TraCInvent AS

Tracers for authentication of oil-based products and polymers

For
polymers, lubrication oils, oil-based paint,
perfume oils and other oil-based products

Concept of using Tracer Technology for Authentication of Oil Products

- In the concept of using oil soluble tracers for authentication of oil products and polymers the oil soluble tracers are added to the oil product or polymer during the production process
- The oil product or polymer can be marked with various concentration ratios of tracers unique for each product or batch. In this way the product or batch can easily be identified by performing a chemical analysis
- Tracers added at a level as low as 1 part per billion or 1 mg per cubic meter can be detected in the oil or polymer
- Two families of oil soluble tracers have been developed, one for use in lubrication or other oil products, and one for polymers
- More than 10 different tracers from each family are available
- The tracers can be analyzed by applying robust and relatively uncomplicated analytical instrumentation and methodology

- Addition of the tracers at the extremely low level applied will not have any significant effect on the physical or chemical properties of the product
- Because of the low concentration level the tracer cost will be negligible
- The described technology can be used to disclose cases were pirate products have been exchanged with the original quality product. It can also be useful in cases where it is important to verify that the correct type of product has been applied, for instance the correct lubrication oil product
- For polymer products that have limited durability it can be important to tag the product with tracers so that the batch number and production date can be identified
- A producer of articles made of a polymer may also be interested in tagging their products with tracers so that pirate products can be disclosed

- The tracers are chemically and thermally stable compounds that can withstand high temperatures
- Such tracers have been synthesized by Tracinvent AS and methods for analyzing the tracers at extremely low levels have been developed
- Figure 1 shows a plot from analysis of 9 different tracers for oil products at a concentration of 1 ng/ml (1ppb).
- The technology was tested for tracing engine lubrication oil of a car diesel engine. In the experiment where one tracer was applied, the tracer concentration in the engine oil was only reduced to about half of the starting level after driving 10000 km (Figure 2)
- In Figure 3 chromatograms from analysis of two tracers extracted from a polymer containing the tracers at 100 ng/g level. A chromatogram showing separation of 8 different tracers for use in polymers is also shown
- More information about the technology can be obtained by contacting TracInvent AS on e-mail h.stray@online.no

