

Analysis of European wines before and after activated carbon treatment: total, active and volatile acidity; free and total sulfites; total polyphenols; color intensity and shade

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1. INTRODUCTION

➤ The pollution of the planet has exceeded all limits. One aspect of concern is the environmental burden caused by heavy metals. The issue with these metals is that they tend to accumulate in the environment, leading to adverse effects.

➤ In our main study, we used two types of activated carbon to remove or reduce the levels of the following metals detected within permissible limits in the wines we examined, (Lead, Cadmium, Mercury, Silver, Zinc, Chromium, Cobalt, Nickel, Selenium, Arsenic) as well as the chemical substance *N*-(phosphonomethyl)glycine. The first type of activated carbon came from potato peels, while the second from banana peels

➤ Very important for the success of our study is that the carbon we use to achieve our main goal does not negatively affect our wine. In order to see how much the addition of carbon affects the quality of our final wine, we had to carry out a series of analyses before and after its addition in order to reach safe conclusions. The quality factors examined were Total, active and volatile acidity, free and total sulphite, color intensity and shade.

➤ The results were very satisfactory using 1000 grams per ton of activated carbon since we had almost no substantial change in the basic quality characteristics of the wine. The only thing that was affected was the expected shade of the wine, and total polyphenols, which is not a problem.

