

Translated English of Chinese Standard: GB/T511-2010

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# GB

NATIONAL STANDARD OF THE  
PEOPLE'S REPUBLIC OF CHINA

ICS 75.080

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## GB/T 511-2010

### Replacing GB/T 511-1998

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## Petroleum, petroleum products and additives - Method for determination of mechanical admixtures

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**Issued on: September 2, 2010**

**Implemented on: December 1, 2010**

**Issued by: General Administration of Quality Supervision, Inspection and Quarantine;**

**Standardization Administration Committee.**

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## Foreword

This Standard modified and adopted the former Soviet Union standard TOCT 6370-1983 (1997) "Petroleum, petroleum products and additives - Method for determination of mechanical admixtures".

This Standard was re-drafted in accordance with TOCT 6370-1983 (1997).

This Standard modified TOCT 6370-1983 (1997) so as to make it suitable for the national conditions of China. The structural differences between this Standard and TOCT 6370-1983 (1997) are shown in Appendix A; and technical differences are shown in Appendix B. The main technical differences between this Standard and TOCT 6370-1983 (1997) are as follows:

- Added "Normative references" in this Standard;
- Made appropriate modifications to "equipment and materials" of TOCT 6370-1983 (1997) in Clause 4 "Equipment and materials", based on Chinese actual situation;
- TOCT 6370-1983 (1997) requires to use white or red card quantitative analysis filter paper, and white card filter paper is required in arbitration test; this Standard adopts quantitative filter paper of which the speed is moderate and diameter is 11 cm based on Chinese national conditions (GB/T 1914);
- Deleted 2.4 and 2.5 of TOCT 6370-1983 (1997), i.e., "Before filter paper or porous glass filter reaches to constant weight, it shall use the solvent used in the test to rinse in advance"; added 7.9 and blank test correction during calculation;
- Added notes in 7.4; made description of the processing of new porous glass filter and the cleaning after use;
- Added Appendix A "Comparison on clause number between this Standard and TOCT 6370-1983 (1997)" and Appendix B "Technical differences between this Standard and TOCT 6370-1983 (1997)".

This Standard replaces GB/T 511-1988 "Petroleum products and additives - Method for determination of mechanical admixtures (gravimetric method)" which was formulated by adopting TOCT 6370-59 "Petroleum products and additives - Method for determination of mechanical admixtures".

Compared with GB/T 511-1988, the main changes are as follows:

# Petroleum, petroleum products and additives - Method for determination of mechanical admixtures

## 1 Scope

This Standard specifies the method for determination of mechanical admixtures in petroleum, petroleum products and additives by using constant weight quantitative filter paper or porous glass filter to filter the sample.

This Standard is applicable to determination of mechanical admixtures in petroleum, petroleum products and additives.

This Standard is not applicable to lubricating grease and asphalt.

## 2 Normative references

The following standards contain the provisions which, through reference in this Standard, constitute the provisions of this Standard. For dated references, subsequent amendments (excluding corrections) or revisions do not apply to this Standard. However, the parties who enter into agreement based on this Standard are encouraged to investigate whether the latest versions of these documents are applicable. For undated reference documents, the latest versions apply to this Standard.

GB/T 1914 Chemical analytical filter paper

GB/T 6682 Water for analytical laboratory use - Specification and test methods (GB/T 6682-2008, ISO 3696:1987, MOD)

SH 0004 Solvent oil for rubber industrial use

## 3 Method summary

Weigh a certain amount of sample; dissolve it in the solvent used; use constant weight filter paper or porous glass filter to filter; the admixtures left on the filter paper or porous glass filter is the mechanical admixtures.

## 4 Apparatus

- 4.1 Beaker or wide-necked Erlenmeyer flask.
- 4.2 Weighing bottle.
- 4.3 Glass funnel.
- 4.4 Insulation funnel.
- 4.5 Washing bottle.
- 4.6 Glass rod.
- 4.7 Filtering flask.
- 4.8 Water bath or heating plate.
- 4.9 Vacuum pump or water pump: ensure the residual pressure is not greater than  $1.33 \times 10^3$  Pa.
- 4.10 Dryer.
- 4.11 Oven: can be heated to  $105^\circ\text{C} \pm 2^\circ\text{C}$ .
- 4.12 Infrared light bulb.
- 4.13 Porous glass filter: funnel type; P10 (aperture  $4\mu\text{m} \sim 10\mu\text{m}$ ); diameter: 40mm, 60mm and 90mm.
- 4.14 Analytical balance: sensitivity is 0.1mg.