Plot from analysis of 9 oil tracers at 1ng/ml concentration

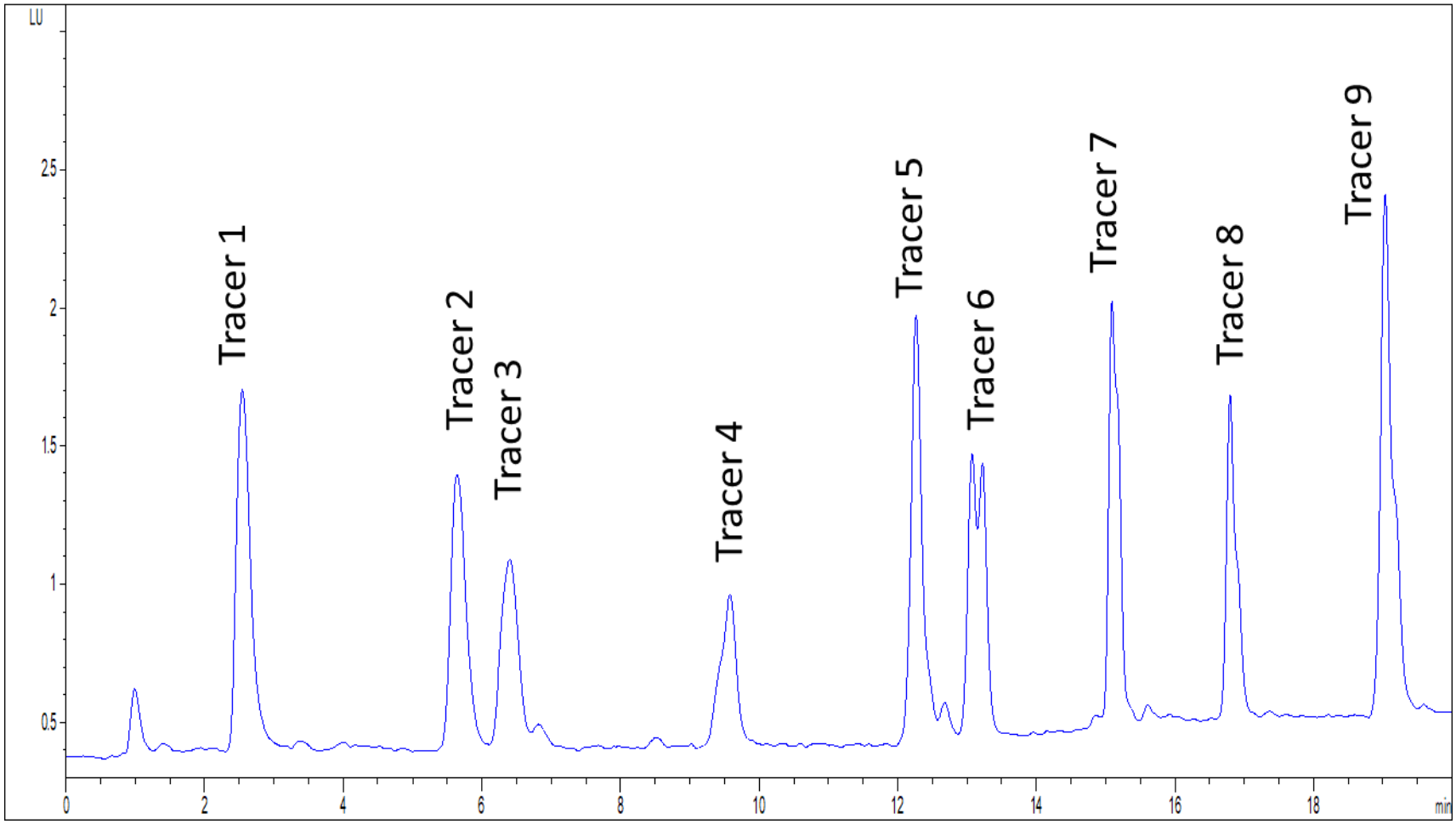


Figure 1

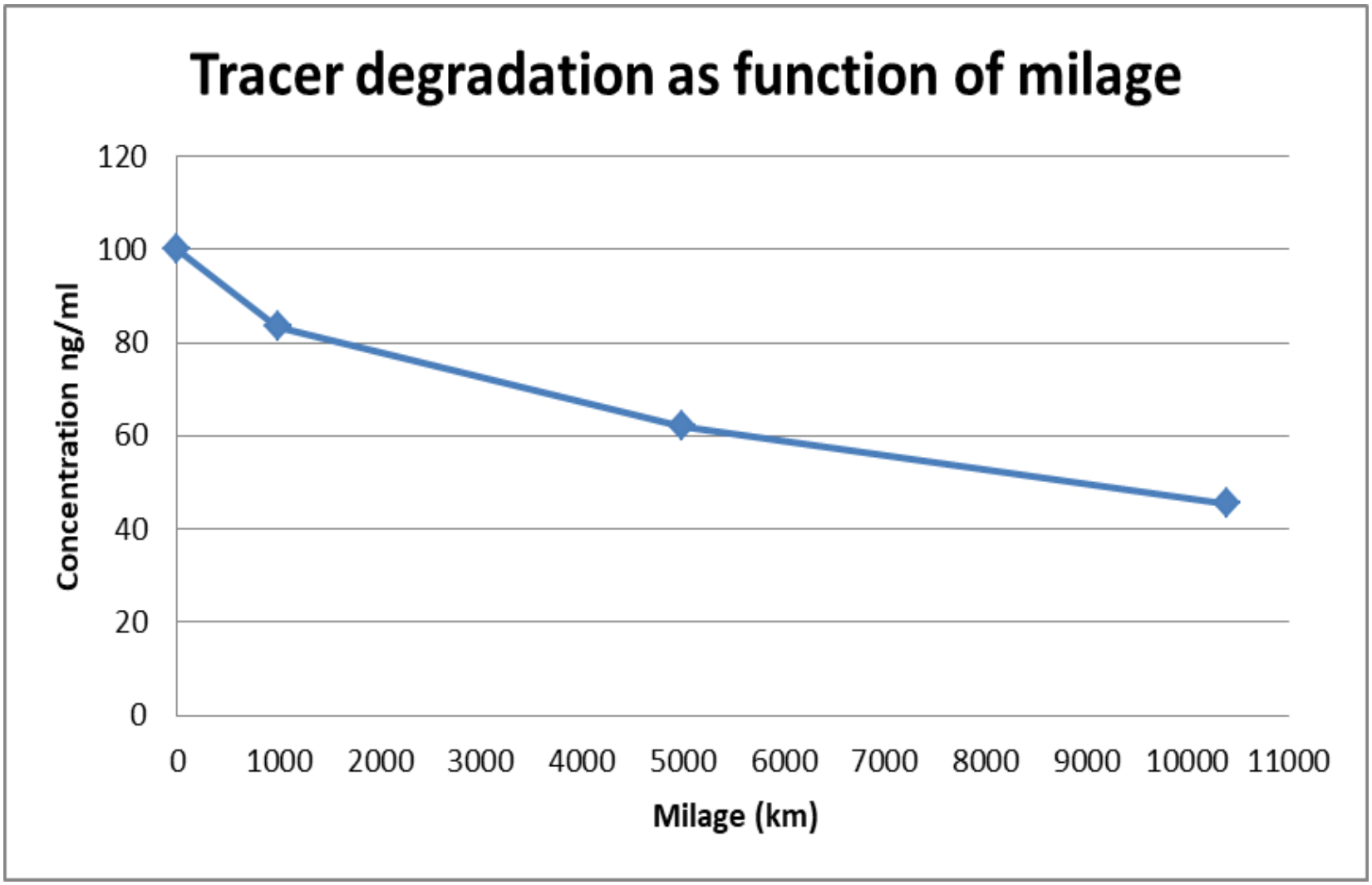
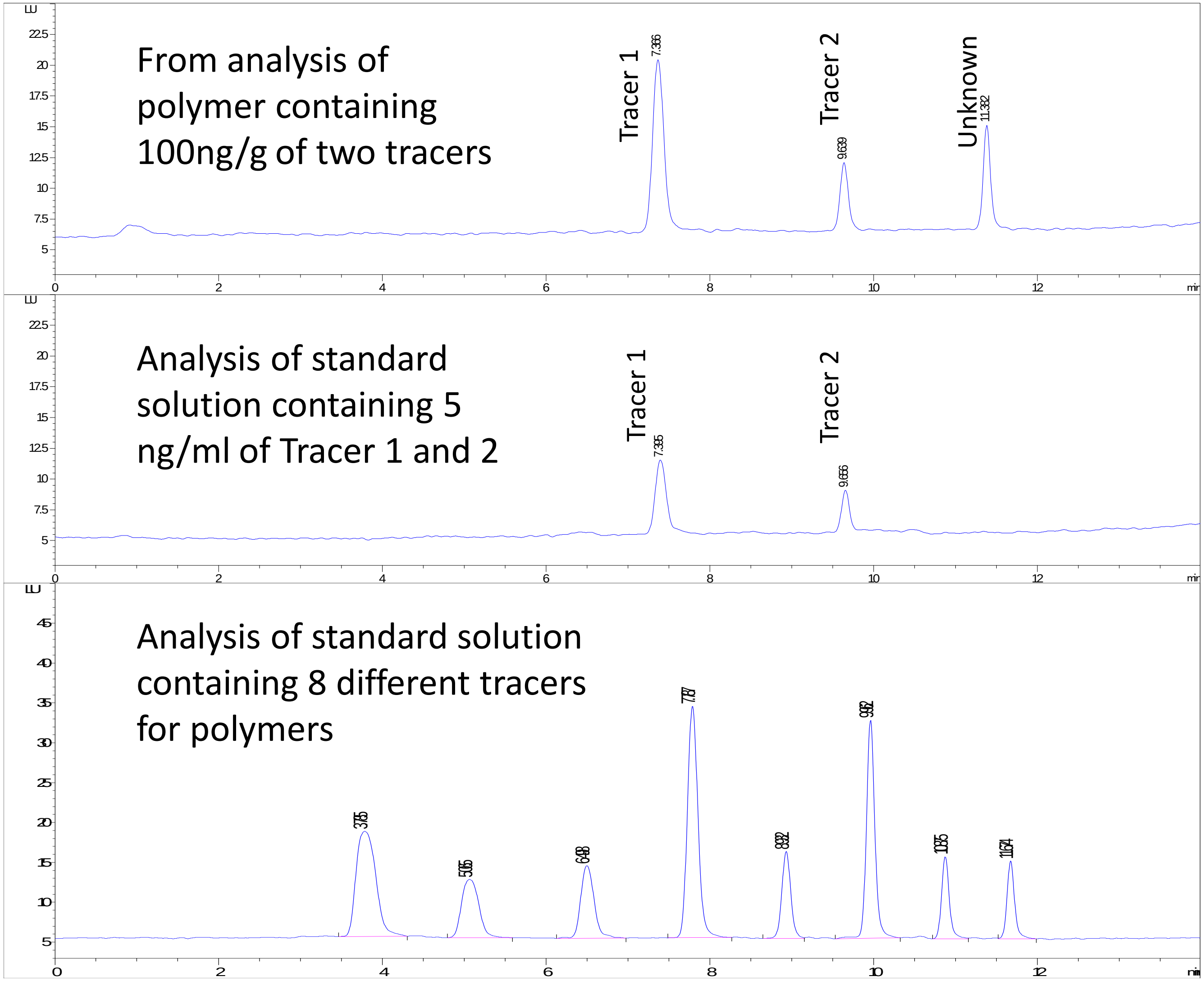

Tracer degradation as function of milage
120
100
80
60
40
20
0
Concentration ng/ml
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
11000
Milage (km)

Figure 2



From analysis of polymer containing 100ng/g of two tracers
Tracer 1
Tracer 2
Unknown
7.366
9.639
11.382
Analysis of standard solution containing 5 ng/ml of Tracer 1 and 2
Tracer 1
Tracer 2
7.395
9.656
Analysis of standard solution containing 8 different tracers for polymers

Figure 3