3. RESULTS

Morphological characterization

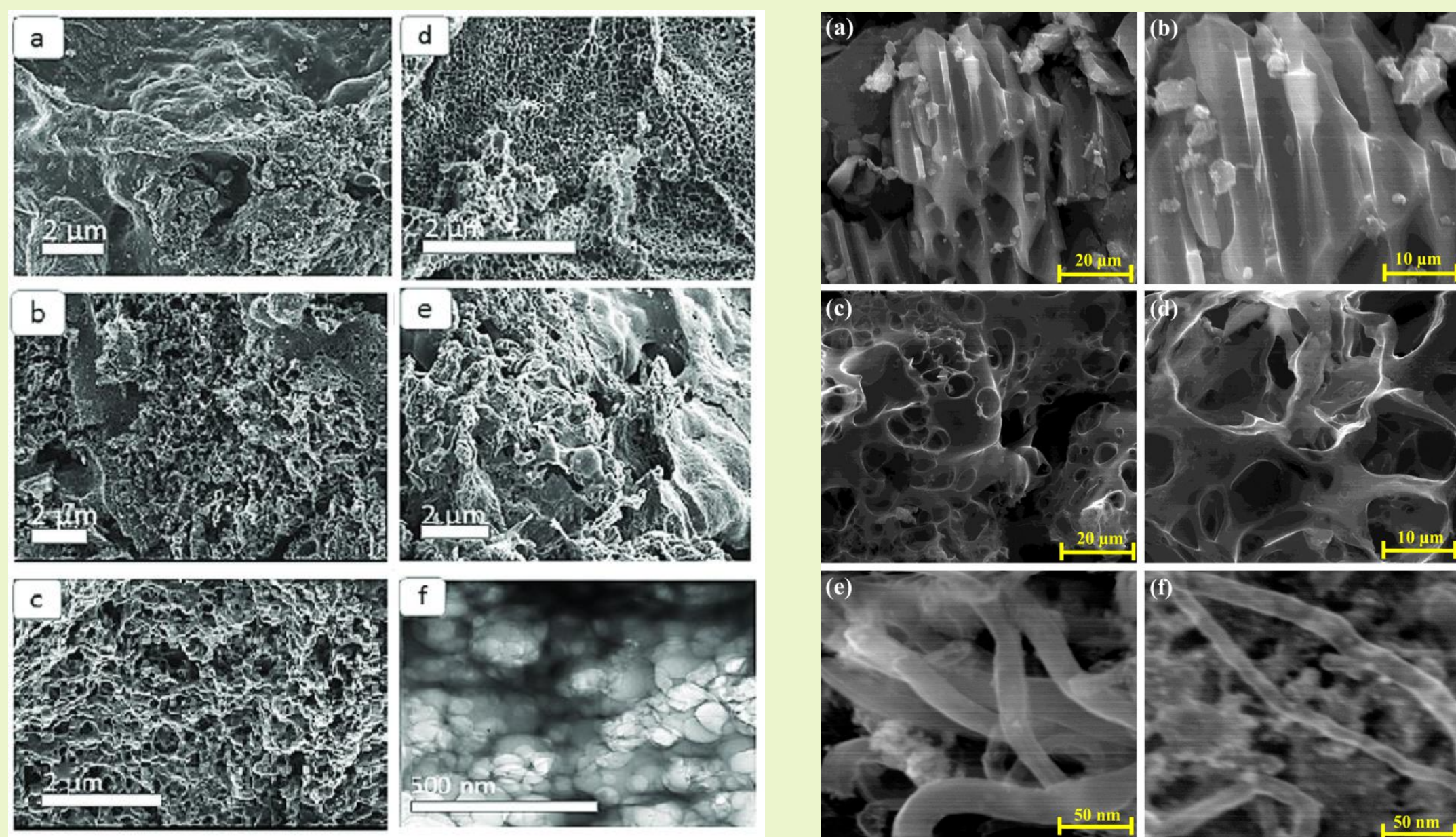
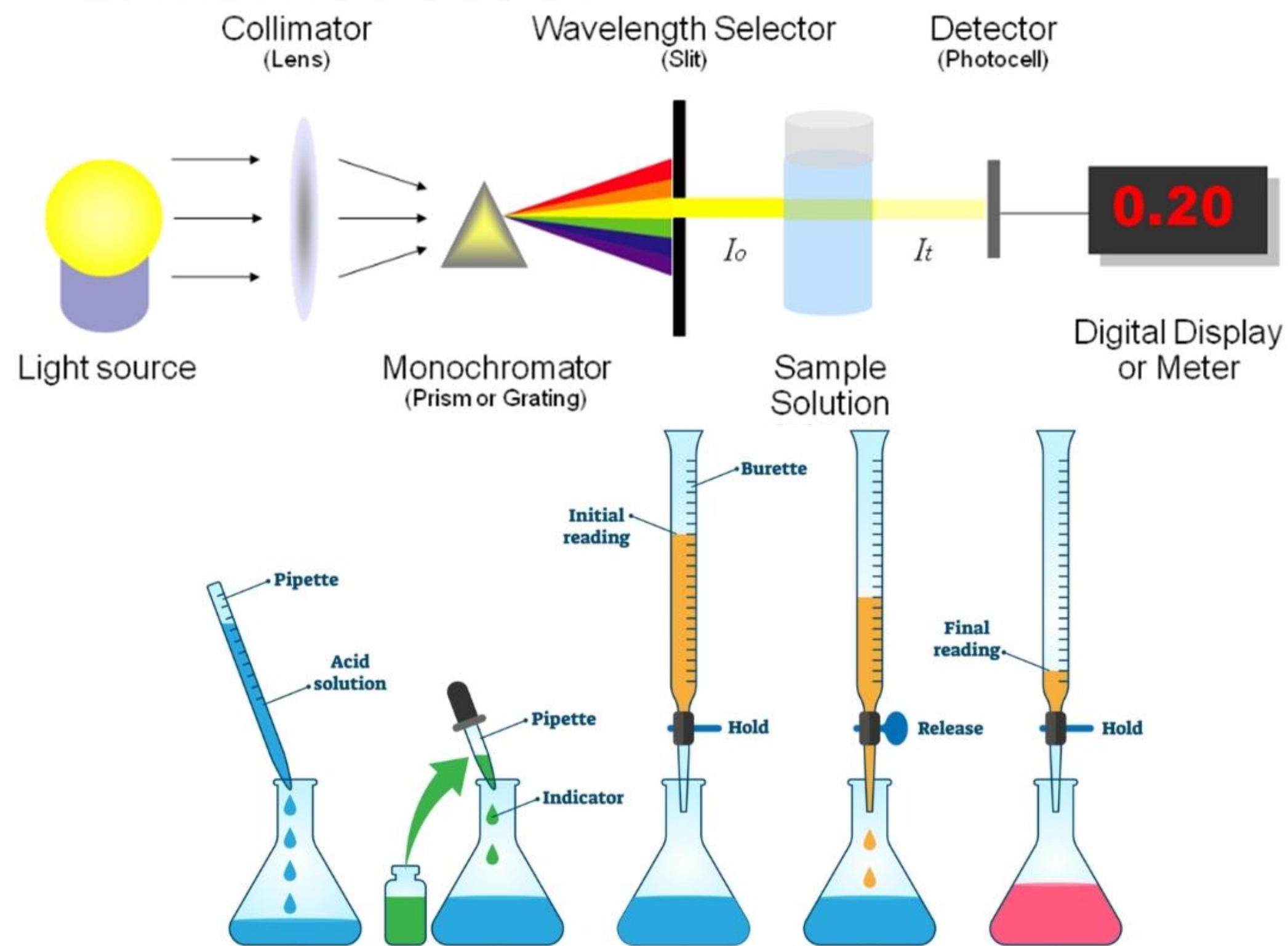


