

TechTips- Plastic Bags for Solar Cookers

These Notes are for consideration in designing solar cookers for your use. As an alternative to Glass, clear plastic is an option, though not all plastics are created equal. Discussed below are some considerations. This information was shared by S. Mahoney of Solar Cookers International, a great solar cooking organizational resource. www.solarcooking.org [9/2003]

Generally there are 4 types of bags that will work: polypropylene (SCI bags), nylon (Reynolds oven roasting bags), polyester, or high density polyethylene (HDPE) bags (the crinkly-sounding bags that are common in stores in the United States and many parts of the world, often bearing the #2 recycle symbol.) The HDPE bags need to be clear or mostly clear and are not quite as durable as the other options.

REPLACING YOUR COOKING BAGS

The ideal bag for a solar Cookit lets the maximum amount of sunlight through, but does not melt or break down when exposed to the hot pots and the ultraviolet light in sunshine. In practice, bags do break down and some less-than-fully-transparent bags will work with your Cookit.

The bags packed by SCI with the Cookits we sell are called "autoclavable polypropylene bags" which we purchase in boxes of 1000. They are 2 mils in thickness and 19 inches by 24 inches in size. Thicker bags would tend to last longer but be stiffer and harder to work with, but not substantially different. The size of the bag need only be large enough to completely surround your pot with a very small amount of room to spare.

In the United States, generally the easiest way to find replacement bags is by visiting your grocery store and looking for "oven roasting bags" or "turkey roasting bags." "Reynolds" oven roasting bags are made of nylon.

HDPE (high density polyethylene plastic) bags can be used with a solar Cookit. They handle high temperatures well. In the United States, they are in common use as grocery bags, often milky white or tan in color, and rustle noisily when handled. These do not appear to work quite as well as completely transparent high-temperature bags, but except on marginal solar-cooking days, the difference may not be noticeable.

Experimenters have found that clear nylon, polyester or polypropylene bags work well. After about a dozen uses they get brittle and tear. Even with holes in them, the bags still work, and two badly torn bags, one inside the other, can be as good as one new one. These bags are found in most countries, but can be expensive; they are often sold to hospitals for use in sterilizers.

In many parts of the world, heat resistant plastic bags are difficult to find in smaller villages and towns. However, this is not always the case. For example, our team found the bags for sale in the remote village of Kakuma, Kenya. If the bags cannot be found in the smaller towns, one should check in the larger cities. Organizations planning a solar cooking project may want to check with manufacturers of plastic bags in their countries to see whether the bags can be made to order, as one of our correspondents from Burkina Faso has done.

Where plastic bags are most difficult to replace, one answer being tried is to make small frames that hold the plastic bag around the pot to insulate it, but keep the bag from actually touching the hot pot, so that the bag does not heat up as much and thus lasts longer. Below is an example of a frame designed by Mr. Gnibouwa Diassana of Mali, by twisting stiff electrical wire into shape: (diagram not included).

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ALTERNATIVES TO BAGS

In the original experiments that led to the invention of the CookIt, inventor Roger Bernard used a large glass salad bowl placed upside down over the pot to let in light and trap heat. SCI has heard of people using large, clear, low-cost plastic or glass fish bowls instead of bags. (Try to check to be sure the plastic does not include flouride, chloride or iodide additives). A Japanese solar cook uses a 25 cm diameter clear plastic dome that is sold as protecting young plants from frost.

ARE PLASTIC BAGS HARMFUL TO THE ENVIRONMENT?

Production of plastic bags consumes almost no energy, because the chemical changes from oil to these plastics are minor molecular changes.

The amount of fossil fuel (oil) needed to produce a plastic bag is a tiny fraction of that consumed when someone instead cooks a meal with paraffin (kerosene).

Not all plastics give off harmful fumes when heated or burned, only those containing chlorides, fluorides or iodide additives, such as PVC pipes and styrenes (styrofoam) where there is insufficient oxygen. Others, including all plastic bags used in solar cooking (polyethylenes, polypropylenes and polyesters), are all simple hydrocarbons which, when heated or burned, give off only carbon dioxide and water, no other fumes

After bags are worn out, they can be safely burned as fuel--just like paraffin or wood. They can also first be re-used. For example, in the solar cooking field projects sponsored by Solar Cookers International in East African refugee camps, refugees have used traditional weaving skills to make baskets, pot hangers, mats, ropes and other useful items from worn out solar cooking bags.

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[September 2003 email communication w. S. Mahoney]

Additional note on maximum temperatures of various plastics

Polypropylene (autoclave bags) – 135C (275F)

Vinyl (Reynolds Oven Bags) – 400 F