

KES

Analysis of Hydro Carbon Composition for LPG

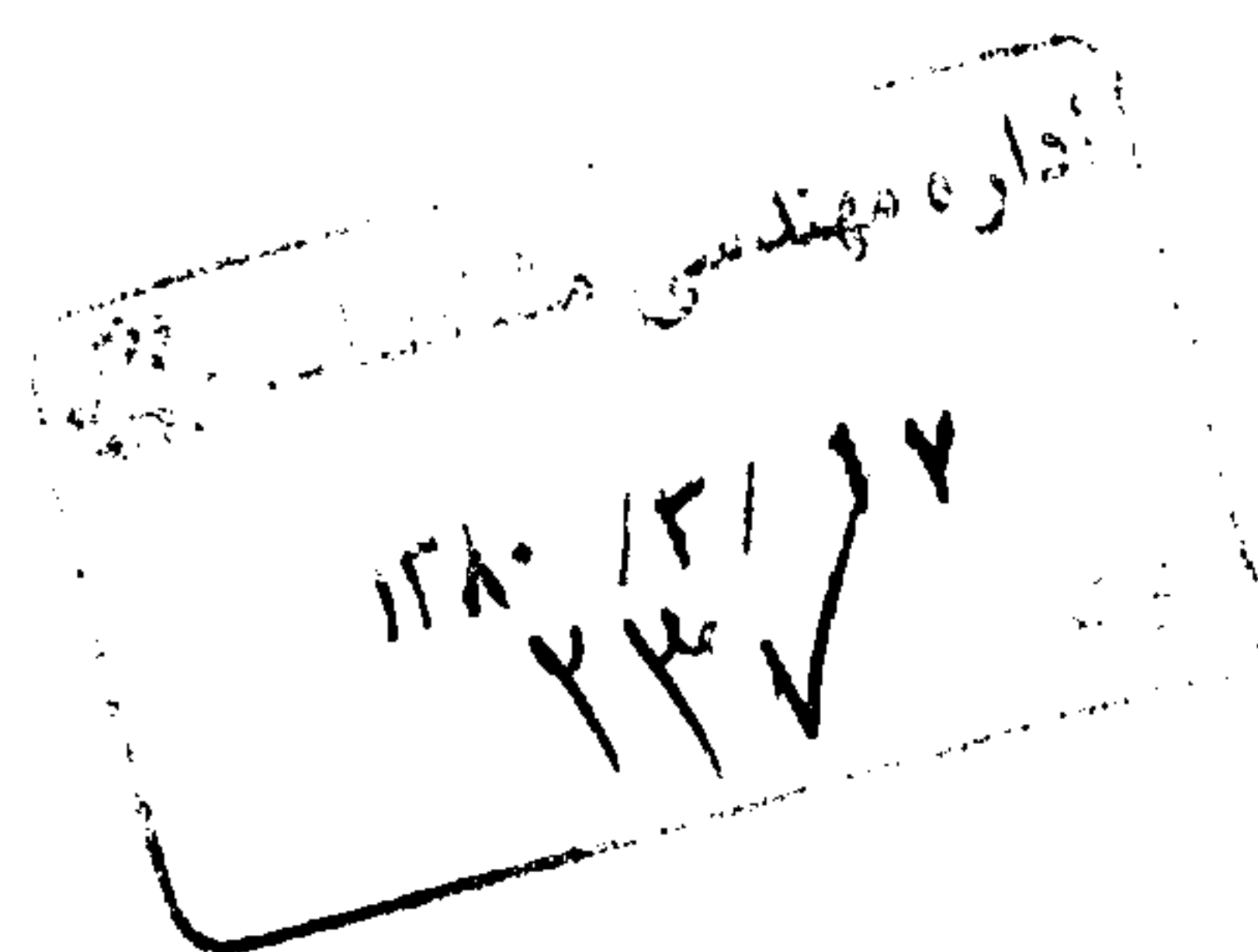
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Additional Rule



1. Scope of Application

This standard shall specify the method to measure each composition of ethane, ethylene (or compound quantity of ethane & ethylene), propane, propylene, isobutene, n-butane, iso butane, 1 – butane (or compound quantity of iso butane & 1 – butane), trans 2 – butane, cis 2 – butane, 1, 3 – butadiene, isopentane and n-pentane among C2 ~ C5 hydrocarbon containing more than 0.1% of LPG by chromatography.

Note : When you measure compound quantity of ethane & ethylene, propane, propylene and 1, 3 – butadiene, you should use the gas chromatography that is approved by Japan LPG Plant Association and the analysis is performed with respect to the standard of gas chromatography for LPG of the same association.

