One-Way ANOVA Results, Assumptions, and Post-Hoc Tests (Tukey)

Results of the one-way ANOVA applied to seven water quality parameters (pH, temperature, conductivity, turbidity, color, nitrate, phosphorus) comparing three sample groups: PCL, PCL/NFC, and cellulose. Assumption tests (Shapiro-Wilk and Levene) and Tukey's multiple comparisons were included when the ANOVA was significant.

Table S1. Results of one-way ANOVA comparing PCL, PCL/NFC, and cellulose membranes for water quality parameters.

Parameter	**F**	**p-value**	**Shapiro p-value**	**Levene p-value**	**Eta²** (Close to 1 very large differences)	**Significance**
pH	0.283	0.763	0.296	0.640	0.086	ns
Temperature	2.06	0.209	0.606	0.587	0.407	ns
Conductivity	2.81	0.138	0.577	0.776	0.484	ns
Turbidity	213.4	<0.001 (0.00000266)	0.552	0.875	0.986	***
Color	206.8	<0.001 (0.00000292)	0.597	0.559	0.986	***
Nitrate	121.0	<0.001 (0.0000142)	0.132	0.492	0.976	***
Phosphorus	3.39	0.103	0.058	0.532	0.531	ns

Interpretation of Differences

- Not significant (ns): pH, Temperature, Conductivity, Phosphorus - no evidence of differences between groups.
- Highly significant (*): Turbidity, Color, Nitrate - the groups differ strongly in these parameters.
- Eta² close to 1 in Turbidity, Color, and Nitrate - huge differences between groups.
- In post-hoc Tukey tests:
- Turbidity: CELLULOSE differs from PCL and PCL/NFC.
- Color: CELLULOSE differs from PCL and PCL/NFC.
- Nitrate: CELLULOSE differs from PCL and PCL/NFC.

Assumptions

- Shapiro-Wilk: In all cases, $p > 0.05 \rightarrow$ the residuals are normal.
- Levene: In all cases, $p > 0.05 \rightarrow$ homogeneity of variance is observed.
- The ANOVA is valid.

To visualize the differences between groups and by parameter

- The differences seen in the Turbidity, Color, and Nitrate graphs are significant.



Figure S1. Group comparison boxplots for water quality parameters (pH, temperature, conductivity, turbidity, apparent color, nitrate, and phosphorus) after filtration through cellulose, PCL, and PCL/NFC membranes. The central line indicates the median, the box indicates the interquartile range, whiskers denote the minimum and maximum values, and dots represent individual data points (n = 3).

TUKEY TESTS

1. Turbidity (NTU):

- CELLULOSE differs significantly from PCL and PCL/NFC ($p < 0.001$).
- PCL vs. PCL/NFC do not differ ($p = 0.265$).
- The group with the highest turbidity is CELLULOSE.

2. Color (Pt-Co):

- CELLULOSE differs significantly from PCL and PCL/NFC ($p < 0.001$).
- PCL vs. PCL/NFC do not differ ($p = 0.725$).
- The group with the highest color is CELLULOSE.

3. Nitrate (mg/L):

- CELLULOSE differs significantly from PCL and PCL/NFC ($p < 0.001$).
- PCL vs. PCL/NFC did not differ ($p = 1.00$).
- The group with the highest nitrate was CELLULOSE.

Table S2. Tukey test of means results

Variable	Comparison	diff	lwr	upr	p adj
Turbidity (NTU)	PCL/NFC – PCL	0.350	-0.266	0.966	0.2655
	CELLULOSE – PCL	3.753	3.138	4.369	0.0000034
	CELLULOSE – PCL/NFC	3.403	2.788	4.019	0.0000062
Color (Pt-Co)	PCL/NFC – PCL	3.333	-9.684	16.351	0.7248
	CELLULOSE – PCL	76.333	63.316	89.351	0.0000043
	CELLULOSE – PCL/NFC	73.000	59.982	86.018	0.0000057
Nitrate (mg/L)	PCL/NFC – PCL	0.000	-0.251	0.251	1.0000
	CELLULOSE – PCL	1.100	0.849	1.351	0.0000254
	CELLULOSE – PCL/NFC	1.100	0.849	1.351	0.0000254

