

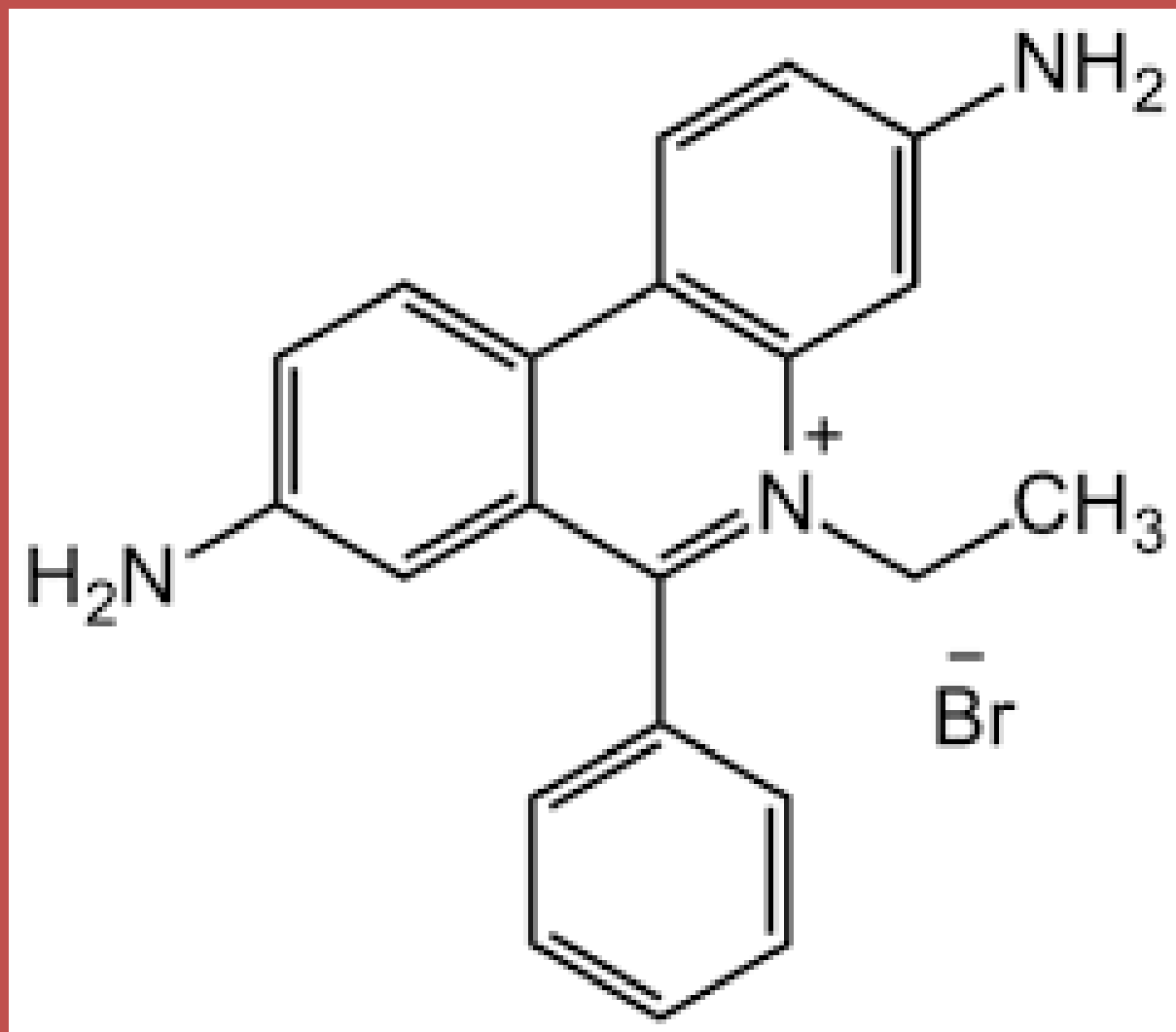
Looking for an alternative to Ethidium Bromide

