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Aromatic hydrocarbons — Sampling

Hydrocarbures aromatiques — Échantillonnage

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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.

International Standard ISO 1995 was developed by Technical Committee ISO/TC 78, *Aromatic hydrocarbons*, and was circulated to the member bodies in November 1979.

It has been approved by the member bodies of the following countries :

Australia	Hungary	Netherlands
Austria	India	Philippines
Chile	Italy	Poland
Czechoslovakia	Japan	South Africa, Rep. of
France	Korea, Rep. of	USSR
Germany, F. R.	Mexico	

The member body of the following country expressed disapproval of the document on technical grounds :

United Kingdom

Aromatic hydrocarbons — Sampling

0 Introduction

This International Standard is one of a series dealing with the sampling, testing and specification of aromatic hydrocarbons.

As most aromatic hydrocarbons are similar to petroleum products, many of the sampling procedures used for the latter are equally applicable to the former. Hence, parts of the text in this International Standard are identical with that in ISO 3170, *Petroleum products — Liquid hydrocarbons — Manual sampling*. Similarly, as all aromatic hydrocarbons are flammable, and most of them are toxic, the relevant safety precautions described in ISO 3165, *Sampling of chemical products for industrial use — Safety in sampling*, have also been incorporated.

1 Scope and field of application

1.1 This International Standard specifies sampling procedures to be used for obtaining samples of liquid aromatic hydrocarbons from fixed tanks, railcars, road vehicles, barges and drums, or from liquids being pumped in pipelines.

1.2 The samples taken by the procedures specified are intended to be used to determine :

- a) quality;
- b) whether contaminants are present;
- c) the degree of homogeneity of a batch.

The information obtained may be used for either qualitative or quantitative assessment of the batch being sampled.

1.3 When a batch of materials is to be received or consigned, there are often the alternative possibilities of sampling from a tank or from a pipeline during the transfer operation.

Pipeline sampling, manual or automatic, as distinct from tank sampling, is generally used for the following reasons :

- a) when the contents of a tank are likely to suffer from a marked lack of homogeneity, including the presence of two layers with different densities;
- b) for monitoring material that is being pumped through a pipeline;

- c) for monitoring the performance of in-line blending systems, and for determining the properties of a batch of product being made with an in-line blending system.

It is often necessary to employ both tank and pipeline sampling covering particular operations.

1.4 Pipeline sampling may be manual or automatic.

For automatic pipeline sampling, reference should be made to ISO 3171.

Automatic procedures should be employed if there is a possibility that the liquid flowing through the pipeline is non-homogeneous.

2 References

ISO 2859, *Sampling procedures and tables for inspection by attributes*.

ISO 3171, *Petroleum products — Liquid hydrocarbons — Automatic pipeline sampling*.

3 Definitions

3.1 aromatic hydrocarbons : Benzene and its homologues, pure or commercially pure, isolated or in mixtures, and whether or not containing impurities in a substantial proportion, provided that the aromatic-type products predominate in the bulk of the product.

3.2 Terms related to samples

3.2.1 sample : One or more items taken from a population and intended to provide information on the population and possibly to serve as a basis for a decision on the population or on the process which had produced it.

3.2.2 representative sample : A sample assumed to have the same composition as the material sampled when the latter is considered as a homogeneous whole.

3.2.3 bulk sample; gross sample : The total material obtained by the sampling procedure.

3.2.4 spot sample : A sample of specified number or size taken from a specified place in the material or at a specified place and time in a stream of material and representative of its own immediate or local environment.

NOTE — In English, the term “snap sample” is sometimes used as a synonym of “spot sample”.

3.2.5 composite sample : A sample taken by combining representative samples from a number of tanks or containers in amounts proportional to the contents of each of the tanks or containers.

3.2.6 continuous sample : A sample taken continuously from a stream of material.

3.2.7 final sample : A sample obtained or prepared under the sampling plan for possible subdivision into identical portions for testing, reference or storage.

3.2.8 laboratory sample : A sample as prepared for sending to the laboratory and intended for inspection or testing.

3.2.9 test sample : A sample prepared from the laboratory sample and from which test portions will be taken.

3.3 Terms related to the statistics of sampling

3.3.1 true value : Value of a characteristic of the material perfectly defined in the conditions which exist at the moment when that characteristic is the subject of a determination.

It is an ideal value which could be arrived at only if all causes of measurement error could be eliminated.

3.3.2 average lot quality : The result that would theoretically be obtained by taking the average of results from a large number of laboratories, of replicate determinations of a characteristic, by the test method in question, made on replicate representative samples taken from the lot.

3.3.3 variability : The differences throughout the material in the value of a characteristic.

3.3.4 homogeneous material : Material is said to be homogeneous in relation to a given characteristic if the mean values of that characteristic for the different fractions which make up the material are, for that characteristic, within the limits of error for the measurement made to determine that characteristic.

NOTE — A distinction should be made between

- a) the *constitution heterogeneity*, which is due to difference in the composition between the different portions (for example the particles) constituting the material; and
- b) the *repartition heterogeneity*, which is due to differences in the localization of the different portions constituting the material. This heterogeneity disappears if the portions are mixed (it may then be transformed into constitution heterogeneity).

3.3.5 heterogeneous material : Material which is not homogeneous (see 3.3.4).

3.3.6 defect : Any non-compliance of a sampling unit with specified requirements for the value of a characteristic.

3.3.7 defective unit; defective item : A sampling unit containing one or more defects.

