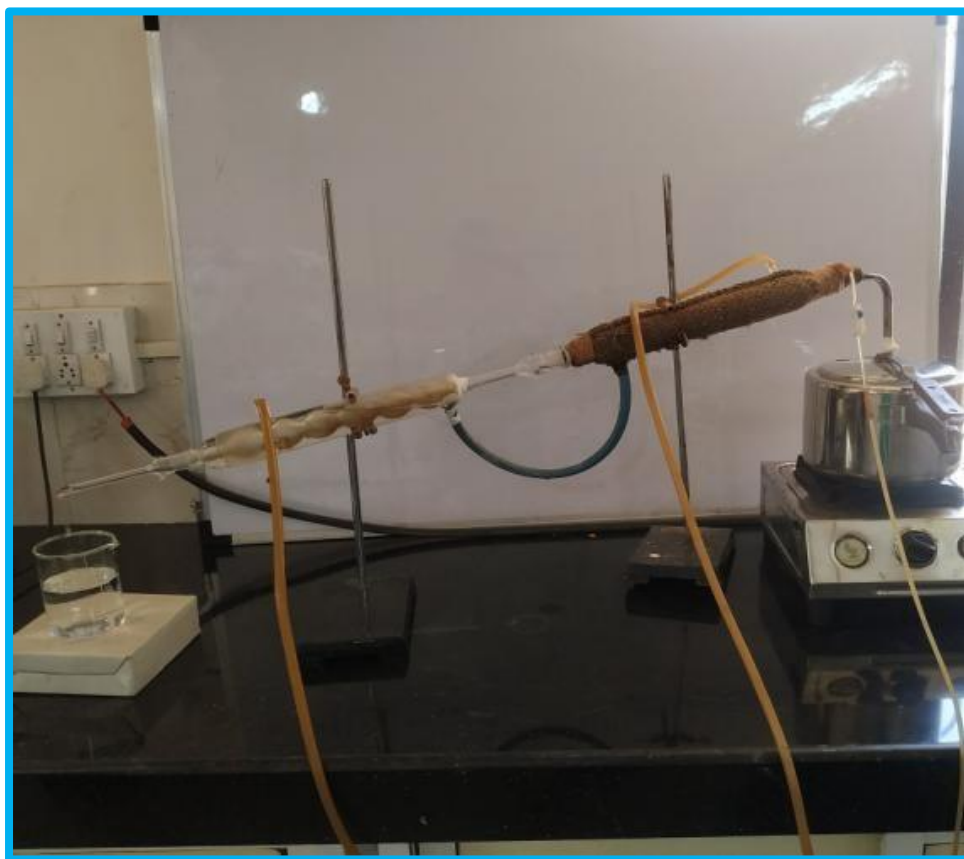


Distillation Unit



Do-It-Yourself Manual

SCOPE

Distilled water is today's need in almost all fields of research and development viz. chemicals, pharmaceuticals, biotechnology, medical science and material science. The most general method for getting distilled water is mainly energy intensive and is very costly too. Vigyan ashram developed low cost & easy handle distillation unit .Low cost distillation unit costing around Rs. 5000/- which is far affordable than of commercially available distillation unit in market costing around Rs. 13000/-.

Contents

Sr No.	Details
1	Introduction
2	Applications
3	Working Principle
4	Materials and their Specifications
5	Equipment required for distillation set up
6	Steps and precautions

1. INTRODUCTION:-



Image :- Distilled Water

The need for distilled water in research areas can hardly be overstressed. It is a primary requirement in chemical laboratories and industries to get large amounts of distilled water. The distillation unit and distilled water purchased from the market is very costly. Vigyan ashram developed a low cost distillation unit to convert saline water or tap water into distilled water.

Distilled water is water that is boiled into vapour and condensed into liquid in a separate container. Distilled water is a one type of purified water. Distilled water is formed from the steam of boiling the water by boiling the water minerals and other impurities are removed leaving the distilled water in pure state because of this distilled water can help cleanse from unnecessary chemicals.

Distillers can effectively remove most or all contaminants, including minerals, metals, organic chemicals, and microorganisms from water. Since distilled water has no minerals, some people claim distilled water tastes flat or slightly sweet. Distillation also kills or removes microorganisms, including most pathogens. Distillation can also remove organic contaminants, but its efficiency depends on the chemical characteristics of the contaminant.

Distillation efficiency also decreases as the TDS of the water increases. Volatile organic chemicals (VOCs) like benzene and TCE vaporize along with the water and decontaminate the distilled water if not removed prior to distillation. Some distillation units may initially purge some steam and volatile chemicals. These units should be properly exhausted to prevent indoor air contamination. Some home distillation units have activated carbon filters to remove VOCs during distillation.

1.1. Distillation unit developed at Vigyan Ashram has following features

1. Low capital & running cost water distillation unit.
2. Easy handle and low cost distillation unit.

2. APPLICATIONS

1. Distilled water is used in laboratory, organic chemistry lab, clinic, fermentation and medical industry etc.
2. It is also used in autoclave, battery and miscellaneous equipment.

3. WORKING PRINCIPLE




The principle for operation of a distiller is simple. Water is heated to boiling in an enclosed container. As the water evaporates, inorganic chemicals, large non-volatile organic chemicals, and microorganisms are left behind or killed off in the boiling chamber. The steam then enters condensing coils or a chamber where the steam is cooled by air or water and condenses back to a liquid. The distilled water then goes into a storage container.





4. MATERIALS AND THEIR SPECIFICATIONS

Materials name	Materials	Quantity	Quality
Cooker	Stainless steel	1	3 litre
Submersible pump	Plastic	1	18 W
Cork	Rubber	1	d= , l=
Connecting hose	Plastic	2	l=
Water storage container	Plastic	1	70 litre
Gas supply	Stainless steel	1	14.5 kg
Distilled water collecting container	Plastic	1	3 litre
Condenser	Glass	1/2	24/29

(d= Diameter, l= Length,)

5. EQUIPMENT REQUIRED FOR DISTILLATION SET UP :-

Sr. No.	Equipment	Description	Image
1.	Cooker	It is required for boiled water. The topside of this cooker attached to the condenser through rubber cork.	
2.	Submersible pump	It is required to circulate water for the cooling system. Use pump with following specification: <ul style="list-style-type: none"> • Voltage: 165-250 V/50H • Power : 18 W • H-Max: 1.5m • Output: 1000L/h 	
3.	Condenser	Condenser is basically a device used to condense a substance from gaseous state to liquid state by cooling it.	

4.	Cork	A rubber stopper is a small, tapered plug used to seal the openings of flasks.	
5.	Gas supply	It requires heat for water.	
6.	Water storage container	It required storing the water.	
7.	Connecting hose	It required an inlet and outlet for the condenser.	

Steps

1. Fill the cooker with water (approximately 5 litre).
2. Kept this cooker on gas & start heating.
3. Switch on a submersible pump to circulate water for the cooling system.
4. Collect distilled water in a container.