



Water Purification Techniques



- Boiling
- Sunlight Exposure
- Chlorination
- Flocculation
- Filtration - Straining
- Three-Pot Treatment



Boiling



- Equipment/Skill Required:
 - Water container
 - Intense heat – fuel (wood, gas, etc)
 - Preferably a fuel efficient stove
 - Must be able to produce heat
- Process:
 - Water should be placed in a container and heated until boiling.
 - The water should be allowed to boil for at least 10 minutes.
 - Once cooled the water will be ready to use.





Boiling



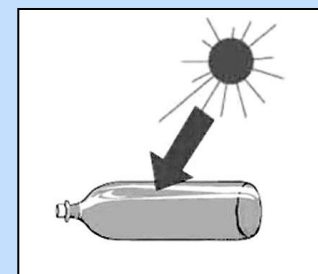
- Advantages
 - Simple and effective method of purification
 - Will kill many waterborne bacteria through the intense heat
 - Uses local available materials
- Disadvantages
 - Can sometimes be difficult, time consuming, and cost inefficient because of the high volume of fuel used
 - Will not remove mud from 'murky' water
 - Will not remove suspended or dissolved compounds



Sunlight Exposure



- Equipment/Skill Required:
 - Disposable clear plastic bottles (glass bottles should not be used as they do not let enough sunlight into the water)
 - Bright sunlight
- Process:
 - Fill a clean bottle, leaving a quarter empty.
 - Put the top on and shake the bottle for 20 seconds.
 - The bottled should then be left in sunlight (usually on the roof of your home) for one day (or two days if the sky is cloudy)
 - Drink the water straight from the bottle to avoid cross-contamination.
 - In the rainy season, paint one side of the bottle black. This will increase the water temperature quicker.
 - The painted side should be placed underneath





Sunlight Exposure



- Advantages:
 - Kills harmful bacteria and pathogens
 - Simple, convenient and inexpensive
 - If used correctly, the water is as clean as boiled water
 - Will not change the taste of water
- Disadvantages:
 - Will not remove mud from 'murky' water
 - A 6-12 hour waiting period

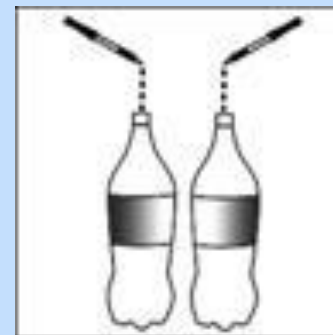


Chlorination



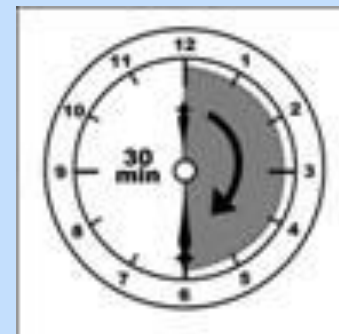
- Equipment/skill required:

- Household bleach
- Water vessel
- Stirrer
- Clearest water possible



- Process:

- Boil the water for 5 minutes
- Add the bleach to water.
- Stir thoroughly.
- Let it stand for at least 30 minutes.





Chlorination



- Advantages:
 - Easy to use method of chemical purification of water
 - Effective at killing bacteria and viruses
 - Inexpensive
- Disadvantages:
 - Not effective at killing all parasites.
 - Complex compounds can form with organic material which over time can be hazardous to health.
 - It is best to use the water in a shorter period of time and store it in a plastic container in a cool and shaded place.



Coagulation and Flocculation



- Equipment/skill required:
 - A coagulant (ex. aluminium sulphate)
 - Some skill/training
 - 2 vessels
 - Stirrer
 - Filter – a cloth
- Process:
 - Add a coagulant to water and stir rapidly.
 - Allow to stand for some time, and continuously stir slowly to form large flocs.
 - The formed flocs clean the water by attracting pathogens and other microorganisms.
 - Remove the flocs using filtration and be careful to not re-contaminate the water.