3.3.8 accuracy : The closeness of agreement between the true value and the mean of test results which would be obtained by carrying out determination of the characteristic a very large number of times.

NOTE — The smaller the systematic part of the experimental errors which affect the results, the more accurate is the determination.

3.3.9 precision : The closeness of agreement between the results obtained for a given characteristic by carrying out the determination several times under prescribed conditions.

NOTE — The smaller the random part of the experimental errors which affect the results, the more precise is the determination.

3.3.10 sampling error : That part of the total estimation error of a parameter due to the random nature of the sample.

4 General recommendations

4.1 The following recommendations apply to all sampling operations whatever the nature of the material being sampled. The operator should have :

- safe access to and from the place where the sample is taken, and
- a safe working place with adequate light and ventilation.

Sampling points in fixed installations should be arranged to satisfy these needs as well as any special conditions arising from the nature of the material being sampled. Precautions shall be taken against falls when the sample is withdrawn from the top of a tank or tank vehicle and against the collapse of stacked containers or solids in bulk.

4.2 The sampling operation shall be carried out in such a manner as not to prejudice the security of the bulk.

This applies particularly to the sampling of fluids through cocks where the seizure of the cock in an open position could lead to the escape of large quantities of the fluid. It is recommended that the devices used for such sampling be arranged so as to limit the total quantity drawn at any one time and to restrict the rate of flow to a convenient value.

It is reasonable to assume that spillages will occur and to provide both a drained trough and a tundish to trap spilt liquids safely and a permanent splash guard to protect the sampler.

Provision shall be made whenever possible for isolating the sampling point from the bulk or line by a valve near to, but not

immediately adjacent to, the sampling point so that in the event of an accident the flow may be controlled from a safe place.

In all cases it is part of the sampler's task to ensure satisfactory re-closure by appropriate personnel of all opened packages and sampling points.

4.3 When it is necessary to purge or rinse a sample container with the material to be sampled, and this material presents a hazard, then appropriate facilities shall be provided for the disposal of material used in purging. Vapours should be vented away from the vicinity of the sampler and other personnel.

4.4 The size of the sample and the frequency of sampling shall not be greater than are necessary for the examination proposed.

4.5 The sample in its container shall be carried in a suitable carrier designed and constructed to facilitate handling and to minimize the risk and consequences of breakage of the sample container.

4.6 The equipment, including all tools and containers, shall be compatible with the material being sampled and suitable for the intended purpose.

Samples shall be kept away from other chemical products liable to interact with them.

4.7 Before sampling, or as soon as possible, mark the container to indicate the nature of the material and the risks associated with it.

4.8 The person taking the sample shall be made fully aware of the nature of the hazards involved and the precautions to be taken. He shall be instructed in the use of all appliances provided for his safety, including fire extinguishers, protective goggles and clothing, etc. He shall be instructed to report to an appropriate supervisor before and after taking the sample and shall report, preferably to the same authority, any unusual happening or situation.

If toxic substances are being sampled, he shall be instructed that, in the event of feeling unwell, he should report immediately to his supervisor.

4.9 The sampler should be accompanied by a second person whose task is to ensure the safety of the sampler. During the sampling operation this observer shall remain well clear of the sampling point and observe the whole operation. He shall be given specific instructions as to the action he shall take in an emergency and such instructions should always require that he first raises an alarm and does not attempt a single-handed rescue, except in extreme circumstances.

4.10 These general recommendations and the specific ones which follow should be used as a guide to the precautions necessary in preparing all samples.

4.11 Eye protection equipment should be used continuously wherever there is contact with chemicals.

4.12 It is stressed that those directing the activities of samplers shall consider in detail the consequences of minor mishaps which may occur, such as spillage, failure of cocks, etc. The sampler shall be given specific instructions covering both the normal situation and what he must do in the event of mishaps. Equally important are the specific instructions to be given to the safety observer present when toxic materials are sampled (see 5.2).

5 Specific recommendations for hazardous materials

The physical and chemical properties of aromatic hydrocarbons are such that they can have a direct physiological effect or be such that, for example, fire or explosion risks are present. The degree of risk is extremely variable and only general guidance is possible. A general classification of risks is listed below together with the appropriate precautions which are additional to those given in 4.2.

Many materials present more than one hazard; for example benzene is toxic and flammable and its vapour forms an explosive mixture with air.

Further information on individual substances is given in the following publications :

- *Substances chimiques dangereuses et proposition concernant leur étiquetage*. Conseil de l'Europe (Sous-comité de la santé et sécurité industrielle) — (Section chimie), Strasbourg, 3^{ème} édition 1971.
- *Dangerous properties of industrial materials*, by N. Irving Sax. Published by Van Nostrand Reinhold Company.
- *Toxicity and metabolism of industrial solvents*, by Ethel Browning. Published by Elsevier.
- *Hazards in the chemical laboratory*, Ed. by G. D. Muir. Published by Royal Institute of Chemistry.
- *The care, handling and disposal of dangerous chemicals*, by P. J. Gaston. Published by the Institute of Science Technology.

The following types of hazard may be encountered :

- flammable substances (see 5.1);
- toxic substances (see 5.2).

5.1 Flammable substances

5.1.1 The sample container shall be closed so as to prevent loss of contents or evaporation.

5.1.2 The samples shall be protected from heat and shall be transported only in a carrier designed to retain the sample in the event of a breakage or a leakage.

5.1.3 All spillages should be reported and corrected as soon as possible. Spilt flammable liquids should not be allowed to