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

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## Abstract

In this research, conducted by Greg Ryabtsev, the influence of coconut shell charcoal briquettes on shisha taste, smell, and overall smoking experience is examined. The research is conducted by tasting and smoking 387 hookahs at the factory facility of PT Coco Total Karbon Indonesia in Magelang, Central Java, Indonesia.

During the research, 32 samples of shisha charcoal were 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 a popular activity that originally came from India, then widely spread among Middle Eastern countries. The process of smoking involves heating up tobacco by hot air that in turn is heated by charcoal.

The smoker is inhaling air via pipes that pass by charcoal, which heats the air, then hot air passes the bowl with tobacco (also called molasses) and via pipes to a bottle with water, where it is cooled down and then to the lungs of the smoker.

The critical part is the charcoal that basically makes the whole hookah work.

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) <br> – Weight of charcoal briquettes (every 20 mins) |

Table 1: Research information and methods

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 is a vast amount of research papers about coconut shell charcoal related to activated carbon or chemical manufacturing, but almost none of the research is 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 |

| Composition | Wt% |
|---|---|
| Uronic Anhydrides | 3.5 |
| Ash | 0.6 |

Chemical composition of coconut shell charcoal

## Why is coconut shell charcoal the most popular choice

The coconut shell charcoal briquettes are the most popular choice for shisha smoking because of the coconut shell’s properties. Coconut charcoal shell keeps the high temperature of 650 °C, 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 of 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.) | Does not emit any smell | Free from changing the original taste | Higher than coconut charcoal |

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

Compared to wood charcoal or bamboo charcoal,l which, while burning, make a smell and change the original tobacco taste, coconut shell charcoal is free from odor or smells. It also makes very low ash during the burning time (1.6-2.5%) compared 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’s primary task is to heat up the tobacco so it starts giving taste and smell during smoking. On one hand, shisha charcoal should have enough temperature during a smoking session (usually 30 minutes to 1.5 hours) and should not change taste or emit any smell during smoking.
As an 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 of dirt, hair, and impurities. Then, chunk it into small pieces and burn it without access to 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 are crushed into small mesh particles. Then, small particles are mixed with water, tapioca, compressed, and cut into the shapes (cubes, hexagonal, sticks, dome, and other shapes). The product is being dried in the oven, then packed, and is ready to use by the final user.

**Chemicals involved in the production process of shisha charcoal**

Initially, coconut shells do not emit any smell or change the 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 the taste and smell of tobacco naturally vary, and there is no standard gradation or laboratory method for analyzing the change in smell and taste during the smoking process. That is why mostly organoleptic methods were involved during the 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 a report of smoking. The temperature inside the bowl, outside the bowl was measured every 10-11 minutes.

The weight of the charcoal briquettes is measured every 20 minutes. Smoking was intense, with an 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 show that excessive use of tapioca or any chemicals with a significant with alpha >82% shows a change in taste or smell during smoking.

Table 4: Results of adding chemicals to shisha charcoal

| | | | |
|---|---|---|---|
| Bleachers (e.g., Sodium Hypochlorite) | To make the resulting ash appear whiter. | – Highly toxic if inhaled. <br> – 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. |

Results of adding chemicals to shisha charcoal

Excessive use of tapioca or use of not well processed tapioca makes a very distinct smell of rotten wheat during heating up the charcoal (usually 1st minutes after heating) and unpleasant taste during the smoking session. Usage of bleachers such as sodium hypochlorite (NaClO) is causing a burning feeling in the throat in 72% of smoking sessions. While using sodium silicate ($Na_2O(SiO_2)$) significantly (92% cases) makes an 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 subjective 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. |

| Additive/Issue | Specific Finding | Quantitative Result |
|---|---|---|
| Binders/Glues (e.g., Sodium Silicate) | Produced an unpleasant, unmarked smell during both the warming-up and smoking phases. | Caused a “throat-etching feeling” during the smoking session. |

Chemicals’ influence on shisha charcoal

The second problem is that samples are 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 has 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 known approximately.

As the results and analysis show, any use of chemicals or unprocessed tapioca will change the taste of tobacco during smoking. Further discussion should involve the development of the industry standards of shisha charcoal manufacturing, which limit or prohibit the usage of chemicals during the 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, they emit amounts of chlorine gasthat 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 the manufacturing process
2. Avoid using 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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