At What "Proof" will most Alcohol Spirits Burn?

I am aware that in the 18th century, alcoholic beverages were defined by their "proof," meaning its relative dilution and combustability (A 100 proof liquor would sustain combustion of gunpowder).

But here in the 21st century, I am certain I have seen liquors that are below 100 proof --Sambuca, for example-- be lit on fire, and sustain a flame.

So what's up? Is there an absolute proof lower limit, at which a shot won't light on fire? Or does it depend on the other ingredients in the liquid? Might an 80 proof Sambuca burn where an 80 proof rum wont?
posted by **eduke** to **food & drink** (10 answers total)

"proof" = (% ethyl alcohol) X 2. "Eighty proof" means the booze is 40% ethyl alcohol.

Any booze over 40 proof will ignite (I think, but I could be wrong) though you won't get a nice sustained blue flame until you get over 80 proof, and even then there's enough other liquids to douse the flame rather swiftly.

Use 151 for all your flaming alcohol needs (though Wild Turkey 101 will work in a pinch).

Signed,

A bartender who used to serve flaming drinks to flaming assholes.
posted by **BitterOldPunk** at **11:56 AM** on July 1, 2008 [1 favorite]

It's theoretically possible that the other ingredients would make a difference, but unlikely as a practical matter--as far as the question of "will it burn," spirits can be considered a mixture of ethanol and water, and I doubt there's enough "other stuff" in them to make much of a difference.

What does matter is the temperature--a liquor which does not have enough alcohol to burn at room temperature may burn when heated, which cooks often take advantage of when flambéing. Likewise, a shot which might not burn outside on a winter day might burn on a summer day.

The gunpowder test does not strike me as a particularly accurate one, for a number

of reasons (what temperature is it conducted at? how much gunpowder, and how much liquor? etc.) and indeed, does not appear to have been used since at least **1740**. I wouldn't be at all surprised if 80-proof liquors passed this "test" under the right conditions.
posted by **DevilsAdvocate** at **12:02 PM** on July 1, 2008 [1 favorite]

For what's it's worth, blue-label Smirnoff (100 proof) will ignite while red-label (80 proof) won't. The red-label kind will have kind of a fire splutter for a half-second, though.

That makes me think the mark is somewhere between there, like 90 proof maybe, for pure alcohol since vodka is nothing but water and alcohol. Sambuca is anise oil and alcohol, so maybe that has something to do with the ignition factor?
posted by **Willie0248** at **12:07 PM** on July 1, 2008

Wine (9% alcohol) will burn if you pour it into a hot pan near on a gas stove, but won't ignite like a shot of 151.
posted by **mattbucher** at **12:25 PM** on July 1, 2008

Sambuca is anise oil and alcohol, so maybe that has something to do with the ignition factor?

Sambuca also has quite a bit of sugar in it, which I would guess has more to do with it. In fact, I would guess that "too much water" is more of a factor in flammability than "not enough alcohol"; the two are correlated, of course, but "proof" only deals with percentage alcohol by volume.
posted by **Johnny Assay** at **12:34 PM** on July 1, 2008

Also, the question of whether gunpowder will burn if soaked in a specific liquor is different than the question of whether the liquor itself will burn. I'm not sure it's as simple as "the gunpowder ignites if and only if the liquor ignites."
posted by **DevilsAdvocate** at **12:42 PM** on July 1, 2008

This reference contains a chart confirming what others are suggesting - it shows flash points (the minimum temperature at which a combustible gas mixture will form) for mixtures down to 5%, but the flash point temperature steadily increases as the concentration of ethanol increases. So the answer will vary depending on ambient temperature or if you heat the mixture.

Here's a Google books reference stating that while the idea of burning gunpowder with alcohol to ascertain its "proof" is a consistent element in explanations of origins of the term, there seems to be a lack of proper, authoritative references on the real origin and history of this practice. One thing I read in more than one place is that it was not just the ability to sustain combustion but the quality of combustion (steadiness and color of flame) that defined proof. It's not unbelievable - early science had all sorts of wacky methods for metrics (ever look into the origin of the **Fahrenheit scale**?), and obfuscating the exact reasoning and methodology of things wasn't uncommon.

To answer your exact question, I'd say that (putting aside the issue of historical accuracy), the alleged proof test is not the same thing as whether a shot of whatever will burn if a lighter is put to it, so there's really no inconsistency.
posted by **nanojath** at **12:58 PM** on July 1, 2008 [1 favorite]

For what's it's worth, blue-label Smirnoff (100 proof) will ignite while red-label (80 proof) won't.

My blue-label Smirnoff (No. 57) is marked 45% ABV (=90 proof). The other day I was drinking some and also having trouble lighting a barbecue. I can confirm that 90 proof alcohol *goes up with a mighty whoosh* when poured onto a naked flame.

Off topic: How come Wikipedia says Smirnoff red is 80 proof (40% ABV) - a fact the **NY Times** confirms - but has a picture of a bottle marked 37.5% ABV? And how come my bottle of blue-label Smirnoff is marked 45% ABV (90 proof) when both Wikipedia and Willie0248 say it's 100 proof?
posted by **Mike1024** at **2:00 PM** on July 1, 2008

Wine (9% alcohol) will burn if you pour it into a hot pan near on a gas stove

That's because you're heating the wine up really fast, putting ethanol vapor in the air above the pan, and then lighting that on fire.
posted by **rxrfrx** at **7:24 PM** on July 1, 2008 [1 favorite]

I am aware that in the 18th century...
You've mixed up the original British origins of "proof" with what is now termed "proof" in the US. The two definitions have no relationship. The contemporary definition for proof was established around 1848 and was based entirely on % alcohol by volume (% ABV) and not combustability or specific gravity. More info

here.

posted by **junesix** at **9:30 PM** on July 1, 2008

http://ask.metafilter.com/95484/At-what-proof-will-spirits-burn

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The falmmibility of proof is 57.15% alcohol by volume.

In the 18th century and until 1 January 1980, Britain defined alcohol content in terms of "proof spirit," which was defined as the most dilute spirit that would sustain combustion of gunpowder.[1]The term originated in the 18th century, when payments to British sailors included rations of rum. To ensure that the rum had not been watered down, it was "proofed" by dousing gunpowder in it, then testing to see if the gunpowder would ignite. If it did not burn, the rum contained too much water—and was considered to be "under proof." A proven sample of rum was defined to be 100 degrees proof; this was later found to occur at 57.15% alcohol by volume, which is very close to a 4:7 ratio of alcohol to total amount of liquid. Thus, the definition amounted to declaring that (4÷7) × 175 = 100 degrees proof spirit.

From this it followed that pure, 100% alcohol had (7÷7) × 175 = 175 degrees proof spirit, and that 50% ABV had (3.5÷7) × 175 = 87.5 degrees proof spirit.