## 5 Reagents and materials

### 5.1 Reagents

- 5.1.1 95% Ethanol: chemically pure.
- 5.1.2 Ether: chemically pure.
- 5.1.3 Toluene: chemically pure.
- 5.1.4 Ethanol-toluene mixed solvent: use 95% ethanol and toluene to prepare according to volume ratio 1:4.
- 5.1.5 Ethanol-ether mixed solvent: use 95% ethanol and ether to prepare according to volume ratio 4:1.

paper with solvent and make it completely close to the funnel wall. The height of poured solution shall not exceed 3/4 of filter paper or porous glass filter. After the first part of solution drains away, add the new part of the solution. Filtration rate shall be controlled to make filtrate in droplet-shape, not in thread-shape.

During hot filtration, it shall not make the filtered solution boiling. The heating of solvent oil solution must not exceed 40°C and the heating of toluene solution must not exceed 80°C.

Note 1: Before use, the new porous glass filter must be treated by chromic acid lotion. Then rinse it with distilled water. Place it in the drying oven for use. After the test ends, it shall be soaked in chromic acid lotion for 4h~5h before using distilled water to clean. Place it in the drying oven for use after drying.

Note 2: When dispute arises on determination results between porous glass filter and filter paper, the results determined by filter paper shall prevail.

**7.5** After the filtration, for filter paper with precipitate or porous glass filter, it shall use washing bottle, filled with solvent oil, which does not exceed 40°C, to clean till there is no sample traces on filter paper or porous glass filter and the filtered solvent must be completely transparent and colorless.

**7.5.1** When determining petroleum, dark petroleum products, lubricant with additive and mechanical admixtures in additives, it shall use toluene rinse filter paper which does not exceed 80°C or porous glass filter.

**7.5.2** When determining mechanical admixtures in additives and lubricating oil with additives, if there are residues which are insoluble in toluene and solvent oil in filter paper or porous glass filter, it shall use ethanol-toluene mixed solvent that has been heated to 60°C to rinse as a supplement.

**7.6** When determining mechanical admixtures in petroleum, additives and lubricating oil with additives, it shall allow to use hot distilled water to rinse the residues. For filter paper with precipitate or porous glass filter, after rinsing with solvent, dry it in the air for 10min~15min. Then use 200mL~300mL of distilled water which has been heated to 80°C to rinse. When determining mechanical admixtures in petroleum, it shall use hot water to rinse till there is no chloride in the filtrate. And use 0.1mol/L silver nitrate to inspect the existence of chloride. There shall be no chloride when filtrate is not turbid.

**7.7** After rinsing filter paper with precipitate or porous glass filter, place the filter paper with precipitate into the corresponding weighing bottles before filtration. Dry the open weighing bottle or porous glass filter in a 105°C±2°C oven for not less than 45min. Then cool it in the dryer for 30min (weighing bottle should be covered), weigh it and make it accurate to 0.0002g. Repeat drying process (the second drying only requires 30min) and weigh till the difference between two

the following provisions (confidence level is 95%).

**10.1** Repeatability: the difference between two test results determined consecutively to the same test sample in the same laboratory by the same operator via the same instrument shall not exceed the numbers stipulated in Table 2.

**10.2** Reproducibility: the difference between two single and independent test results determined to the same test sample in different laboratory by different operator via different instrument shall not exceed the numbers stipulated in Table 2.

**Table 2 Repeatability and reproducibility**

Mechanical admixtures (mass fraction) / %	Repeatability (mass fraction) / %	Reproducibility (mass fraction) / %
≤0.01	0.0025	0.005
>0.01~0.1	0.005	0.01
>0.1~1.0	0.01	0.02
>1.0	0.10	0.20

## Appendix A

(Informative)

### Comparison on clause number between this Standard and TOCT 6370-1983 (1997)

Table A.1 lists out the comparison on clause number between this Standard and TOCT 6370-1983 (1997).

**Table A.1 Comparison on clause number between this Standard and TOCT 6370-1983 (1997)**

Clause No. of this Standard	Clause No. of TOCT 6370-1983 (1997)
1	Foreword
2	-
3	Foreword
4	1
5	1
6	2
7	3
8	4
9	4
10	4
Appendix A	-
Appendix B	-



		glass filter but conduct blank test correction at the same time. After comparing the results of test methods, the content of mechanical admixtures are all within the range of repeatability.
5	Add notes in 7.4 and make description of the processing of new porous glass filter and the cleaning after use;	Continue to use the previous standard GB/T 511-1988.
6	Appendix A	According to rules for drafting of Chinese standard
7	Appendix B	According to rules for drafting of Chinese standard
Note: The contents not listed out in the table of this Standard are same with the ones in TOCT 6370-1983 (1997).		

————— **END** —————

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