

# **Influence of coconut shisha charcoal on the taste and smell of hookah molasse smoking**

Research by Greg Ryabtsev

## **Abstract**

In this research, made by Greg Ryabtsev, discussed influence of the coconut shell charcoal briquettes for shisha on the taste, smell and overall smoking experience. The research is made by tasting and smoking of 387 hookah at the factory facility of PT Coco Total Karbon Indonesia in Magelang, Central Java, Indonesia. During the research 32 samples of shisha charcoal was tested and analyzed by Carsurin Laboratory. The research results are structured by the following schema: reasons - consequences - influence on health and smoking experience - method to eliminate negative results. Results show that additives like sodium hypochlorite created a throat etching sensation in 72% of applicable test sessions , and any use of unprocessed binders or chemicals resulted in a discernible off-taste or smell. The research concludes that the use of chemical additives in coconut charcoal production has a significant negative impact on the sensory experience, highlighting a need for industry-wide quality standards.

## **Introduction**

Shisha or also called hookah smoking is popular activity originally come from India, then wildy spread among Middle East countries. Process of smoking involved heating up tobacco by hot air that in turn is heated by charcoal.

The smokers is inhaling air via pipes that pass by charcoal, that heat the air then hot air passing the bow with tobacco (also called molasses) and via pipes going to bottle with water where is cooled down and then to the lungs of the smoker.

The critical part is charcoal that, basically make whole hookah works.

There are different types of charcoal used for heating tobacco. The most popular is coconut shell based charcoal briquettes. But also used wood chunks charcoal, chemical fast light charcoal, bamboo charcoal, lemon charcoal or even electric heaters.

Table 1: Research information and methods

Parameter	Specification / Controlled Variable	
Testing Location	Factory facility of PT Coco Total Karbon Indonesia, Magelang	
Total Hookah Sessions		387
Charcoal Samples Tested		32
Hookah Tobacco (Molasses)	Alfaker, Double Apple flavor	
Hookah Bowl	UPG, volcano model	
Liquid in Base	Water (same volume for each session)	
Sensory Panel	5 individuals with a combined 40+ years of experience	
Data Collection Method	Standardized questionnaire (1-10 scale), photos, videos, written reports	
Regular Measurements	- Temperature inside and outside the bowl (every 10-11 mins) &lt;br> - Weight of charcoal briquettes (every 20 mins)	

However, the quality of these briquettes can vary significantly. Many manufacturers, in an attempt to cut costs or achieve specific aesthetic properties like white ash, introduce chemical additives during production. The influence of these specific additives on the taste and smell of the final smoking experience has not been rigorously documented.

This study aims to: 1) Identify common additives used in coconut charcoal production. 2) Systematically evaluate the sensory impact (taste and smell) of these additives during a controlled hookah session. 3) Propose quality control methods to prevent negative sensory outcomes.

## Literature Review

There are a vast amount of research papers about coconut shell charcoal related to activated carbon or the chemicals manufacturing, but almost none of the research related to the shisha charcoal.

## Chemical composition of coconut shell charcoal

Table 2 Chemical composition of coconut shell charcoal

Composition	Wt%
Lignin	29.4
Pentosans	27.7
Cellulose	26.6
Moisture	8
Solvent Extractives	4.2
Uronic Anhydrides	3.5
Ash	0.6

# Why coconut shell charcoal is the most popular choice

The coconut shell charcoal briquettes is the most popular choice for shisha smoking because of the coconut shell properties. Coconut charcoal shell keep the high temperature of 650C, and does not emit any smell or change the taste of the tobacco.

Table 3 Comparison table of coconut shell, bamboo, wood and other types charcoal

Charcoal Type	Odor/Smell During Burning	Influence on Tobacco Taste	Ash Content
Coconut Shell Charcoal	Does not emit any smell	Free from changing the original taste	Very low (1.6-2.5%)
Wood Charcoal	Emits a smell	Changes the original tobacco taste	High
Bamboo Charcoal	Emits a smell	Changes the original tobacco taste	Not specified
Other (Nuts, etc.)	Not specified	Not specified	Higher than coconut charcoal

Compare to wood charcoal or bamboo charcoal that while burning making smell and change the original tobacco taste, coconut shell charcoal is free from odor or smells. It is also make very low ash during the burning time (1.6-2.5%) compare to walnut, almond or other nuts and especially wood charcoal.

- Find sources on the chemical composition of coconut shells.
- Cite studies or patents related to tapioca as a binding agent.
- Include safety data sheets or chemical analysis papers for sodium hypochlorite and sodium silicate and their combustion byproducts. This will strengthen your "Consequences" section

## How shisha charcoal is being used

Shisha charcoal primary task is to heat up the tobacco so it start giving taste and smell during smoking. On one hand shisha charcoal should have enough temperature during smoking session (usually 30 minutes to 1.5 hours) and do not change taste or emit any smell during smoking.

As additional bonus coconut based shisha charcoal is low on ash.

## Production process of shisha charcoal

Manufacturing coconut shell charcoal briquettes for shisha starts from cleaning and preparing raw material i.e coconut shells. Cleaning coconut shells from dirt, hair and impurities. Then chunk into small pieces and burning it without access of oxygen. This burning process is called carbonization.

During carbonization coconut shells turned to coconut charcoal with 75-85% of Carbon value in it.

After carbonization, coconut shells being crushed into small mesh particles. Then small particles are being mixes with water, tapioca, compressed and cut into the shapes (cubes, hexagonal, stix, dome and others shapes). Product si being dried in the oven, then packed and ready to use by final user.

# Chemicals involved in the production process of shisha charcoal

Initially coconut shells does not emit any smell or change taste of the tobacco, but during the manufacturing process some factories are adding chemicals like bleachers or glues that make the final product (shisha charcoal) smell or change the taste of the hookah.

