

Simple HPLC Analysis for Sudan Dyes

Monitor Sudan I, II, III, and IV in a Single, Isocratic Analysis

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- Ultra Aqueous C18 HPLC column separates the four Sudan dyes in 20 minutes.
- Simple methanol and water mobile phase; two wavelengths detect all four dyes.
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Sudan dyes are synthetic industrial azo-dyes traditionally used in waxes, plastics, oils, and polishes. Although recognized as carcinogens, Sudan dyes recently have been found in food products in some European countries. They are added to foods such as chili powders to mimic, intensify, and prolong the appearance of natural red hues. In the UK, more than six hundred products containing Sudan dyes have been recalled, the largest food recall in British history.¹

Sudan dyes are categorized as Class 3 carcinogens by the International Agency for Research on Cancer (IARC) and, therefore, are illegal as food additives according to both the FDA and the EU. The European Commission requires products to have documentation confirming the absence of Sudan dyes.^{2,3} Since 2003, European nations have required random product testing and testing of suspected adulterated products. Items found to contain Sudan dyes must be disposed of as hazardous waste.⁴

Laboratories performing analyses for Sudan dyes are not required to follow defined methods. The EU has set detection limits at 0.5-1 mg/kg, and any food material containing more than the limit should be withdrawn from the market.¹ Here, we describe a simple reversed phase HPLC separation of Sudan I, Sudan II, Sudan III, and Sudan IV (Scarlet Red).

We prepared 1mg/mL stock solutions of Sudan I or Sudan II in HPLC grade methanol, and equivalent solutions of Sudan III or Sudan IV in ethyl acetate. To avoid reductive cleavage, we stored the stock solutions at 4°C in foil-wrapped containers. We prepared sample solutions by combining the four stock solutions and diluting with methanol to 20µg/mL each dye. We used a 150 x 4.6mm Ultra Aqueous C18 HPLC column (cat.# 9178565) for the analysis.

Results

Figure 1 shows the Ultra Aqueous C18 column separates the four dyes in approximately 20 minutes. Sudan I can be detected at 476nm or 418nm, Sudan II at 493nm or 604nm, Sudan III at 508nm to 512nm, and Sudan IV at 357nm or 520nm. For each dye except Sudan III, we observed the higher response at the first listed wavelength; for Sudan III there was little difference. The dyes can be detected by monitoring at 488nm for Sudan I and II and at 520nm for Sudan III and IV, allowing all four dyes to be detected with a fixed dual wavelength instrument.

This method is simple, yet efficient, requiring only a simple mobile phase, isocratic elution, and detection at two wavelengths. The Ultra Aqueous C18 column provides the selectivity needed to assure the separation.

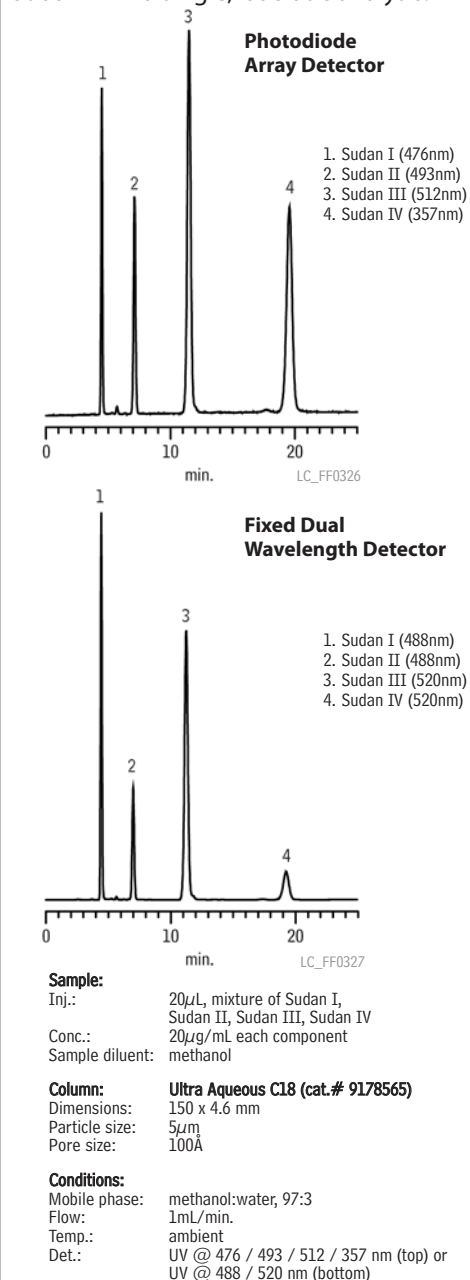
References

1. http://www.ift.org/news_bin/news/newsBody.shtml
2. Commission Decision of 20 June 2003 on emergency measures regarding hot chili and hot chili products, notified under document number C(2003) 1970, (2003/460/EC), OJ L. 154/114, 21.6.2003.
3. Implementation of Commission Decision 2003/460/EC of 21 January 2004.
4. <http://www.food.gov.uk/foodindustry/guidancenotes/foodguid/sudanguidance>

for more info

For other column dimensions, please refer to our catalog, or visit our website.

Figure 1 Monitor Sudan I, II, III and Sudan IV in a single, isocratic analysis.



Ultra Aqueous C18 Column (USP L1)

5µm Column, 4.6mm
150mm

cat. #
9178565