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Introduction

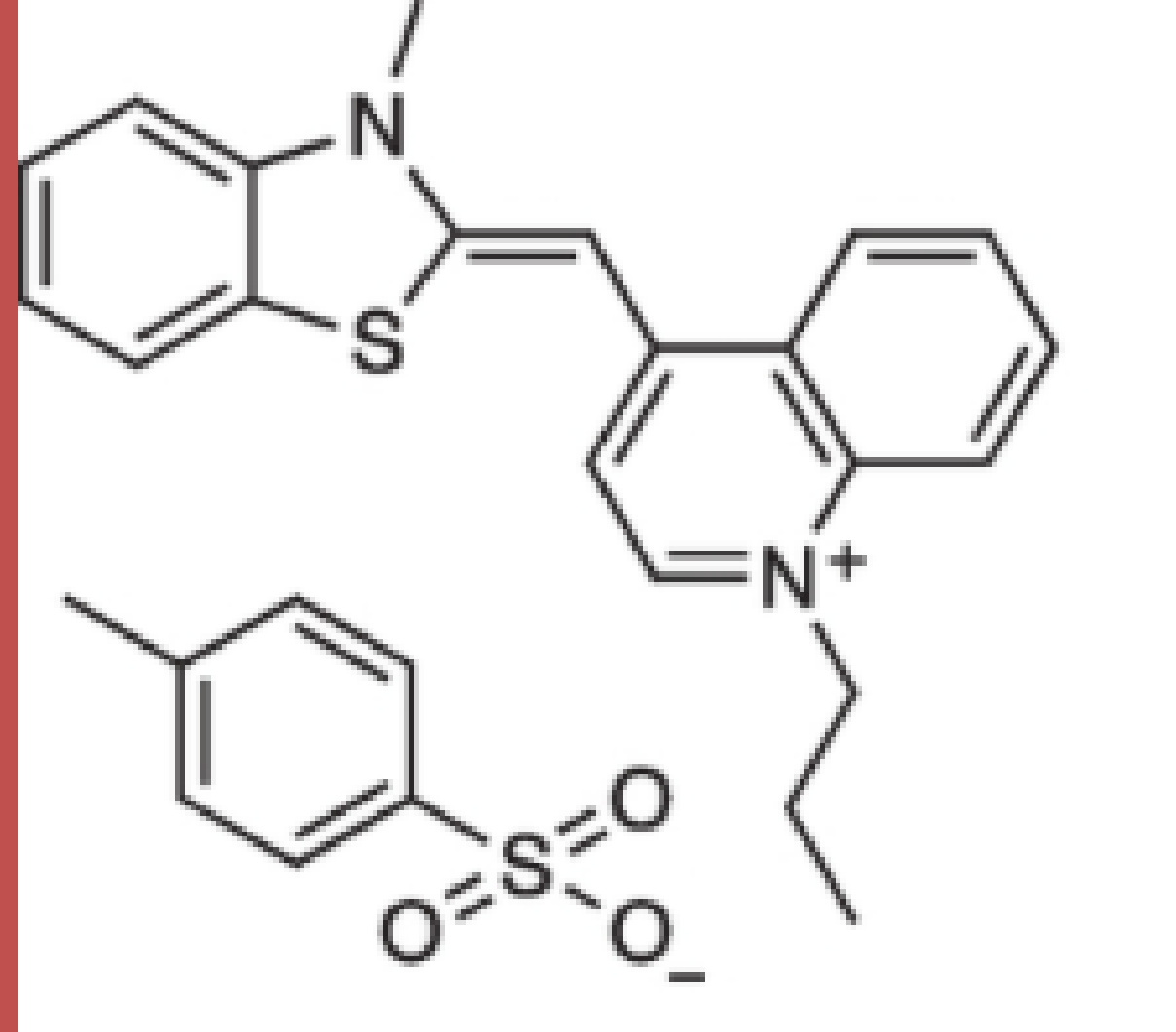
Making DNA visible in gel electrophoresis is essential for numerous molecular biological analyses. Traditionally, ethidium bromide, a cheap and reliable dye, is used for this purpose, but it does pose significant health and safety risks. This is why there is a growing need for safer alternatives that offer the same analytical quality. In this project, we compare three promising dyes: SYBR Safe, GelRed™ and GelGreen™ with ethidium bromide in terms of sensitivity, band intensity and ease of use. The aim is to determine whether these modern dyes are an equivalent but safer alternative for everyday laboratory use.