Figure 1. SEM of activated carbon derived from banana peels (left) and potato peels (right)

4. CONCLUSIONS

- The different origins of the activated carbons used, specifically potato and banana, had almost the same effectiveness in reducing unwanted pollutants in wines. The same can be said for the results regarding the qualitative state of the wine before and after their application.
- Regarding Total, Active and Volatile Acidity, Free and Total Sulphur, the results were excellent since we had almost no change in these measurements after the application of both carbons. The very small changes may also be due to the hardship that the wine sample was exposed to after the application of the carbon and during its filtration to extract a clean sample free of carbon.
- The differences in the measurements of total polyphenols, color intensity and hue were expected and do not alter the quality of the wine. The application of activated carbon to improve the color of wines as well as their deodorization from unwanted odors is known and a change in the results after the application of carbon was expected. However, upon macroscopic examination, the wine samples were excellent and their results acceptable.

2. METHODOLOGY



Wine analysis

		Acidity (g/l of tartaric acid)	pH	Volatile acidity (g/l acetic acid)	Free sulfur dioxide (mg/l SO ₂)	Total sulfur dioxide (mg/l SO ₂)	total poly-phenols	color intensity	color shade
Non AC Wine 1		3.6	3.41	0.19	4	47	28	4.372	1.0824
AC-Ban	Red	3.6	3.41	0.19	3	46	26	3.795	1.3676
AC-Pot		3.6	3.41	0.19	3	45	24.5	3.786	1.3573
Non AC Wine 2		4.5	3.42	0.53	5	54	75	9.461	0.9783
AC-Ban	Red	4.5	3.43	0.53	5	50	71	9.213	0.9783
AC-Pot		4.4	3.44	0.53	5	46	70	9.202	0.9783
Non AC Wine 3		5.7	3.03	0.34	20	67	8	0.142	4.4800
AC-Ban	White	5.7	3.01	0.30	15	57	15.7	0.182	2.3850
AC-Pot		5.6	3.01	0.30	13	55	15.8	0.182	2.3830
Non AC Wine 4		5.3	3.39	0.38	13	32	47.2	7.734	0.7447
AC-Ban	Red	5.2	3.4	0.37	5	26	51.7	6.649	5.9000
AC-Pot		5.1	3.41	0.34	3	27	51.7	6.649	5.9020
Non AC Wine 5		5.9	3.1	0.38	45	102	6	0.082	3.8750
AC-Ban	White	5.9	3.1	0.38	31	95	19.6	0.164	1.7580
AC-Pot		5.9	3.09	0.38	32	91	19.7	0.164	1.7600
Non AC Wine 6		4.5	3.67	0.56	13	72	55.9	7.574	0.8679
AC-Ban	Red	4.5	3.65	0.56	12	71	65.2	7.12	0.9005
AC-Pot		4.5	3.64	0.56	13	72	65.4	7.111	0.9091
Non AC Wine 7		4.7	3.24	0.30	6	113	5.4	0.122	2.3939
AC-Ban	White	4.7	3.21	0.25	4	104	17.8	0.184	1.5932
AC-Pot		4.7	3.22	0.26	4	100	17.6	0.185	1.6034
Non AC Wine 8		3.6	3.64	0.23	20	65	5.7	0.112	2.4000
AC-Ban	White	3.5	3.62	0.19	20	47	17.8	0.173	1.7654
AC-Pot		3.5	3.62	0.19	19	46	17.9	0.184	1.7778
Non AC Wine 9		5.1	3.11	0.23	3	9	4.6	0.349	2.0000
AC-Ban	White	4.8	3.14	0.22	2	8	9.8	0.192	1.9754
AC-Pot		4.8	3.15	0.23	1	6	10	0.195	1.9815
Non AC Wine 10		5.1	3.2	0.56	5	102	7.9	0.236	0.2516
AC-Ban	Pink	5.1	3.2	0.53	4	97	12.3	0.184	2.4200
AC-Pot		5.1	3.19	0.53	3	96	12.4	0.189	2.4490

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NATIONAL RECOVERY AND RESILIENCE PLAN

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