

Topic: Lightweight Stoves and Fuels

Learning Objectives

At the end of this session, each participant should be able to:

- Explain why lightweight stove training is important for Scouts and Scouters
- Explain the different types of fuels typically used in the backcountry and their relative advantages and disadvantages
- Identify the most commonly used backpacking stoves and their relative advantages and disadvantages
- Describe the safety considerations necessary for properly using backpacking stoves and fuels
- Explain some common maintenance techniques for backpacking stoves

Summary

Cooking in the backcountry can be an adventure, but it doesn't have to be a challenge. Choosing the right kind of stove and fuel depends on several considerations, such as weight, bulk, ease of use, and safety. Knowing how to make the right choice can make your backpacking meals more enjoyable and your hike more comfortable. Also, the new Second Class Requirement 2f makes it necessary to teach safe and proper stove-handling techniques to Scouts early in their Scouting career.

Outline

- 1) Types of Fuels (Advantages and Disadvantages)
 - Liquid Fuels
 - White Gas
 - Kerosene
 - Alcohol
 - Compressed Gas
 - Propane
 - Isobutane
 - Wood
- 2) Types of Stoves
 - A) Integral Fuel Container
 - Coleman Peak-1 Feather
 - MSR Rapidfire
 - GAZ
 - B) External Fuel Container
 - Coleman Peak-1 Apex
 - MSR XGK
 - MSR WhisperLite
 - MSR Dragonfly
 - Others
- 3) Stove Safety
 - Pouring Fuel
 - Fuel Storage
 - Reservoir Within the Stove
 - External Fuel Bottle
 - Pre-Heating (Priming)
 - Standard Methods
 - Alternatives (e.g., Fire Ribbon)
 - Importance of Stove Training
- 4) Stove Maintenance
 - Storage
 - Cleaning
 - Self-Cleaning Jets
 - Pump Maintenance

References

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1) Types of Fuels

There are several different types of fuels available for use in the backcountry. Each has its own specific advantages and disadvantages.

Liquid fuels are the most commonly chosen for backpacking use. They provide more heat output and are less bulky to carry, but they require special precautions for safe storage and handling.

White gas (e.g., gasoline or Coleman fuel) is perhaps the liquid fuel of choice for most backpacking stoves in the USA. It is readily available here and it burns hot and clean. Because of the explosion hazard of gasoline fumes, though, extreme caution must be exercised in handling this fuel.

Refined kerosene can be burned in some multi-fuel stoves, but it doesn't burn as clean as white gas and doesn't give quite as much heat output.

Alcohol is the cleanest and safest burning of the liquid fuels, but it also has a lower heat output than the petroleum-based fuels.

Compressed gas is a good alternative when safety is the primary consideration. However, the added weight and bulk of compressed-gas canisters, plus the problem of their disposal, makes these fuels less attractive for backpacking.

Propane is relatively safe, inexpensive, and readily available. It is reliable at high altitudes, but not in cold weather. The seals on propane bottles and pressure safety release valves have been known to leak.

Isobutane also is a relatively safe fuel, but it is more expensive and less readily available than propane and doesn't burn as hot.

Sterno does not burn hot enough and should not be relied upon for use in the backcountry.

Wood, the low-technology fuel, is usually available in the backcountry but ground fires aren't always allowed (e.g., due to the threat of forest fire in extremely dry conditions, or because overuse has severely limited the availability of firewood). Disposal of ashes and other residue, and cleaning of cookware, are additional considerations.

2) Types of Stoves

A) Integral Fuel Container

Coleman makes a variety of stoves under the Peak-1 brand name. The Backpack model is simple, durable, and relatively easy to use. It burns a butane-propane blend, which doesn't perform well at low temperature or high altitude. Also, the control knob is close to the burner, which can be painfully discovered. One of the most popular of the Peak-1 stoves is the Feather series. These stoves are relatively simple to use, allow good burner control for simmering, and are among the least expensive of the liquid-fuel stoves. Since the fuel bottle is an integral part of the stove assembly, though, overheating is a concern, especially when using a large pot. Also, the stove is a bit bulky and maintenance can be tricky in the backcountry.