Ethidiumbromide



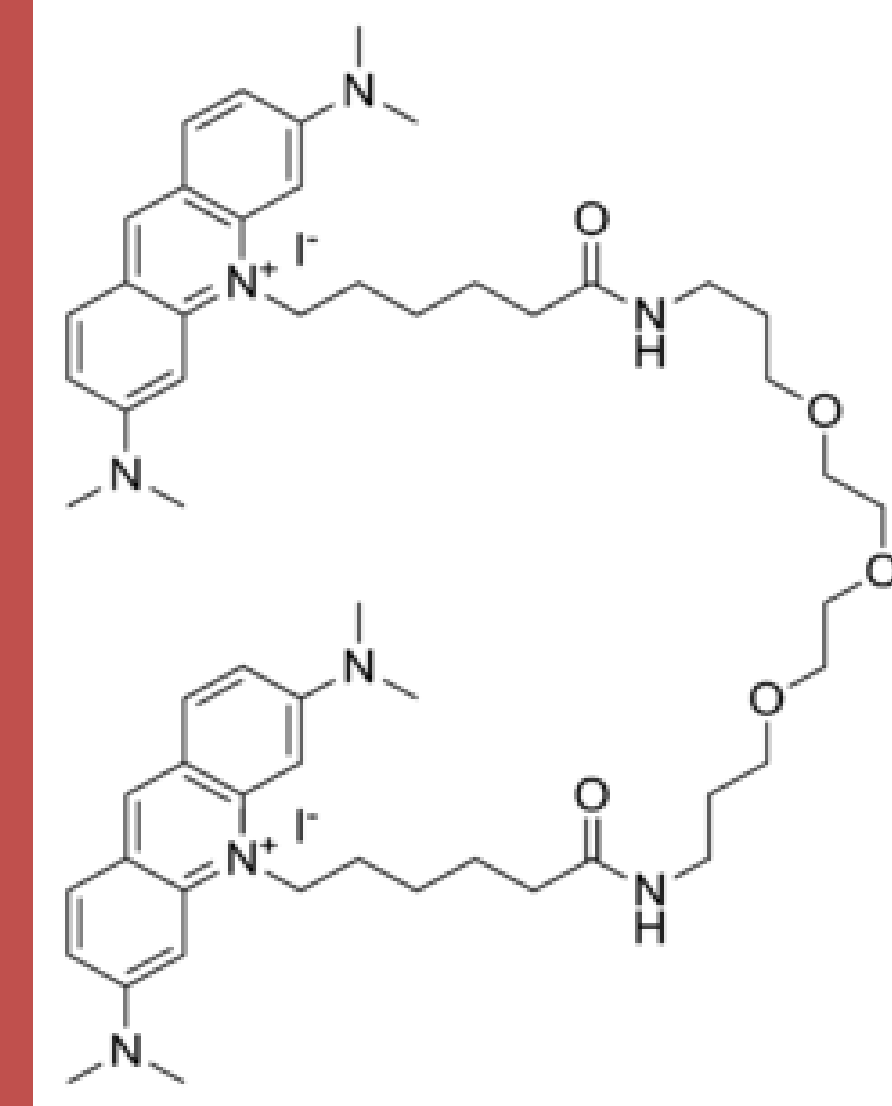
- 296 nm
- €0,14 (colouring bath 200 mL)
- Staining time: 15-30 minutes

SYBR Safe



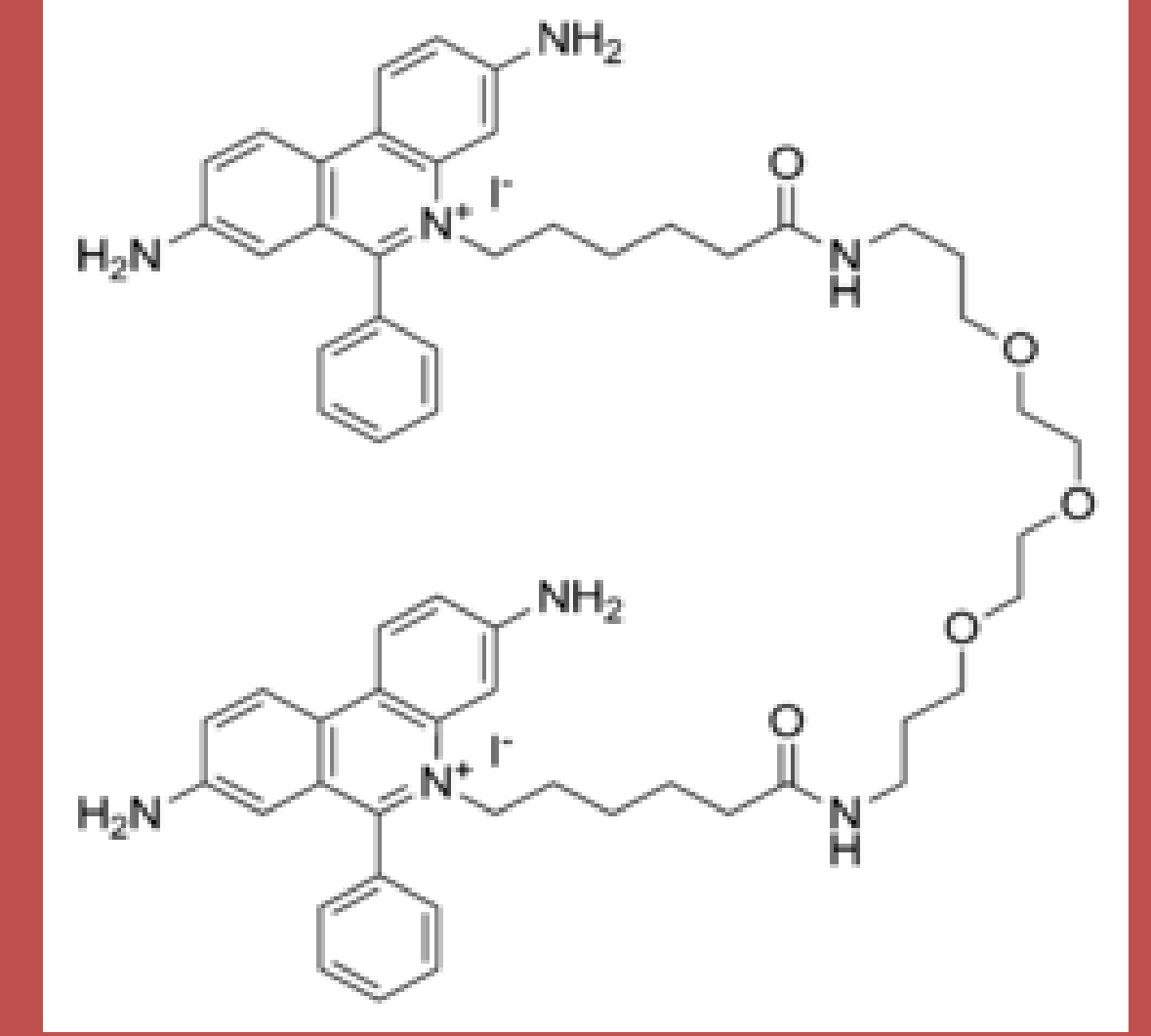
- 280 nm (UV) or 502 nm (blue light)
- €6,80 ((colouring bath 200 mL)
- Staining time: 30 minutes

