

# DISTILLATION



# Distillation \*

- \*Distillation is a process of purification of liquid organic compounds by conversion to the vapor state with the aid of heat, and condensation of the vapors to the liquid state.
- \*The temperature at which the liquid distills is definite value (at a given pressure) for every pure organic compound and is known as the boiling point.

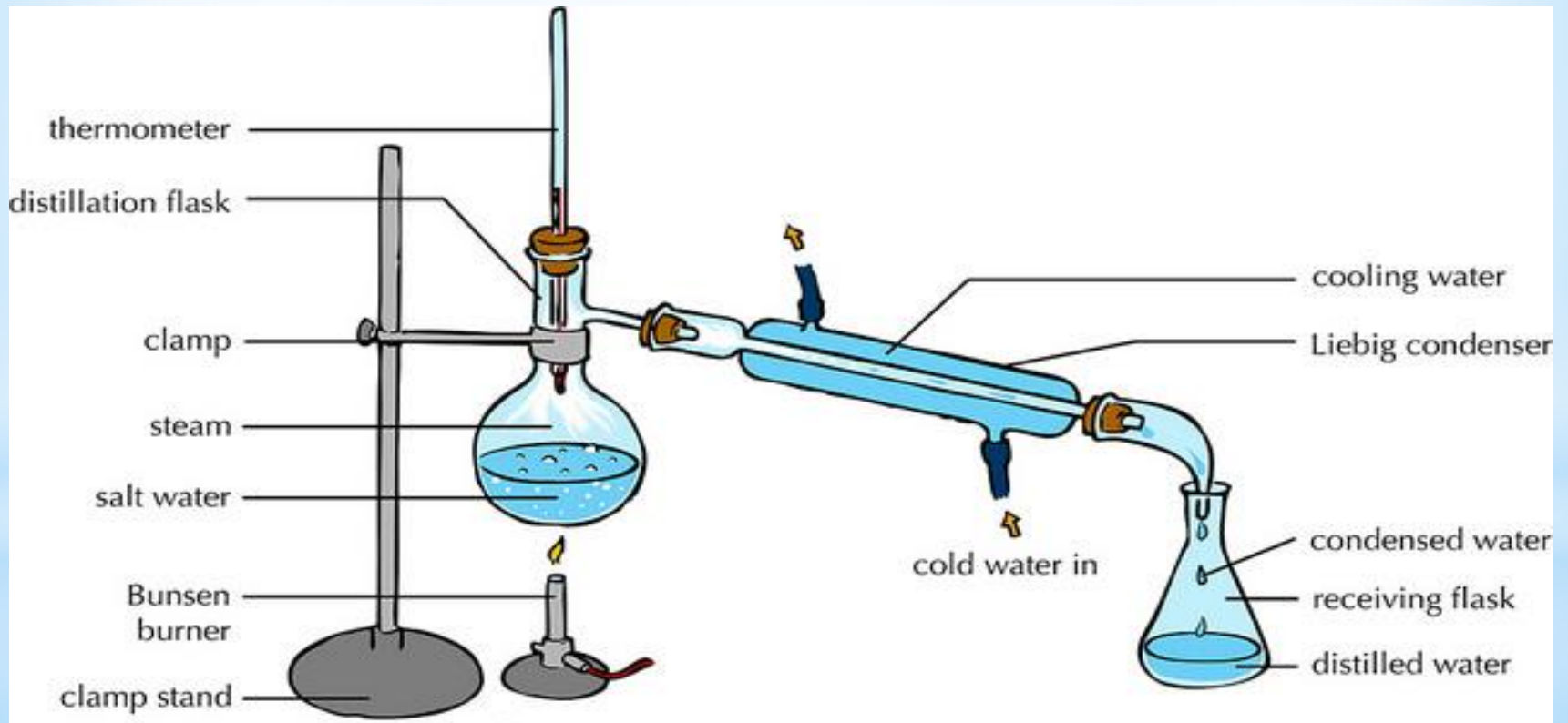
## Aim of the experiment \*

- \* 1-purification of liquid organic substance.
- \* 2-determination of the boiling point.
- \* 3-separation of liquid organic substances from each other or from a non –volatile solid compound.
- \* Distillation is limited to a certain extent because some organic compounds decompose when an attempt is made to distill them at a normal atmospheric pressure.

