RECIPE

Smoked Meats In the Modern Age.

Ready in **5 hours**

Serves **4-6 people**

Ingredients

- *Hamburger patty, combined total of 8, ⅓ pound patties.*
- *Steaks*
- *3 and a ½ pound rack of ribs*
- *Sausage*
- *Salt*
- *Pepper*
- *Thyme*
- *Onion powder*
- *Garlic Powder*
- *Rub*

History of the smoking of meats

The smoking of meat dates back to the age that humans were living in caves. This was one of the first food preservation methods used, now there is a whole variety of methods including but not limited to refrigeration, pickling, and the creation of shelf-stable products. The Medieval period in Europe started and it was still being used as a food preservation method but this time it was on purpose unlike what the cavemen were doing where they accidentally exposed meat to smoke. In the Medieval times the rich had their own storehouses for smoking while the poorer classes simply hung their meat over their fireplace. Now people have created an entire culture around cooking meats using smoked things like festivals, competition, restaurant chains, and the state of Texas is a product of this.

Instructions

1. **Heat the coals,** using the chimney which is a long metal tube with a grate in the middle separating the coals from the newspaper that is used as the catalyst for the burn due to it being easy to light.
2. **Season.** Typically all meats will use a different variety of seasoning. For example using the foods that I cooked, for the ribs I used a rub consisting of a variety of seasonings including salt and pepper. You then rub your preferred amount on to the ribs hence the name rub. The steaks that I cooked used a fairly traditional mix of spices, such as Thyme, Pepper, Salt, Onion powder/Garlic Powder. The Burgers used a very simple mixture of salt and pepper.
3. **Section out everything**, after placing down the coals it is important to plan out how you are going to cook everything. What I did was start the burgers first so I could swap out the woods more easily and if I were to place the ribs first it would have an uneven amount of different wood's smoke. But, if I did not have to do the science experiment I would have placed the ribs first as they take a longer time to cook then say a sausage.
4. **Add flame.** You can imagine that fire is an extremely important part of the cooking process when on a grill but it is an ingredient that can over power the slab of meat you are cooking just as much as say bay leaf. Flame becomes quite important when trying to get a good char, now the char is an extremely important aspect of the grilling process because it imparts a good texture and flavor to the meat. Too much access to open flame though will have the meat losing all moisture and become well-done which may sound like "oh well maybe some people like their steak well-done?" you're eating wood chips if you like your steak well-done.
5. **Control.** managing the fire is another important aspect of grilling and one of the hardest things to do while grilling mainly due to your focus being on a lot of things at once. You have your meats that you are having to move on and off direct heat, you are having to flip them over to ensure that it is evenly cooked, and now added on top of that you have to make sure that the heat does not rise above certain temperatures or drop below certain temperatures. This management can be done by utilizing the air vents located on the chimney and the side of the grill. By opening these vents you provide more oxygen to the fire making it hotter, by closing them you cut off airflow which causes the fire to slowly die and thus get colder. Typically smoking temps are around 150-300 degrees fahrenheit, while grilling is along the lines of 400-500 degrees fahrenheit. It doesn't need to be exact though and fluctuations will occur during the cooking process so there is no need to be nervous.
6. **Time.** Time plays maybe the most important part of the cooking process, by giving certain meats more time to cook and smoke it imparts more of the flavor onto it. An example of this would be the hour a pound rule, in which for every pound you have of baby back ribs you smoke it for an hour.

7. **Changing out the coals and wood,** when cooking you are going to start to become low on coals or you are going to run low on wood that is actively burning. You will want to remove the center grates and pour in coals and wood. This may have to occur many times or not at all it depends on how long you are cooking.
8. **All time comes to an end, decay is the only constant.** It will come to an end, you will remove the cooked meat and place it onto a tray or a plate. Close all the vents to prevent oxygen from getting in effectively killing the fire. Wash your hands because they probably have raw meat on them. If you haven't touched raw meat you're doing it wrong. Enjoy.

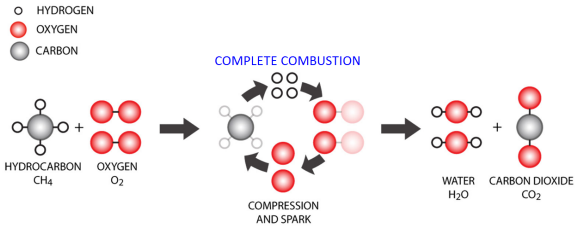
Tips

- Commit to it, you cannot give up halfway through this because you are worried that you messed something up. You just have to accept that mistakes happen and don't get mad at yourself for it.
- Do not use easy burn coals or lighter fluid as it will give your meats an odd chemical taste that is impossible to get out. Invest in a grill chimney.
- As opposed to what Hank Hill says propane also gives off that same chemical taste with the added benefit of it being generally easier to work with. It just is not the same as coal and wood though, be a grill purist. This goes for pellet cooking as well.
- Cook a lot at once because you are going to be using the same amount of coal and wood either way. Might as well use it to the best of your abilities.