## Methods

The problem of analysis is that taste and smell of tobacco is naturally vary and there is no standard gradation or laboratory methods of analysis of the change is smell and taste during the smoking process. That is why mostly organoleptic methods was involved during testing process. Our expert team with heat of team Greg Ryabtsev as the charcoal expert was smoking 387 sets of hookah with the same tobacco (double apple, by Alfaker) with the same water volume and the same bowl (UPG, volcano). Each smoking session was recorded by video, photos and report of smoking. Temperature inside the bowl, outside the bowl was measured every 10-11 minutes. Weight of the charcoal briquettes is measured every 20 minutes. Smoking was intense with inhale every 1 to 2 minutes. The sensory panel consisted of five individuals, including the lead researcher (Greg Ryabtsev), with a combined 40+ years of shisha smoking experience. While not a formally trained panel, their extensive experience allows for the detection of subtle off-notes. For each session, panelists completed a standardized questionnaire rating the following attributes on a 1-10 scale: Flavor Clarity, Harshness, Sweetness, and Presence of Chemical Aftertaste. They also provided open-ended qualitative notes on the aroma and taste

## Results

As the results shows that excessive use of tapioca or any chemicals with significantly with alpha >82% shows change in taste or smell during the smoking.

Table 4 results of adding chemicals to shisha charcoal

Additive	Reason for Use	Identified Consequences & Health Risks	Recommended Prevention Method
Bleachers (e.g., Sodium Hypochlorite)	To make the resulting ash appear whiter.	- Highly toxic if inhaled.   - Burning emits chlorine gas, which can lead to fluid buildup in the lungs and severe shortness of breath.	Avoid using bleaching chemicals entirely.
Water Glass (Sodium Silicate)	Used as a binder/glue.	- Inhaling finely powdered silica (a component) can cause respiratory issues like silicosis, bronchitis, and lung cancer, though this is mainly linked to occupational exposure.	Minimize or completely avoid using this chemical during the manufacturing process.

Excessive use of tapioca or use of not well processed tapioca make very distinct smell of rotten wheat during heating up the charcoal (usually 1st minutes after heating) and unpleasant taste during smoking session. Usage of bleachers such as sodium hypochlorite ( $\text{NaClO}$ ) are making etching feeling in the throat in 72% of smoking sessions. While using sodium silicate ( $\text{Na}_2\text{O}(\text{SiO}_2)$ ) is significantly (92% cases) make unpleasant unmarked smell during warming up charcoal and smoking.

## Analysis & Discussions

It must be noted that this study was not conducted under double-blind conditions. The lead researcher was aware of the samples being tested. Furthermore, the sensory data is

subjective and relies on the experience of the panel.

The main problem of analysis was that testing methods are organoleptic and heavily depend on the person who is smoking. Actually if the experience of shisha smoking is more than 10 years (for example as Greg Ryabtsev) the person can clearly feel more changes. If the person just started smoking he very seldom (<30%) can feel any changes in tobacco taste.

Table 5 chemicals influence on shisha charcoal

Additive/Issue	Specific Finding	Quantitative Result
Unprocessed/Excessive Tapioca	Produced a distinct smell of rotten wheat during heating and an unpleasant taste during smoking.	Change in taste/smell noted with "alpha > 82%" significance.
Bleachers (e.g., Sodium Hypochlorite)	Caused a "throat etching feeling" during the smoking session.	Observed in 72% of applicable smoking sessions.
Binders/Glues (e.g., Sodium Silicate)	Produced an unpleasant, unmarked smell during both the warming-up and smoking phases.	Observed in 92% of applicable smoking sessions.

The second problem is that samples being taken not only from PT Coco Total Karbon Indonesia (charcoal.pro), but also from other factories around Indonesia. The reason for that is that charcoal.pro is making non chemical modified shisha charcoal. So the research team have to find samples from other factories that use chemicals. And in most of the cases (56%) the volume of chemicals being used in the briquettes is unknown or only know approximately.

As the results and analysis shows any use of chemicals or unprocessed tapioca will change the taste of tobacco during smoking. Further discussion should involve of the developing of the industry standards of shisha charcoal manufacturing, that limit or prohibit usage of the chemicals during manufacturing process.

## Influence on the smell and taste

### Reasons

1. Water glass, a compound of sodium oxide and silicon dioxide, is generally considered safe for its intended uses, though some potential health effects exist, particularly with inhalation or ingestion.
2. Bleachers used to make ash white

### Consequences

1. **Inhalation:** Inhaling finely powdered silica (a component of water glass) can cause respiratory issues, including silicosis (a progressive lung disease), bronchitis, and even lung cancer. However, these effects are primarily associated with occupational exposure to respirable crystalline silica, not incidental exposure to amorphous silica or water glass.
2. Bleachers are very toxic if inhaled also while burning it emits amounts of chlorine gas can lead to a build-up of fluid in the lungs and severe shortness of breath that could lead to death if untreated

## Preventing methods

1. minimize or do not use this chemical during manufacturing process
2. avoid using of bleaching chemicals

## Conclusion

This research empirically demonstrates that while pure coconut shell charcoal provides a neutral and stable heat source ideal for hookah smoking, the common practice of using chemical additives like bleaches and binders introduces significant negative tastes and smells, along with potential health risks. Therefore, establishing and adhering to a 'chemical-free' manufacturing standard is essential for product quality, consumer satisfaction, and safety within the shisha industry.

Future research should focus on using mass spectrometry to analyze the specific volatile compounds released by chemically altered charcoals during combustion and correlate them with specific sensory outcomes.

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