

## Thermo. Titr. Application Note No. H-001

<b>Title:</b>	<b>Determination of TAN in Oils</b>								
<b>Scope:</b>	Determination of Total Acid Number (TAN) values in mineral oils and similar fluids.								
<b>Principle:</b>	Dissolve oil sample in mixture of toluene and propan-2-ol, add paraformaldehyde and titrate with 0.1M KOH in propan-2-ol. The endpoint is indicated by a strongly endothermic response caused by the base-catalyzed depolymerization of paraformaldehyde.								
<b>Reagents:</b>	0.1 mol/L KOH in iso-propanol (standardized) 50% A.R. toluene : 50% A.R. propan-2-ol by volume A.R. paraformaldehyde fine powder (eg, Sigma-Aldrich cat. no. 158127)								
<b>Method:</b>	<p>Basic Experimental Parameters:</p> <table><tr><td>Data rate (per second)</td><td>20</td></tr><tr><td>Titration delivery rate (mL/min.)</td><td>1</td></tr><tr><td>No. of endothermic endpoints</td><td>1</td></tr><tr><td>Data smoothing factor</td><td>50</td></tr></table> <p>Procedure:</p> <p>Weigh accurately approximately 0.5 – 2 mL oil in a clean dry titration vessel (the aim is to obtain a titre of approx. 1 mL KOH). Add 30 mL of toluene/propan-2-ol mixture. Add ~0.5-0.6g paraformaldehyde (a level 1/8<sup>th</sup> kitchen teaspoon measure is ~0.5g). Titrate to an inflection characterized by a sudden reduction in temperature.</p>	Data rate (per second)	20	Titration delivery rate (mL/min.)	1	No. of endothermic endpoints	1	Data smoothing factor	50
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Titration delivery rate (mL/min.)	1								
No. of endothermic endpoints	1								
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**Results:** Analysis of a heavy vehicle hydraulic oil:

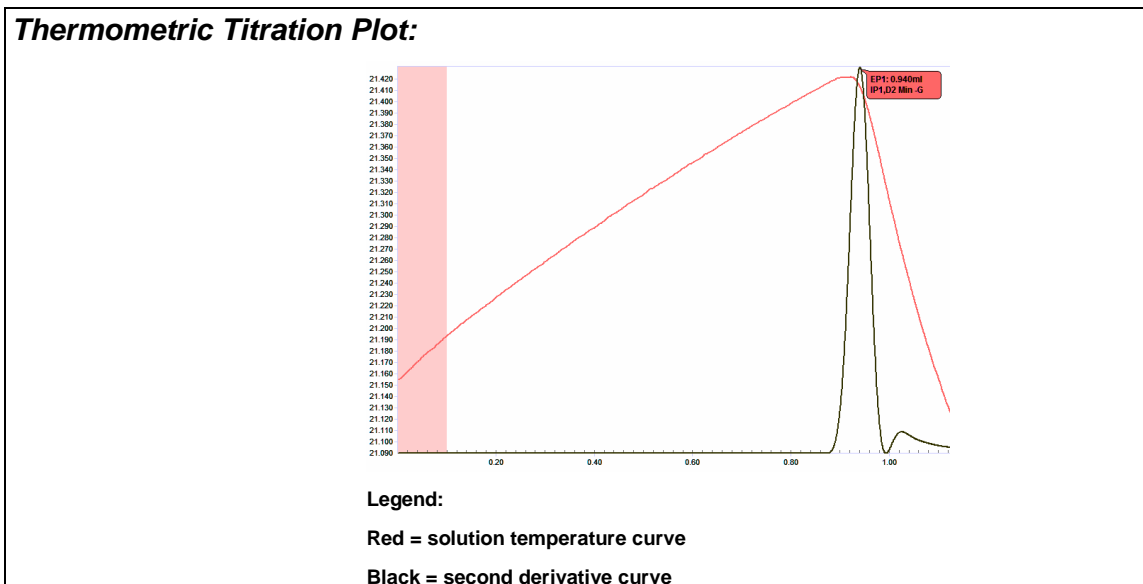
Sample Mass, g	mL 0.1 mol/L KOH	TAN mg KOH/g sample
1.7447	0.875	2.60
1.8842	0.940	2.60
1.9237	0.960	2.61
1.8487	0.924	2.60
1.8494	0.924	2.60
1.4029	0.718	2.60
0.9727	0.519	2.60
0.5049	0.304	2.60
	Average	2.60
	Standard Deviation	0.002

**Calculation:**

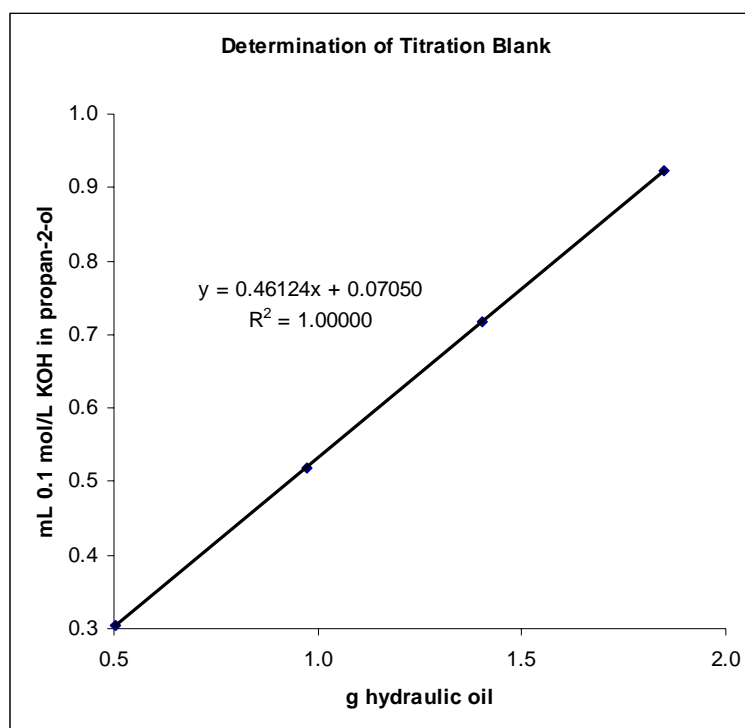
TAN = mg KOH / g oil

$$\therefore \text{TAN} = \frac{(\text{titre, mL} - \text{blank, mL}) \times \text{MKOH} \times \text{FWKOH}}{\text{sample mass, g}}$$

Example:

$$\text{TAN} = \frac{(0.940 - 0.071) \times 0.1006 \times 56.11}{1.8842} = 2.60$$


**Determination of titration blank or offset:**



Titration blank or offset = y-intercept = 0.0705 mL (which is to be subtracted from each titre)