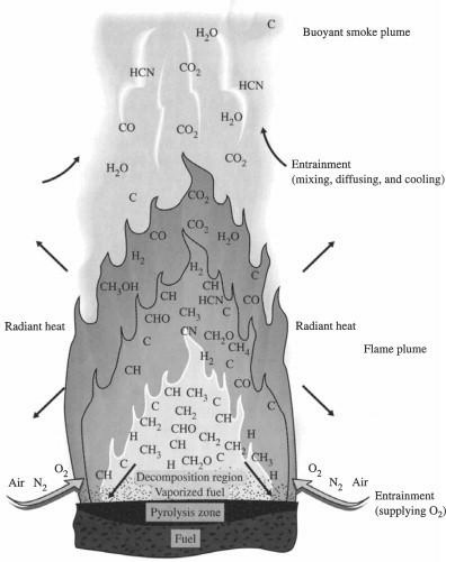
The Science behind it

Complete combustion of wood. Smoking is the process of the combustion of the molecules in wood when fire is introduced. Smoke is produced when the wood is burned incompletely meaning that there is not enough oxygen present in the atmosphere to fully burn the wood down to H2O and Co2 molecules. When incomplete combustion occurs particles get carried away in groups forming smoke. But, why does wood burn? Everything on earth has the ability to burn just not everything has different melting points that it burns at, take metals for example copper has a melting point of 1,984 degrees fahrenheit while ice is just 32 degrees fahrenheit. Back on the topic of wood though, wood has a lot of oxygen, carbon, and hydrogen bonds in it when burnt, say thrown into a burning mess of coals; those bonds begin to break apart. This process is called pyrolysis, which is the thermochemical composition of organic material once it reaches a certain temperature, this releases energy and atoms. The energy that is released is stored in the atomic bonds of the atoms; this is called chemical energy. The atoms proceed to rebond with the oxygen atoms present in the atmosphere, carbon atoms in the wood bond with the oxygen to create carbon dioxide and hydrogen atoms bond with oxygen to create H2O or water. This is where the build up of water vapor on the insides of the grill comes from. This is the basic idea of a complete burn, which is what was previously

mentioned that caused the wood only to release water and carbon dioxide.



Incomplete combustion of wood. What is truly utilized in the grill is what is an incomplete burn or combustion. By only releasing water and carbon dioxide there is not much flavor that is transferred over to the wood. By burning incompletely bigger chunks get picked up, these bigger chunks being different and larger molecules (larger than water and carbon dioxide molecules) like Guaiacol and Syringol. Wood burns incompletely when there is too little oxygen found in the atmosphere or when something happens to cool down the temperature of the fire like someone throws an ice cube in and the fire attempts to quickly reach an equilibrium temperature between the wood's burning temperature and the ice cube's temperature. Smoke is a collection of these larger molecules, sure you can't see them with your naked eye but when they come together they form smoke.



Flavor from smoke. Lignin is an organic polymer that works to transport water and also supplies mechanical support against various stresses. It is found in the cell walls of many plants while some plants may contain more or less than one another. They are found especially in wood or bark which later explains why wood is used primarily instead of various plants like grasses which is significantly lower than wood's content. It is important to have Lignin because it contains guaiacol and syringol and when combusted these chemicals release and create that smokey and well-known smoking flavor. This is because Guaiacol is responsible for the taste and the aroma is thanks to syringol and this is also the ingredient that causes your nose to sense fire.

The Experiment

My experiment revolved around the concept that lignin amounts in the wood and the effect that the quantity of lignin would have on the smokey flavor that grilling/smoking is

known for. The experiment took place using quarter pound beef hamburger patties that were grilled on open flame for around 4 minutes then left to smoke in a closed smoker for 8 minutes giving it time to absorb the flavor in the smoke. The woods sampled were hickory, mesquite, and a mixed blend (which consisted of apple, hickory, and oak). My hypothesis was that the meat will have a smokier flavor when using mesquite. This is because mesquite is high in the compound lignin and thus will have a more distinct smokier flavor than other woods. It would make sense to use a soft wood though due to their traditionally higher lignin amounts but mesquite is 63% lignin. How did I test this? I set up a blind taste test that measures the smokiness, density, general flavor, tenderness, char, texture, and looks of the burgers (Taste Test Paper). I kept it blind as opposed to open due to people's preconceived notions that mesquite is a stronger, smokier wood. The sample size was not the largest consisting only of four people. They were asked to on a scale of one through ten go through the categories for each burger (burgers were given the letter corresponding to their wood I.e hickory was H). The first few sheets that I viewed were somewhat expected, with mesquite scoring a 5, 9, and 7 in the smokiness category meaning that it was fairly smokey compared to the others, though there was an outlier giving it a 3. If we were to take out that one and calculate an average we would find that the average rating is 7 (adding the 3 to the equation would drop it by 1 making it a 6). The average for hickory was 5.25 and the average rating for the blend was 4.75. In the end, it seems that Mesquite was the smokier wood.