The Camping Gaz Turbo stove burns a compressed gas blend in special canisters that aren't interchangeable with those from other compressed-gas stoves. This model has been reported to have stability problems, especially with large pots, and requires patience and dexterity to assemble.

The MSR Rapidfire is an isobutane stove whose basic advantage is its simplicity. It doesn't burn as hot as the liquid-fuel stoves, but may be adequate for novice backpackers or when handling of liquid fuels is a concern.

B) External Fuel Container

The Peak-1 Apex stove is Coleman's entry in the external liquid-fuel bottle stove market. This stove also has good burner control and has been rated as one of the best at simmering. It is bulky to pack, though, and large pots can be

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tricky to balance. It has also been reported to require frequent maintenance in the field.

Mountain Safety Research (MSR) also makes a variety of commonly used stoves. The XGK model is probably the most basic and simplest design, and it is easy to set up and light. This stove is not good at simmering, though. The MSR WhisperLite is one of the lightest, most compact, and most reliable of the liquid-fuel stoves. It has been given high marks for stability and durability, and is easy to maintain in the backcountry. The major disadvantage of this stove is that it does not simmer well. The MSR Dragonfly is very similar to the WhisperLite, but it has an additional valve for better control of simmering. Of course, this additional capability means a corresponding higher price.

There are many other types of backpacking stoves that range from the basic to the exotic. The stove that you choose will depend on your requirements for such things as ease of handling, weight, bulk, and type of fuel. Note: These notes are for reference only. They are not intended to imply product endorsement or preference.

3) Stove Safety and Operation

One of the major concerns of liquid-fuel stoves is transferring fuel from a carrying container to the stove. Never pour fuel into or near a hot stove. Also, allow sufficient time for fuel vapors to disperse before attempting to light a stove after pouring fuel. Finally, using a small filter when pouring fuel can help avoid problems caused later by clogged fuel lines. Fuel storage is a special concern for stoves that have an integral fuel reservoir under the stove. Not only do these stoves require care when transferring fuel, but also caution must be exercised when using large pots that reflect heat back down to the fuel reservoir and can cause overheating.

Stoves with external fuel bottles are not free from concern, though. The use of a heat shield between the stove and the fuel bottle is a good idea. Also, when removing the fuel bottle, pressure must be released slowly and carefully to avoid spraying or spilling fuel.

Liquid-fuel stoves require preheating (or priming) to vaporize the fuel for efficient burning. The standard priming method usually involves using a small amount of liquid fuel from the stove. Attempting to re-light a liquid-fuel stove while it is hot can be extremely dangerous, because the fuel vapors are potentially explosive. There are alternate priming methods, which use a flammable jelly (e.g., fire ribbon) or denatured alcohol as a priming fuel. These methods are safer to use, but require carrying additional materials.

Stoves always should be operated on a flat and level surface that is free of burnable material.

Always store liquid fuel in bottles that are clearly labeled and have been designed for this specific use. Never use these bottles to contain water. Never store any fuel, either compressed gas or liquid, inside a tent or sleeping area.

The most important safety feature of any stove is a trained operator. Be sure you know how to use and maintain your stove, and be sure to train others (including Scouts) who will be using it. Scouts always should use lightweight stoves under the supervision of a trained and qualified adult.

4) Stove Maintenance

Properly cared for stoves will last indefinitely. For stoves with external fuel bottles, allow the stove to cool and allow the fuel to evaporate from the pump and fuel line, then store the parts in sealed plastic bags. For stoves with integral fuel reservoirs, empty the fuel and allow the residual vapors to dissipate completely before storing the stove.

Even with careful handling stoves will get dirty. Wipe off any soot and avoid getting dirt in the fuel jets or on any pump parts. Periodically clean the fuel line assembly of a liquid-fuel stove with automobile carburetor cleaner.

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Some liquid-fuel stoves have self-cleaning jets that make cleaning easier on the trail.

Probably the most vulnerable part of a liquid-fuel stove is the fuel pump. Repair kits usually contain a variety of gaskets and diaphragm parts, because these are the most likely to wear out. If these parts are inspected and lubricated periodically, future problems on the trail can be minimized.

References

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http://www.gearfinder.com/gf_frames/stoverslt.asp