## Types of distillation:

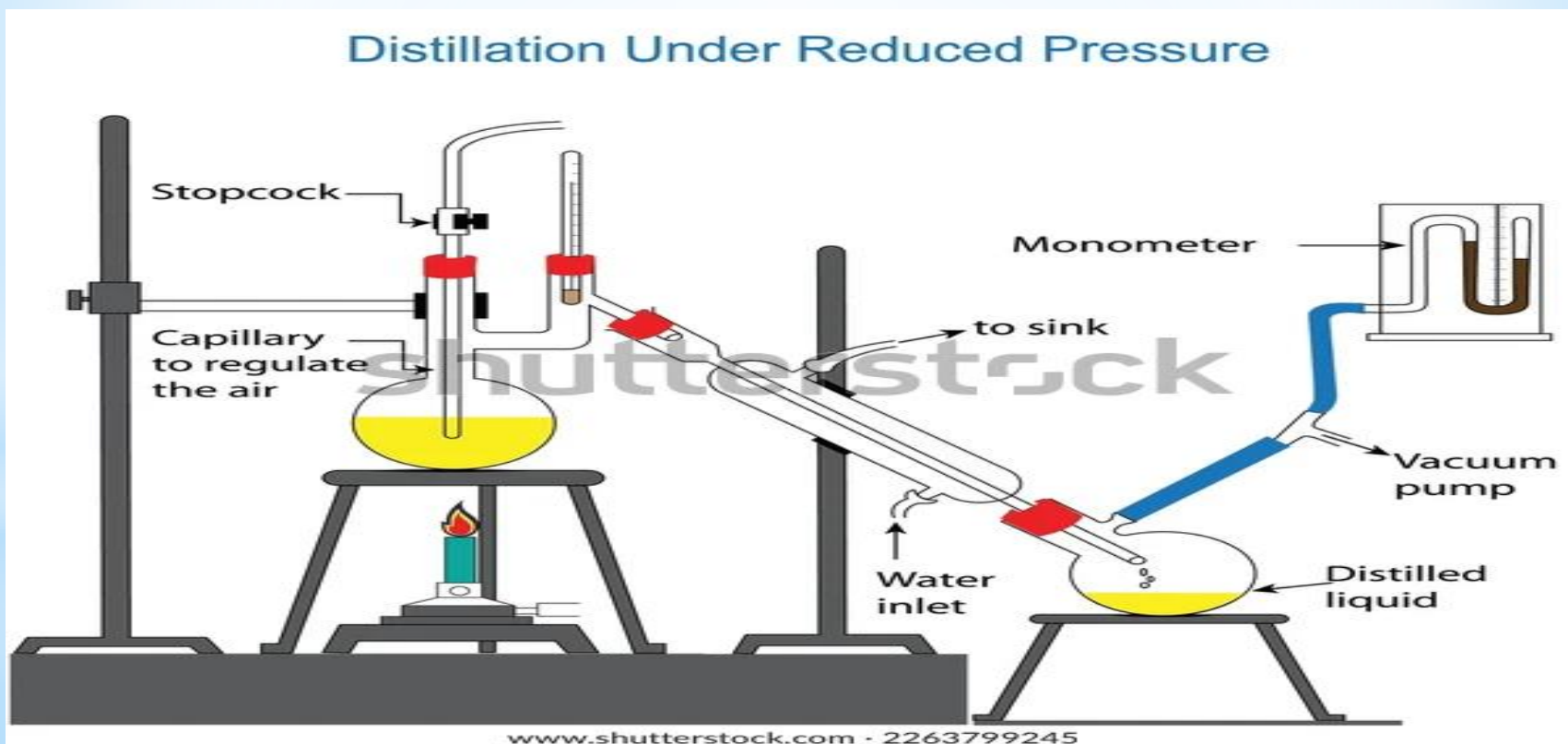
### 1-simple distillation

This method is used for the separation of liquids having boiling points ranging from  $30^{\circ}\text{C}$  to  $150^{\circ}\text{C}$  and are stable to heat.