Coagulation and Flocculation



- Advantages:
 - Proven reduction of viruses, bacteria, protozoa
 - Pesticide and heavy metal removal
 - Simple technology and use
- Disadvantages:
 - May be toxic if used improperly
 - Could be more expensive and complicated than other methods due to increased number of required materials and skill
 - Requires multiple steps



Filtration -Straining



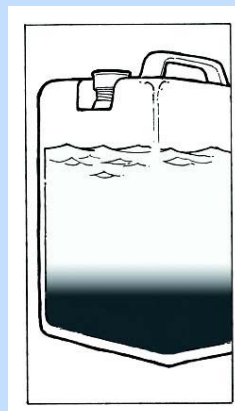
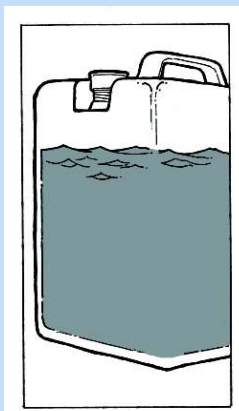
- Equipment/skill required:
 - Porous barrier: cost and efficiency depends on the barrier: clean woven fibers (cotton cloth, linen, others) Moringa tree seed press cake, ceramic filter
 - Water vessel
- Process:
 - Fix the barrier on top of the water vessel.
 - If using cloth it should be folded 4-8 times to create a thicker barrier.
 - Pour water through the barrier into the vessel, trapping solids and particles on top of the barrier.
 - Take care to only allow filtered water to reach the bucket.



Settling



- Letting water collected during the day settle over night can be an effective way of improving the clearness of water by reducing turbidity (very murky water) and is a cheap alternative to sand filtering.
- However you must leave undisturbed for a sufficient period of time (at least 10 hours), out of sunlight (at night), in a sealed container is best.
- **Warning: Must be used in conjunction with Filtering. This is only a pre-treatment to make Filtering more effective!!**





Filtering Water with Cloth



1.



2.



3.



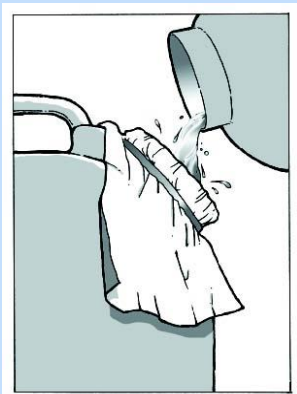
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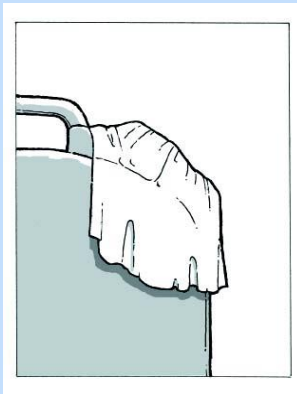
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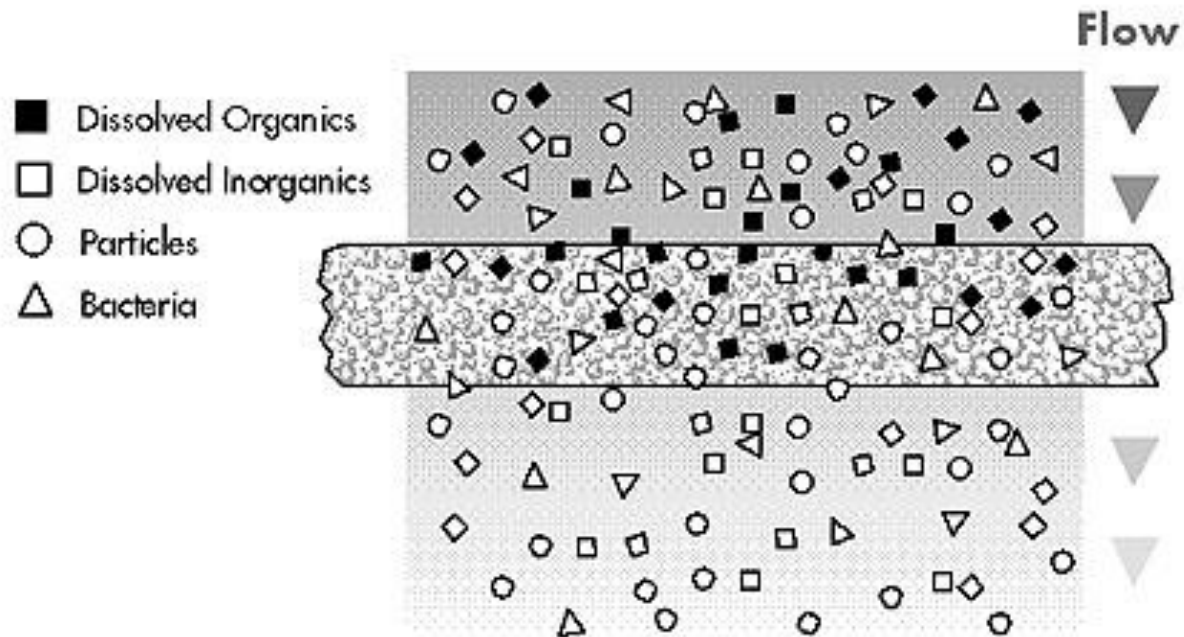