2. Meaning of Terminology

Start Mark

In order to clarify the moment of sending the specimen to separation plate on the record paper, a perpendicular line is drawn at the position of the moment on the time axis (or base line) by recording pen with sending the specimen simultaneously. With considering this line (Start mark) as a starting point, preserving time of each peak on the chromatogram is measured.

3. Summary of Analyzing Method

Liquid specimen is transformed to homogeneous gas specimen. Some portion is sent to the adjusted gas chromatography to specifications and disassembled to each composition of hydrocarbon. Then, the chromatogram is recorded.

Each peak on the chromatogram is measured by the preserving time and inserted quantity of each material is obtained by the area percentage on the area of each peak.

4. Gas Chromatography and Carrier Gas

4.1 Gas chromatography

It is composed of main parts as follows

4.1.1 Inlet & outlet of specimen

0.5 ~ 3 ml of measuring pipe for liquid specimen is attached to the inlet & outlet of specimen. The structure of measuring pipe is able to send the fixed amount of taken liquid specimen to the separation pipe by changing the pathway.

4.1.2 Separation pipe

It is a pipe with longer than 4m of length and 3 ~ 6 mm of inner diameter. It is charged by the charging material specified on 5, 1.

4.1.3 Detector

Heat transfer cell is applied.

4.1.4 Recorder

Use the one, which is specified on the following.

Full Scale	:	Less than 2 mV
Effective area of record paper	:	Greater than 150 mm
Fan speed	:	Full scale within 3 seconds
Sending & receiving speed of record paper	:	Greater than 10 mm/min Use the one that can accelerate appropriately.

4.1.5 Attenuator (Sensitivity transducer)

(1) Detector

The attenuator is located between output side of indication voltage and input side of recorder. The attenuator should be able to attenuate gradually the indication voltage of detector with appropriate attenuating ratio. The maximum attenuating ratio should be more than 50 : 1 and attenuating accuracy of each plate should be within 0.5%.

Note : Gas chromatography is normally included in the main body or recorder.

4.2 Carrier gas

Use the helium with more than 99.8% of purity or charged one at bomb by hydrogen.

5. Charge Material of Separating Pipe and Charging Method

5.1 Charge material of separating pipe

Group (Composed of diatomite, fire resisting brick or active alumina) within 149 ~ 590 μ of softness⁽¹⁾ or various fixed liquids on table 1 are applied. Other than these, the satisfied ones to the objective of analysis are allowable.

Table 1 Fixed Liquid⁽²⁾

Fixed Liquid	Requirement of Separation Pipe		Remark
	Length (m)	Range of applied Temperature (° C)	
Maleic acid di n-Buthyl	4 ~ 8	0 ~ 40	It is difficult to separate Sys 2-butane and 1,3-butadian.
Maleic acid di n-Buthyl 95% β, β` - Oxy di propenitrile 5% } Com-Pounds	4 ~ 8	0 ~ 40	It is appropriate for normal specimen.
Succinic acid di isopropyl	6 ~ 8	0 ~ 30	
De metal Sulfuric acid ⁽³⁾	4 ~ 8	0 ~ 40	It is appropriate for the specimen having propane as main material.
Benthyltianite67% Nitric acid silver 33% } Com-pounds	8 ~ 10	0 ~ 30	It is appropriate for the specimen having butane, butane as main material.

Note⁽¹⁾ : Softness of the group is selected with respect to the inner diameter of the applied separation pipe as follows.

If the inner diameter of separation pipe is 3 mm, 149 ~ 177 μ is applied.

If the inner diameter of separation pipe is 4 mm, 177 ~ 250 μ is applied.

If the inner diameter of separation pipe is 5 ~ 6 mm, 250 ~ 590 μ is applied.

(²) Use the best quality product in the market.

Silicon soil, heat resisting brick or materials made of these are applied as a group for other case than De metal Sulfuric acid.

(³) The alumina, which is treated elastically at 450 ~ 500° C for 5 hours, is applied as a group.

5.2 Manufacturing method of charging material

(1) The group (⁴), which corresponds at least 1.2 times of the volume for the applied separation pipe, is taken to 300 ~ 500 ml of beaker or flask. The weight of group is measured up to 1g.

Note (⁴) The heat resisting brick type of group is treated by chloric acid or nitric acid and is cleaned & dried with water until it turns to neutral.

(2) For 100 of the group, 20 ~ 30 of fixed liquid is taken to the beaker and measured up to 0.1g. Appropriate organic solvent(⁵), which has an identical volume to the group, is added to this and dissolved.

Note (⁵) High quality reagent, which can easily dissolve ethyl ether, benzene, methanol or 4-chloric carbon.

Remark : Among heat resisting brick type and silicon soil type of group, normally appearing specific gravity of 1st one is the greater.

Therefore, the weight ratio of group to fixed liquid for the heat resisting brick type is 100 : 20 ~ 25 and for silicon soil type is 100 : 30 ~ 35.