COMPARING OF COLOR STABILITY OF ADHESIVE RESIN CEMENTS

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OBJECTIVES

The aim of this work was to evaluate the color stability of two adhesive resin cements according to the requirement of ISO 7491 "Determination of color stability". The International Standard specifies a method for the determination of color stability of dental materials after exposure to light and water. The test is intended to demonstrate the color stability of a material after xenon irradiation and water sorption by comparing an irradiated specimen and non-irradiated.

MATERIALS AND METHODS

In this study two dual-cured resin cements were examined: Zirconite (BJM Laboratories Ltd.) and MaxCem Elite (Kerr). The color stability of three shades (clear, yellow, white) of each one of the cements were evaluated. Four specimens of each of the cements were divided into 4 groups. All specimens were chemically polymerized and stored according to ISO 7491 requirements.

TABLE №1: STORAGE CONDITION OF SPECIMENS

Groups	Place of storage	Condition	Temperature	Time
1	Dark	Dry	37°C	7 days
2	Dark	Water	37°C	7 days
3	Dark, Irradiation of the Xenon lamp	Water	37°C	24 hours
4	Dark, Irradiation of the Xenon lamp covered by aluminum foil	Water	37°C	24 hours

In this study, ATLAS Testing Machine was used as source of irradiation and water. The irradiation source was Xenon medium-pressure lamp with a luminance of 150 000 lx. All specimens was placed in a water bath and exposed to the radiation of the xenon lamp for 24 hours. Water temperature was maintained at 37 ± 5°C and the water depth was 10 ± 5mm above the specimens. Color change was analyzed by X-Rite i5 color spectrophotometer and compatible software (Color iQC, version 8). Data were analyzed using a repeated measures ANOVA ($p<0.05$). The DEcmc value represents the distance in color space that a sample falls from the standard. DEcmc ≤ 3.00 - excellent match; 3.00 < DEcmc < 5.00 - acceptable value; DEcmc > 5 - unacceptable value.

RESULTS

Specimens from Group 2 were compared with the same material that was analyzed immediately after polymerization (Table 2).

Color changes of the exposed specimens (Group 3) were compared to the color value of the reference (Group 1) (Table 3).

Color changes of the unexposed specimens (Group 4) were compared to the color value of the reference (Group 1) (Table 4).

TABLE №2: COLOR CHANGES WITHOUT IRRADIATION

Shade	DEcmc	
	Zirconite	MaxCem Elite
Clear	2.51 (excellent match)	11.32 (unacceptable value)
Yellow	1.61 (excellent match)	3.62 (acceptable value)
White	2.16 (excellent match)	4.50 (acceptable value)

TABLE №3: COLOR CHANGES OF THE EXPOSED SPECIMENS

Shade	DEcmc	
	Zirconite	MaxCem Elite
Clear	1.76 (excellent match)	9.22 (unacceptable value)
Yellow	4.77 (acceptable value)	4.71 (acceptable value)
White	1.60 (excellent match)	9.99 (unacceptable value)

TABLE №4: COLOR CHANGES OF THE UNEXPOSED SPECIMENS

Shade	DEcmc	
	Zirconite	MaxCem Elite
Clear	2.00 (excellent match)	4.86 (acceptable value)
Yellow	0.88 (excellent match)	3.70 (acceptable value)
White	1.97 (excellent match)	3.12 (acceptable value)

CONCLUSION

In this study two adhesive resin cements were evaluated on compatibility to the requirement of ISO 7491 "Determination of color stability". The current results indicate that Zirconite (BJM Laboratories Ltd.) has excellent color stability after exposure to light irradiation and water and that it completely corresponds to the requirement of ISO 7491 "Determination of color stability".

MaxCem Elite (Kerr) clear and white shades shown unacceptable values after irradiation by Xenon lamp. In addition, the clear shade went through a color change in an unacceptable value after 7 days storage in a dry place. Color changes of other shades were found to be within accepted values.