Gelgreen™



- 530 nm
- €4,71 (colouring bath 200 mL)
- Staining time: 30 minutes

GelRed™



- 279 nm
- €4,88 (colouring bath 200 mL)
- Staining time: 30-60 minutes

Ethidiumbromide

- + Cheap
- + Short staining time
- Health and safety risk

SYBR Safe

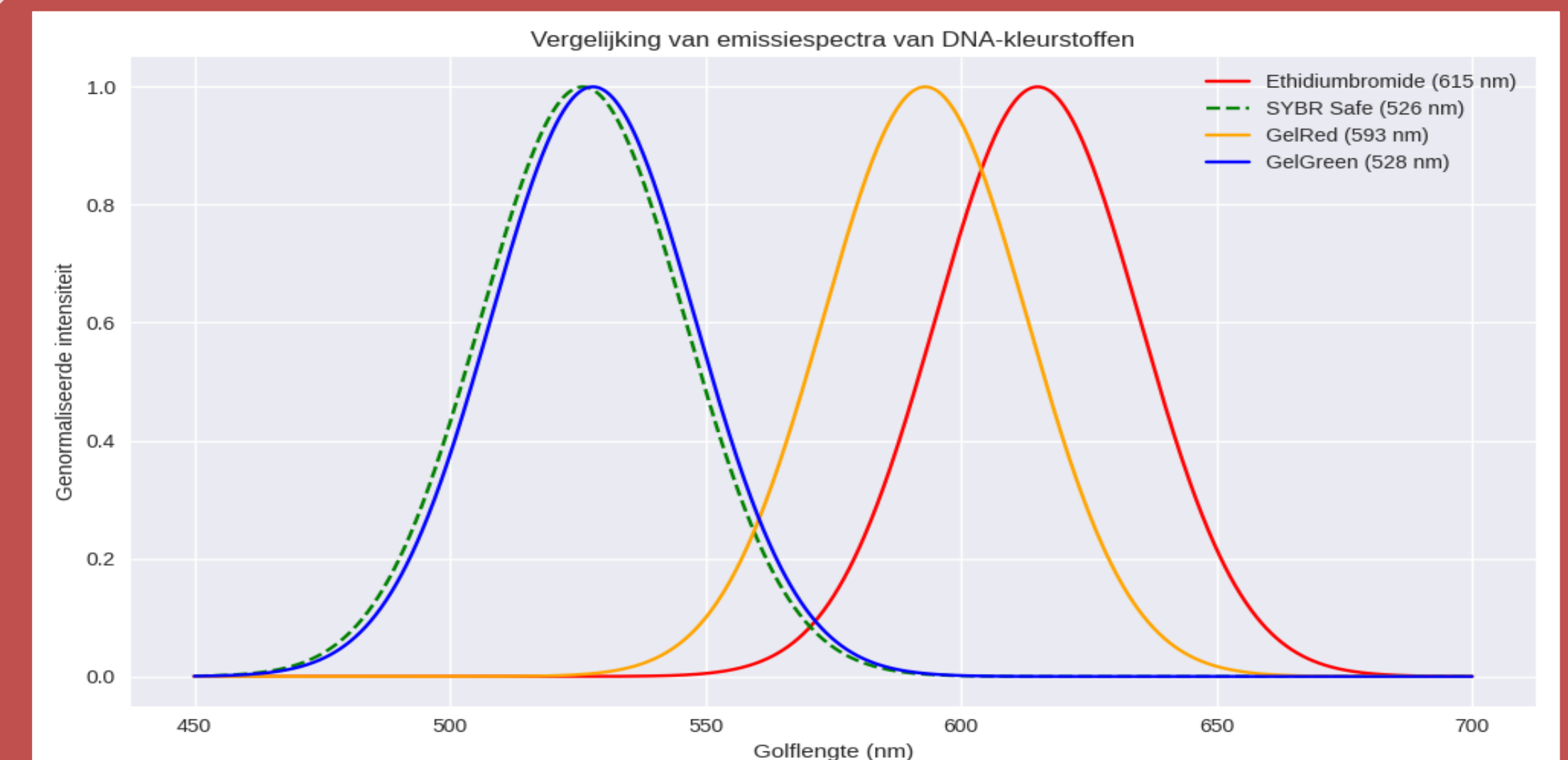
- + Safe usage
- + Clear band resolution
- Expensive
- Staining with no light

