

## Thermo. Titr. Application Note No. H-025

**Title:** Determination of Moisture in Lubricating Oils by DMP

**Scope:** Determination of water in automotive lubricating oils.

**Principle:** Titration with acid-catalysed 2,2-dimethoxypropane (DMP) to an endothermic endpoint. Water reacts endothermically with DMP to form acetone and methanol.

**Reagents:** Titrant: 2mol/L 2,2-dimethoxypropane (DMP) in dry (HPLC grade) cyclohexane [DMP data: FW = 104.15, d = 0.847, purity = 98%]. Dilute 250mL DMP to 1000mL with cyclohexane in a volumetric flask

Methane sulfonic acid  
Cyclohexane, dry (HPLC grade)  
Propan-2-ol, dry (HPLC grade)

**Method:** Basic Experimental Parameters:

Data rate (per second)	10
Titrant delivery rate (mL/min.)	2
No. of exothermic endpoints	1
Data smoothing factor	75

Procedure: Weigh accurately approximately 5-10g motor oil into a clean, dry 140mL polypropylene titration vessel. Deliver 15mL dry cyclohexane or from a bulb pipette into the vessel, plus 10mL dry propan-2-ol, together with 250 $\mu$ L methyl sulphonic acid. Titrate with 2M 2,2-dimethoxypropane in cyclohexane to an endothermic endpoint.

Determine the system blank by titrating a mixture of 15mL of the same cyclohexane or turpentine and 10 of the same propan-2-ol to which has been added 250 $\mu$ L methane sulfonic acid.

<b>Results:</b>		Moisture in new and old automotive lubricating oils		
	<b>Sample</b>	<b>Mass</b>	<b>Titre</b>	<b>% H<sub>2</sub>O</b>
	New oil	8.9262	0.598	0.12
		4.5726	0.442	0.12
		4.2996	0.425	0.11
	<b>Mean</b>			<b>0.12</b>
	Old oil (after 5,000km)	4.6554	0.453	0.12
		4.8841	0.459	0.12
		4.5209	0.431	0.11
	<b>Mean</b>			<b>0.12</b>

<b>Calculation:</b>	
	$\% H_2O = \frac{((Titre - blank) \times FW H_2O \times M DMP \times 100)}{(sample\ mass \times 1000)}$
	$\% H_2O = \frac{((0.453 - 0.296) \times 18.015 \times 1.9925 \times 100)}{(4.6554 \times 1000)}$

