

Making and using a water purifier using plastic buckets and plates a tap and a ceramic candle filter.



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Introduction

The availability and safety of municipal piped drinking water in cities like Harare is much disputed, especially for those people living in high density settlements and the suburbs. This is becoming a source of concern for other towns and cities not only in Zimbabwe but in many other countries throughout the world. The source of Harare's piped water, Lake Chivero, is also heavily polluted and the quality of piped water is suspect even after treatment. Also ground water is being depleted due to heavier use and its quality is also under suspicion, especially in areas where sewer pipes may be leaking. The huge increased reliance of domestic water from underground aquifers is due to a combination of factors such as the huge number of privately owned boreholes now in operation, many driven by solar panels. Also, the considerable fluctuating levels of rainfall. The climate is changing. Ground water levels are falling.

Most people cannot afford to drill boreholes on their own property and pump into tanks in their own back yards. Under these conditions families must take steps to protect themselves by constructing simple equipment to improve the quality of water they drink in their own homes. Cost is an important issue, and the methods of construction must use items which are relatively low cost and available on the market in stores or hardware outlets. This means using a filter of some sort best placed in the kitchen. The method described here uses plastic buckets and plates, a tap, and a ceramic candle filter. Small taps and ceramic candle filters are available in specialised stores. The filter itself will be the most expensive part. This work has been performed at my home, as a demonstration to assist people to build a water purifier for themselves, specifically for drinking in situations where the authorities cannot supply clean water. I drink the water described in this account every day.

The equipment

The water purifier can be made from a 9litre and a 10-litre plastic bucket, 2 plastic plates, a small tap and a ceramic candle filter. The taps are available in many hardware stores and the ceramic filters are available in specialised suppliers in Zimbabwe. In this demonstration I have chosen to use a Doulton candle filter made in England by British Berkefeld. But other filters of this type can be used. Most candle filters are shaped like candles as shown in the photo below. Candle filters are made from a ceramic material with very small pore size which does not allow bacteria to pass through. The water passes through the filter slowly in drips.



The components used in this demonstration. A video has also been made showing the parts and the process.

The components used in this demonstration.



This is the candle filter used in this demonstration. It should be supplied with a rubber washer and plastic wing nut.

The candle filter comes with a rubber washer and a plastic wing nut to tighten the filter onto a suitable container. In this case a bucket. A hole must be made in the base of the bucket to allow the threaded part of the filter to pass through. It is important that the hole is levelled off flat with fine sandpaper.



This hole can be made by using a nail heated over a flame to make holes in the base of the bucket which can be carefully opened with a knife and then opened up a round file.



The hole must be opened so that the threaded part of the filter can pass through the hole. The upper and lower surfaces around the hole must be smoothed down with fine sandpaper.

The upper and lower surfaces around the hole must be smoothed down flat with fine sandpaper. It is essential that the seal between the bucket and the filter's rubber washer is perfect. If the seal is not perfect some water may seep through between the rubber seal and the bucket. It is essential that all the water entering the lower collector bucket passes through the outlet pipe of the filter.



The filter outlet pipe is passed through the hole in the bucket with the rubber washer inside the bucket. The threaded plastic wing nut is then done up tightly holding the filter secure. The bucket with the candle filter is now ready for use.



The hole for the tap is made in the same way and smoothed down.



The tap is inserted with the rubber washer and wing nut.

Assembling the parts

A plastic plate with a hole cut in the middle is placed on the lower collector bucket with a tap fitted. This hole in the plate allows the water from the filter bucket to pass into the lower collector bucket. The filter bucket is then placed on the plate covering the collector bucket. Water from the source is then poured into the filter bucket, so it is almost filled. The remaining plastic plate is then placed on top of the filter bucket to protect the contents.



The plastic plates.



These steps are best undertaken in some suitable place in the kitchen. The lower plate is placed on the lower bucket.



The filter bucket is placed on the lower plate. Water is then introduced into the filter bucket.



The upper plate is placed on the filter bucket to keep the water protected.

The sources of water requiring filtering

These include water from suspect boreholes and wells. And can include water collected from the roof and gutters. But in this case care must be taken. The candle filters operation will be reduced if the water is not clear. This water can be collected in clean unused dustbins and allowed to settle before it is introduced into the water filter. Also, it is best to allow several flushes of the early rainwater to clean debris that has collected on the roof and gutter during the dry period. Water which contains some silt will slow down the flow through the candle filter. Rainwater collected from roofs is not safe for drinking unless it is well flushed and clean, and preferably filtered. The cleanest and best rainwater used for drinking can be collected from dedicated “rain catchers” which I have described elsewhere.

Storing rainwater is essential in this climate as the rain does not fall for most of the year. This means that some form of storage must accompany the various ways of collecting rainwater. So that the rain which is collected can still be tapped from storage tanks, which in these days are specialised plastic tanks.

Also, steps must be taken to use water economically both in the home and in the garden and there are several ways of doing this, which are described elsewhere. Water is precious and must be treated as such. There are methods of saving water for washing hands, even in the house. In sunny climates water can be heated in pipes or black containers.



Collecting rainwater from a dustbin collector with rainwater from a roof and gutter. The roof and gutter must be well washed down by early rains before it is used in the filter system. This roof collected water is not fit for drinking. New dustbins can be used to collect clean rainwater for washing cloths and showering. Stored rainwater can also be used for flushing toilets inside the house.

Flow rates

The water passes through the filter slowly in drips. It may take several hours to fill, or part fill the collector bucket. This can be judged by inspection. The filter will work more slowly and get clogged more quickly if the source water is turbid. For best results the pre filtered water should be as clear as possible. Using the same principles 2 candle filters can be fitted to double the rate of filling of the collector bucket. If the filter becomes less efficient due to partial clogging by sediments, it can be partly cleaned with a clean toothbrush. For long life of the filter, it is best to use very clear water.

Storage of water in the home



The filtered water can be poured into bottles of various sizes for storage and use. 500ml, one litre, 2litre and 5litre bottles can be used.

Carrying purified water for use during the day



Water fit for drinking will be needed during the day away from home. Either at school or at work etc. The writer collecting purified water using the simple candle filter method into a 500ml bottle.



The writer collecting purified water using the simple candle filter method into a 2-litre bottle. Depending on the rate of flow this filter can deliver water to fill a 5li bottle and more overnight.

The bottom line

Water is precious for life. Treat it as such.