Gelgreen™

- + Safe usage
- Low band resolution
- Slow staining time

GelRed™

- + Safe usage
- + Clear band resolution
- + Highly stable
- + Reasonable price

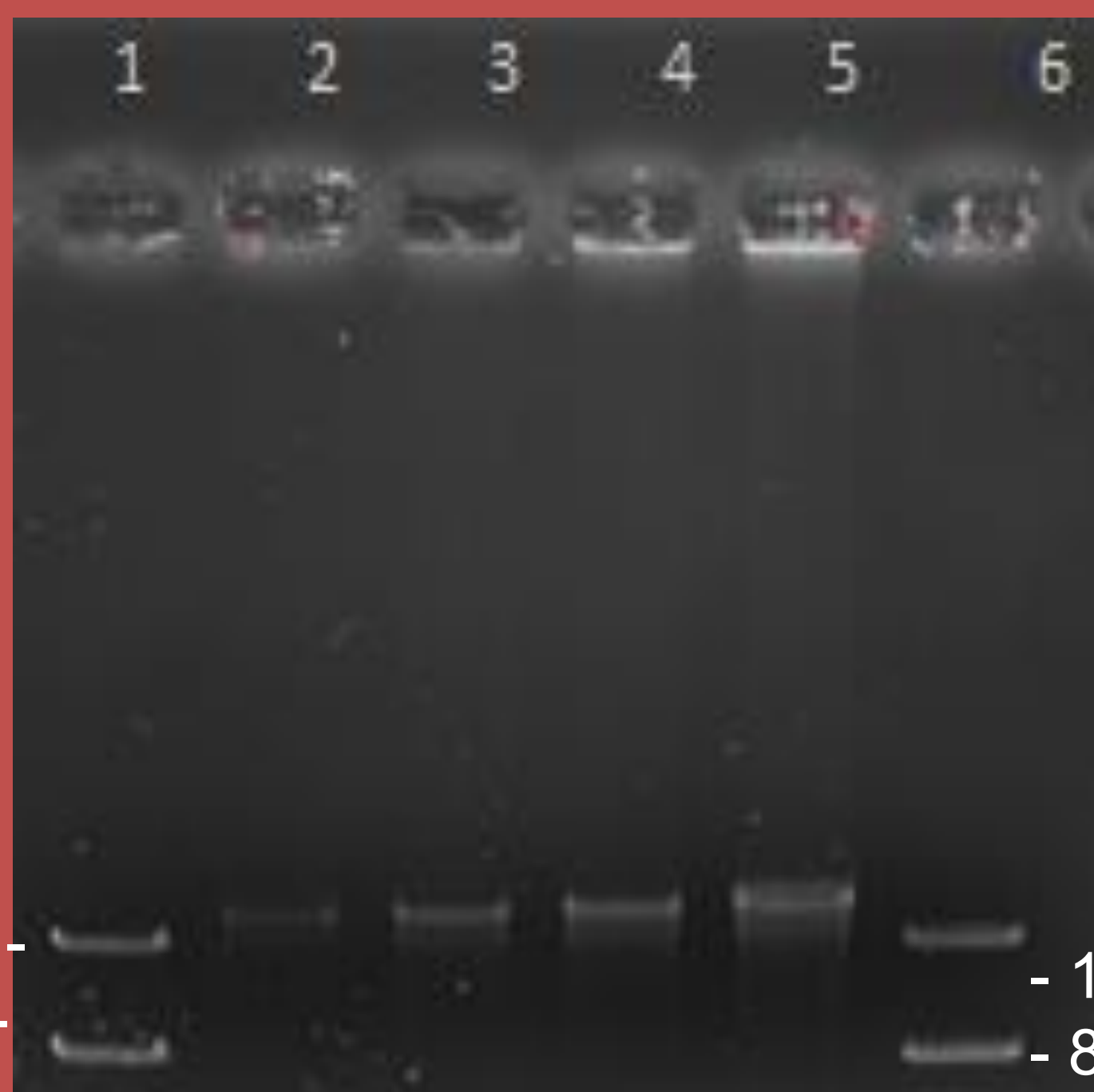


Results and discussion

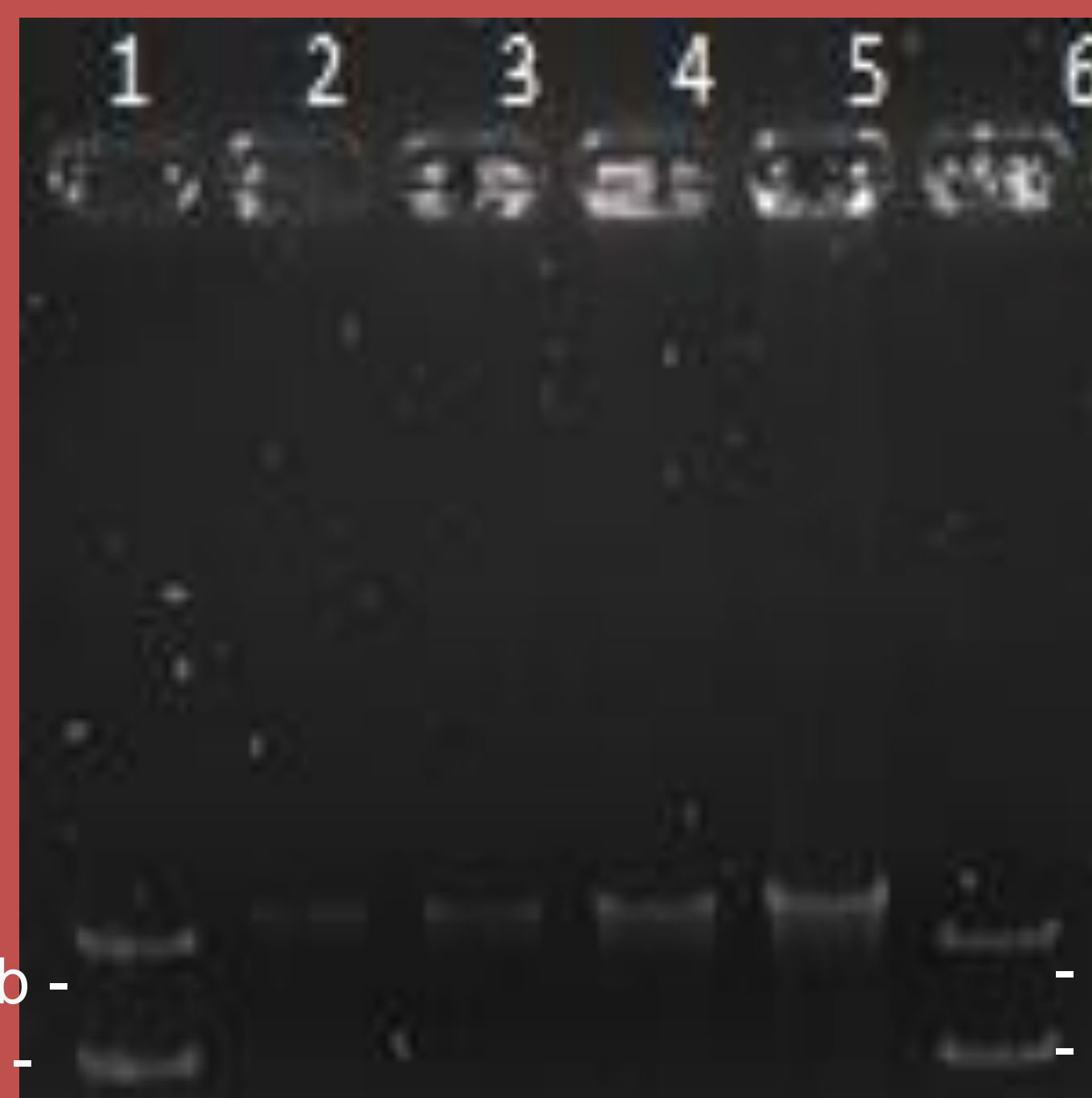
Gel electrophoresis of λDNA concentration gradient