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Filtration -Straining





Filtration -Straining



- Advantages:
 - Cost effective
 - Immediate access to water
 - Filters out all particles that are larger than the pores in the barrier
 - Can be cleaned and reused
 - Does not alter taste of water
- Disadvantages:
 - Does not guarantee removal of all virus particles and infectious contaminants, chemicals, pollutants, chemicals and poor tastes
 - Should not be used as a sole purification method



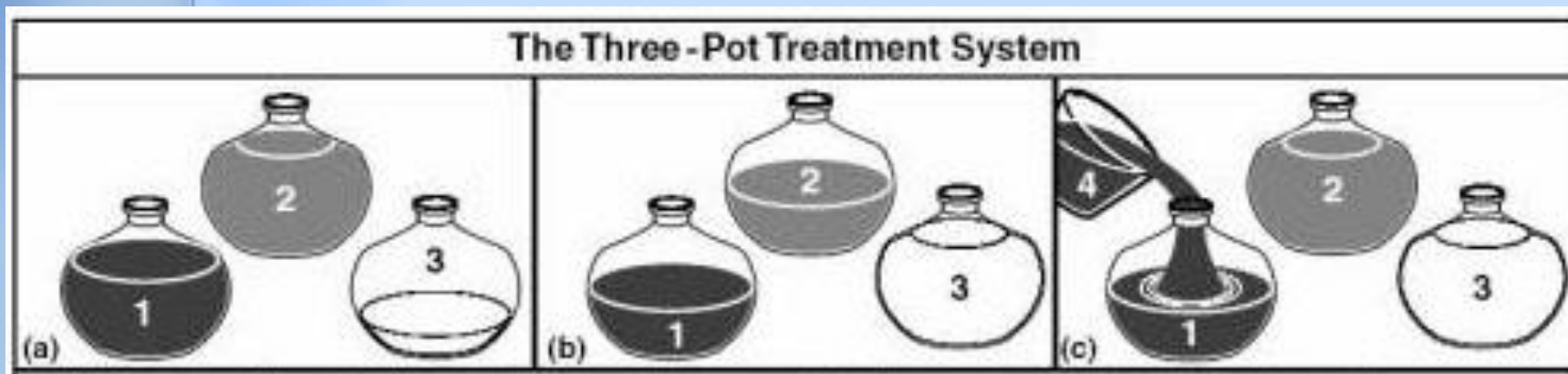
Three-Pot Treatment



- Equipment/skill required:
 - 3 water vessels/pots for processing; 1 for collection of dirty water and 1 for collection of clean water
 - if possible - a flexible pipe to siphon water as it disturbs sediment less than pouring
 - if possible - a cloth or any filtration barrier
- Process:
 - Pour water into the first pot (pouring it through cloth increases efficiency).
 - Let the water settle for as many hours as possible – a length of just one day can kill of more than 50% of most bacteria.
 - Pour water into a second pot, let it settle again.
 - Then pour into the third pot and let it settle again.
 - Drinking water is drawn from the third pot only.



Three-Pot Treatment





Three-Pot Treatment



- Advantages:
 - Cost effective
 - Easy to use and maintain
 - Bacterial contamination levels decrease through settlement and over time
- Disadvantages:
 - Does not guarantee complete removal of some bacteria and micro-organisms
 - Could take a few days to treat water