OBJECTIVE: Improve compliance with the PC10 D874 ash specification

June 21, 2005
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Concern

- **Poor precision of D874 creates significant problems**

- **Current definition of compliance does not account for test reproducibility**

- **Need to define a method to determine SAsh that accounts for test reproducibility problems**

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D874 Precision

average of determinations	repeatibility	reproducibility
0.1	0.01	0.03
0.2	0.02	0.04
0.3	0.02	0.06
0.4	0.03	0.07
0.5	0.04	0.08
0.6	0.04	0.10
0.7	0.05	0.11
0.8	0.05	**0.12**
0.9	0.06	**0.13**
1.0	0.06	**0.14**
1.1	0.06	**0.15**
1.2	0.07	**0.16**
1.3	0.07	0.17
1.4	0.08	0.18
1.5	0.08	0.19
1.6	0.09	0.20
1.7	0.09	0.21
1.8	0.09	0.22
1.9	0.10	0.23
2.0	0.10	0.24

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Limitations of D874 method

5.2 Because of above inter-element interferences, experimentally obtained sulfated ash values may differ from sulfated ash values calculated from elemental analysis. The formation of such non-sulfated species is dependent on the temperature of ashing, time ashed, and the composition of metal compounds present in oils. Hence, sulfated ash requirement generally should not be used in product specifications without a clear understanding between a buyer and a seller of the unreliability of an ash value as an indicator of the total metallic compound content.[6]

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Consequences of Poor D874 Precision

- To ensure compliance with 1.0% maximum ash per ASTM D3244:

  - a blend plant would need to set their maximum specification to ~ 0.86% ash, resulting in serious compromise to TBN retention and drain interval performance

- Heightens risk resulting from bias among labs

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PROPOSAL:

Establish ASTM work group to develop and validate technical basis and procedures for:

1) Robust qualification of <u>DI pack</u> ash level (not to exceed 1.0) using replicated "bias-free" D874 ash determination

2) Use of ICP-AA metals (D5185) as metric for <u>finished oil compliance</u>.

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R^2 = 0.92

SULFASH

Predicted SULFASH

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