This experiment analyzes the visibility of DNA bands across a λDNA concentration gradient using agarose gel electrophoresis. The gradient consists of four concentrations: 50 ng, 100 ng, 200 ng, and 400 ng, loaded between two 1 Kb⁺ DNA ladders for size reference. A 0.7% agarose gel (120 mL) in TAE buffer was prepared, and each lane contained 12.5 μL of sample. Electrophoresis was performed at 140 V for 50 minutes. All gels were destained for 10 minutes in deionized water.

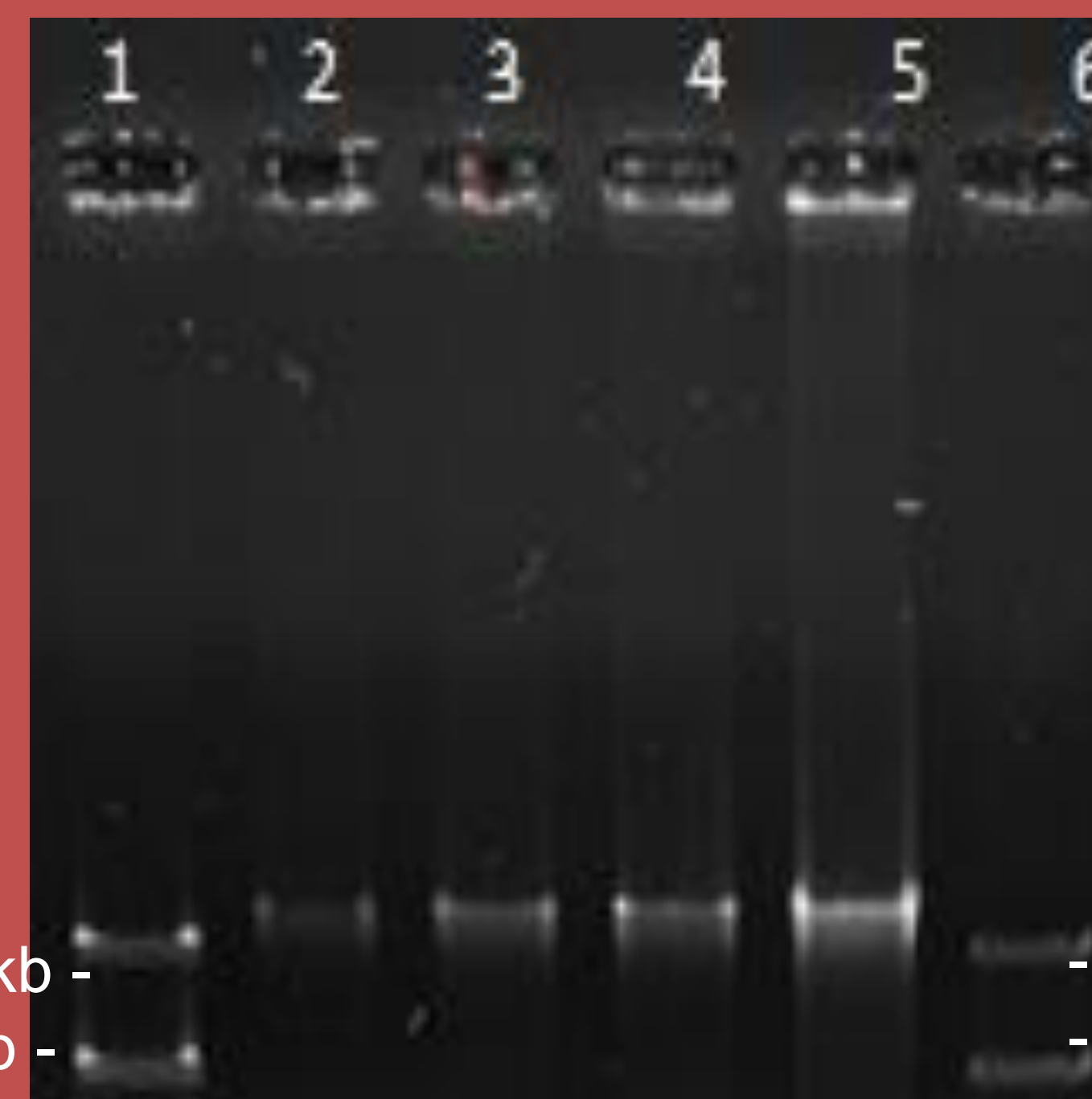
Ethidiumbromide



