

PHOTOCATALYTIC TEST RESULTS IN CIMENTOL SAMPLES

Photocatalytic tests have been carried out in order to determine the photocatalytic activity of the Cimentol samples.

- SAMPLES.

Three samples of paint were measured:

- 1 EKOTOP Lightly protected
- 2 EKOTOP untreated
- 3 EKOTOP protected

The size of the surface of these samples was 16 x 16 cm.

- PHOTOCATALYTIC TEST.

Surface of the samples were impregnated with a solution of Rhodamine (500 ppm) used like organic pigment to determine the photocatalytic activity of the samples. The surface of the samples was irradiated using sun light and UV (380 nm). The degradation of the organic pigment was measured using a colorimeter.

- RESULTS.

We have evaluated the activity of the samples by mean of two different ways:

-We measured the CIELAB parameters of the surface and we used the standard ISO 12647-2 to follow the difference in color before and after the Rhodamine test.

According to this test, a value of the ΔE between 2-4 indicate there is no difference in color. In case of values higher than 5, the difference in color is significant.

We have measure the ΔL (degree of light) and ΔE (used to indicate total color difference and establish quantitative color tolerances). The results obtained for each sample are the following:

1. EKOTOP Lightly protected

Time	L	a	b	ΔL	ΔE_{ab}
Without Rhodamine	95,52	0,09	3,00	0,00	0,00
0 h with Rhodamine	74,95	49,88	-18,73	20,57	58,09
24 h with Rhodamine	81,00	34,77	-3,73	14,51	38,19
9 d with Rhodamine	94,22	3,25	2,44	-1,30	3,47

2. EKOTOP untreated

Time	L	a	b	ΔL	ΔEab
Without Rhodamine	96,16	-0,44	2,00	0,00	0,00
0 h with Rhodamine	75,24	54,75	-	-	63,00
24 h with Rhodamine	79,87	37,21	-4,46	-	41,53
9 d with Rhodamine	94,44	5,07	1,88	-1,72	5,51

3. EKOTOP protected

Time	L	a	b	ΔL	ΔEab
Without Rhodamine	94,55	0,02	2,38	0,00	0,00
0 h with Rhodamine	71,09	62,36	-	-	70,79
24 h with Rhodamine	75,55	41,30	-4,33	-	45,94
9 d with Rhodamine	93,81	1,81	3,01	-0,73	2,04

-We also have measured the activity of the samples by mean of a test based on the standard: UNI 11259:2008- Determinazione dell'attività fotocatalitica di leganti idraulici, Metodo della rodamina.

In this case, we measured the variation of the a* parameter at different times (using 0 hours like reference) and follow the activity using the following equation:

$$R_t = \frac{a^*(0) - a^*(t)}{a^*(t)} \times 100$$

According to the standard, one sample shows photocatalytic activity if R is higher than 20% after 4 hours and 50% after 26 hours.

1. EKOTOP Lightly protected

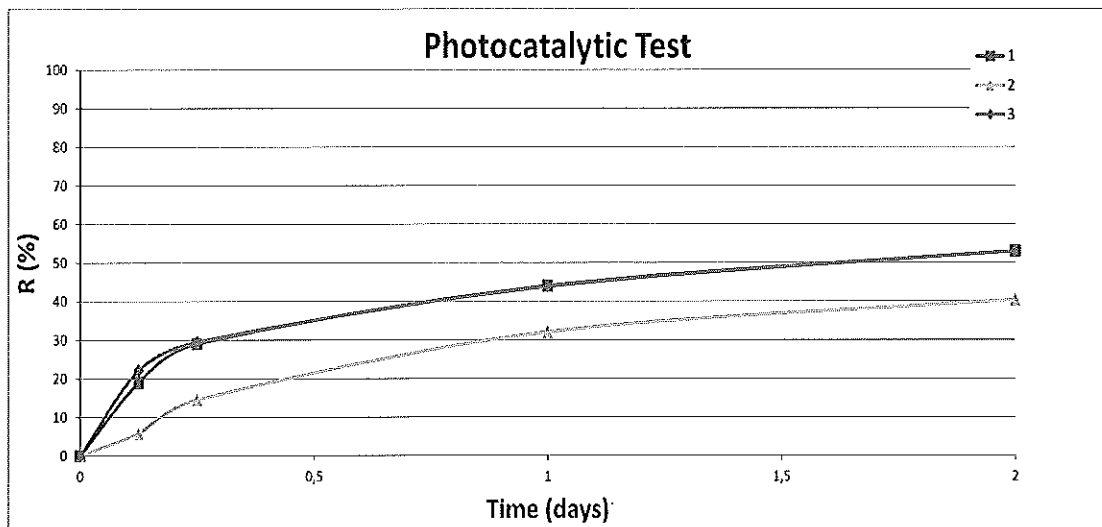
Time (Days)	R (%)
0	0
0,125	19
0,25	29
1	44
2	53

2. EKOTOP untreated

Time (Days)	R (%)
0	0
0,125	6
0,25	14
1	32
2	40

3. EKOTOP protected

Time (Days)	R (%)
0	0
0,125	22
0,25	30
1	44
2	53



- CONCLUSIONS

The measurements of the photocatalytic properties of the Cimentol samples using a colorimeter to follow the degradation of an organic pigment (Rhodamine) show that the most active is the EKOTOP protected sample and after that, the EKOTOP Lightly protected. Both samples show self-cleaning properties because these samples recover the original color after the test (9 days). In case of EKOTOP untreated, the value of ΔE at the same time (9 days) is 5,51.

Regarding to the test based on the standard UNI 11259 using UV light, EKOTOP Lightly protected and EKOTOP protected showed a very similar activity, both past the test after 3 hours ($R > 20\%$) and 2 days ($R > 50\%$). According to the standard, R has to be higher than 50% after 26 hour. In our case, R is higher than 50% after 2 days because we used a high concentration of Rhodamine (500 ppm) to see the differences in the color more clear.