the vapour phase equivalent to 20 % of total volume of the sampling cylinder, open the drainage valve (V₁) to evacuate the excess liquid and close the valve as soon as the vapour phase appears. Close the discharge valve (V₅) and open the drainage valve (V₃) of the sampling line, then close the sampling valve (V₄) and disconnect the sampling cylinder at the coupling R₂.

Whenever possible, it is advisable to use a sampling cylinder mounted on a support (see figure 1) and fitted with a dip pipe in its upper part.

4 Sampling report

A sampling report shall be written containing all essential information pertaining to the material sampled. It shall contain at least the following particulars :

- a) reference to this International Standard;
- b) unambiguous identification of the sample such as name and number of the label on the sampling bottle;
- c) date and duration of sampling;
- d) approximate size of consignment;
- e) comments on abnormalities such as obvious contamination;
- f) any operation not included in this International Standard or regarded as optional.

* 1 MPa = 10 bar