



## Application Note AN-T-206

# Bromine index of petroleum-based hydrocarbons

Environmentally beneficial determination based on ASTM D2710 and IP 299

The bromine index is an important parameter for the determination of aliphatic C=C double bonds in petroleum hydrocarbons. Bromine is generated in-situ from a solution of bromide and bromate, and the bromine index is determined by an electrochemical titration at 5 °C. For the titration, a solvent mixture of

glacial acetic acid, methanol, and dichloromethane is usually used.

In this Application Note, the chlorinated solvent in the solvent mixture was replaced with toluene, resulting in a more environmentally beneficial method in comparison to ASTM D2710 and IP 299.

## SAMPLE AND SAMPLE PREPARATION

This application is demonstrated on heptane and

cyclohexene, respectively.



## EXPERIMENTAL

The analysis is carried out on an OMNIS Advanced Titrator equipped with a double Pt wire electrode.

Before the sample is determination is determined, a blank determination is performed.

An appropriate amount of sample and solvent mixture consisting of glacial acetic acid, methanol, and toluene are added into the titration vessel. While stirring, the solution is cooled below 5 °C. The solution is then titrated with a solution of potassium bromide and potassium bromate until after the equivalent point is reached.



**Figure 1.** OMNIS Advanced Titrator equipped with a double Pt wire electrode for the determination of the bromine index.

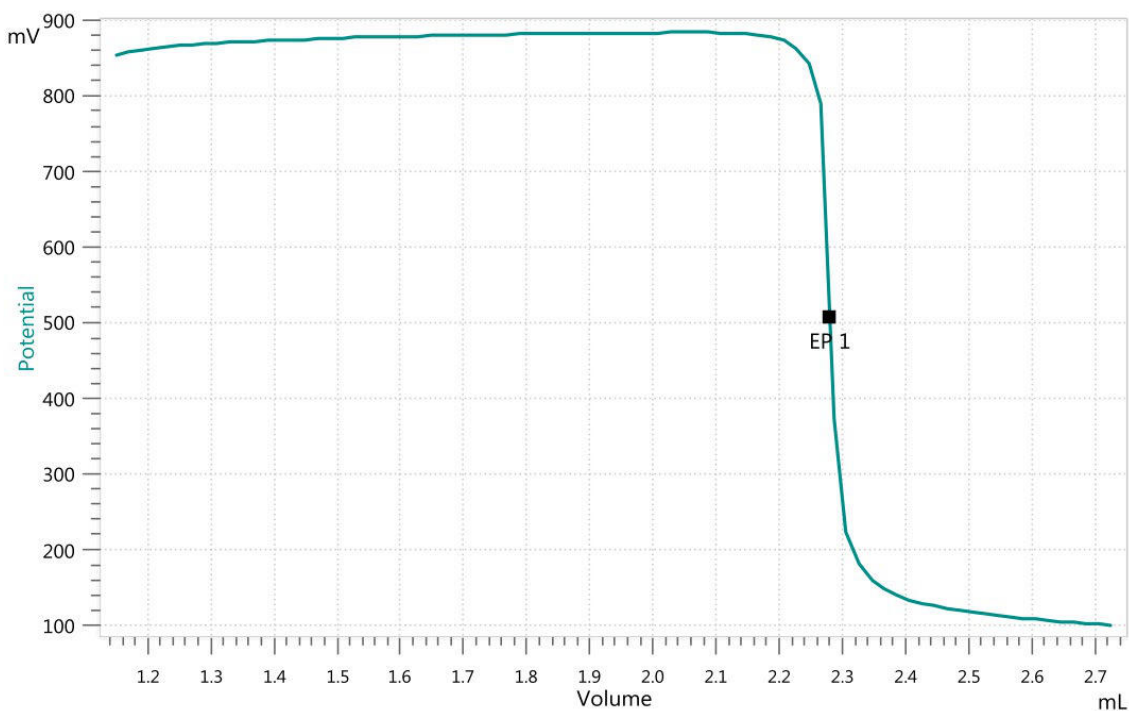
## RESULTS

Well-defined, steep titration curves are obtained for both samples. In addition, low relative standard

deviations below 1% are achieved. The results are displayed in **Table 1**.

**Table 1.** Results of the bromine index determination in heptane and cyclohexene.

| Bromine index (n = 6)        | Heptane in mg/100 g sample | Cyclohexene in mg/100 g sample |
|------------------------------|----------------------------|--------------------------------|
| Mean                         | 0.66                       | 90.61                          |
| SD(abs) / (mg/ 100 g sample) | 0.003                      | 0.63                           |
| SD(rel) / (%)                | 0.4                        | 0.7                            |



**Figure 2.** Example titration curve of the bromine index determination in cyclohexene.

## CONCLUSION

Titration is an inexpensive method, allowing precise and reliable determinations of the bromine index of petroleum hydrocarbons based on **ASTM D2710** and **IP 299**. The replacement of dichloromethane with toluene provides an environmentally friendly

alternative for the analysis.

Using an OMNIS Titrator allows you to customize the system according to your needs and expand it for other titration applications.

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