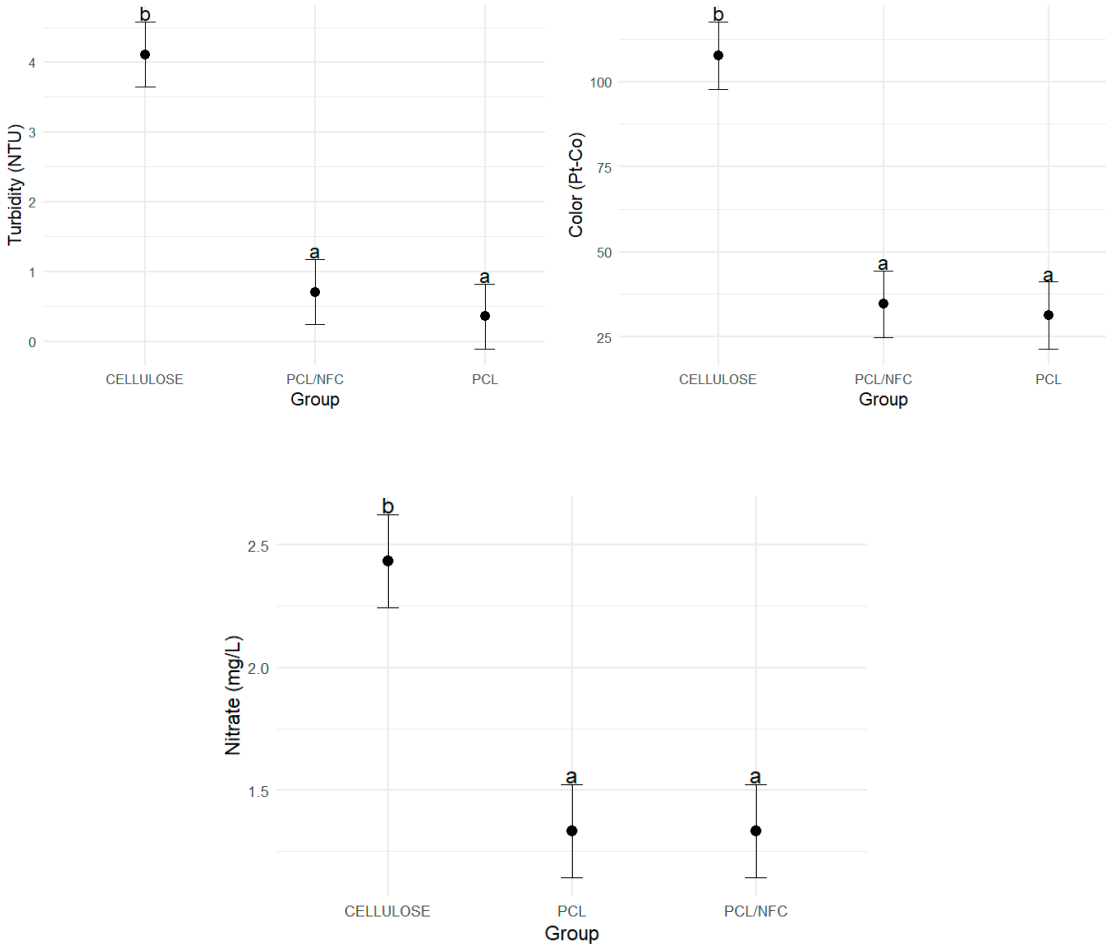


Figure S2. One-way ANOVA with Tukey's HSD (α = 0.05) results for turbidity (NTU), apparent color (Pt-Co), and nitrate (mg·L^{-1}) in effluents filtered through cellulose, PCL, and PCL/NFC membranes. Bars represent mean ± SD (n = 3). Groups sharing the same letter are not significantly different.