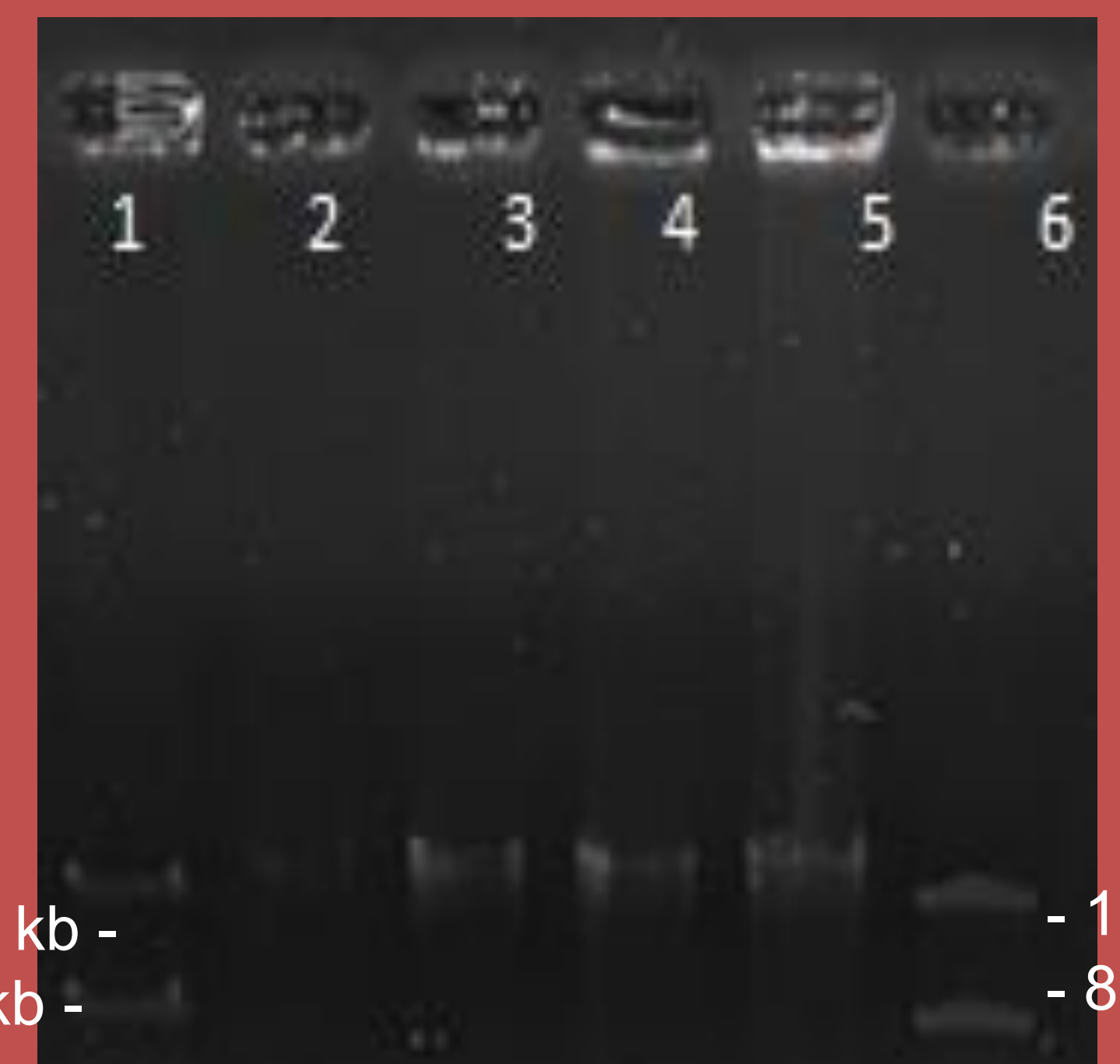
SYBR Safe



GelRed™



GelGreen™



① 1 Kb⁺ ladder 2,5 μg ② λDNA gradiënt 50 ng ③ λDNA gradiënt 100 ng ④ λDNA gradiënt 200 ng ⑤ λDNA gradiënt 400 ng ⑥ 1 Kb⁺ ladder 2,5 μg

Conclusion

GelRed™ is the most reliable and practical alternative to ethidium bromide, offering superior contrast and clarity in DNA and RNA analyses. SYBR Safe performs reasonably but is light-sensitive. GelGreen™ shows weak fluorescence and is not recommended. Decolourisation improves visibility for all dyes.