

Bituminous Solvent Summary Notice

Due to potential health and environmental impact from using chlorinated hydrocarbon solvents, the FHWA Central Federal Lands Highway Division's Central Laboratory sought alternative solvents for laboratory work in 1998. Eight solvents were initially considered resulting in Ensolv being adopted for cleaning and solvent extraction of asphalt from bituminous mixtures. Profile evaluations of Ensolv, the extract of asphalt and Ensolv resulting from reflux extraction, and still bottoms resulting from recycling the extract by distillation show these materials to not be a hazardous waste. The as delivered solvent, and solvent reclaimed by distillation has been found to be effective as a degreaser, cleaning solvent, and for use in reflux extractions of paving grade asphalts from paving mixtures.

Comparative testing for asphalt content and sieve analysis of remaining mineral matter using Ensolv; 1, 1, 1 trichloroethane (TCA), and the ignition furnace was completed. Test results were evaluated at the 95 percent confidence interval using the paired t-test, and F-ratio to compare the three methods using their mean values and standard deviations. By comparing calculated F-values to critical F-values, and comparing calculated paired t-values to critical t-values, there were no differences in test results for asphalt content and material passing the 1-inch, 3/4-inch, 1/2-inch, 3/8-inch, No. 4, No. 30, No. 40, No. 50, or No. 200 sieves.

This analysis show the reflux extraction using Ensolv results in the same answers for asphalt content and gradation as using TCA as a solvent or using the ignition furnace test procedures. Total test time for asphalt content and sieve analysis was found to be approximately two hours faster with Ensolv as compared to using the TCA solvent. Solubility of asphalt (AASHTO T 44) from two samples showed the results to be 99.96 percent and 99.99 percent compared with 157 other laboratories. The mean value of all 157 laboratories was 99.965 and 99.972 percent respectively. For cleaning, Ensolv was found to:

- Leave no residue.
- Excellent cleaner.
- Odor strong but not objectionable.
- Surface not slick when wet.
- High evaporative rate.

For more information on the use of Ensolv by the CFLHD Central Laboratory, write:

Materials Engineer
CFLHD
P. O. Box 25246
Denver, CO 80225