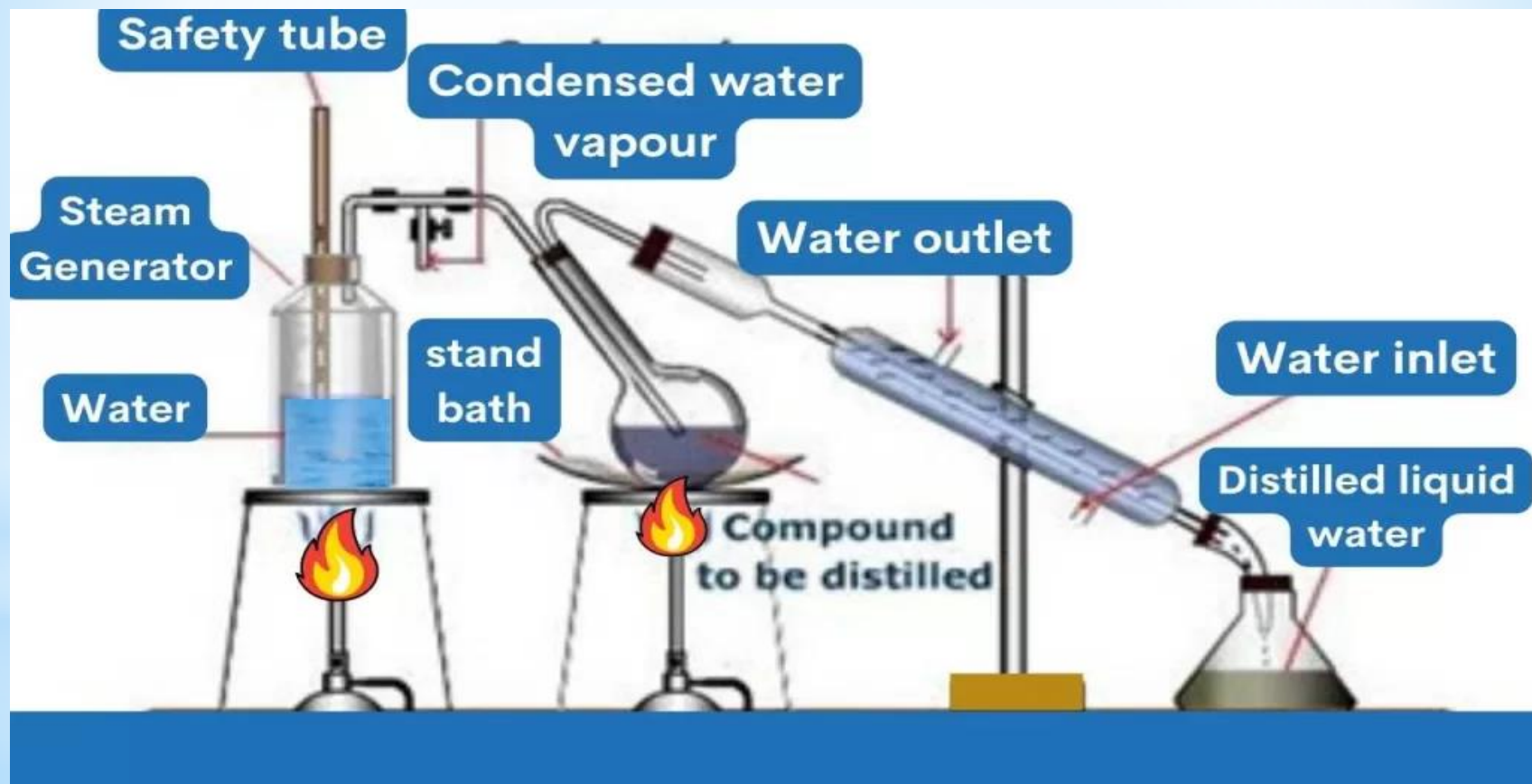
## 2-Vacum distillation (distillation under reduced or diminished pressure)

This method is used for the separation of liquids with high boiling points or are unstable to heat. These difficulties may be overcome by lowering the pressure over the substance, thus lowering the boiling point and the temperature necessary to effect the distillation (diminished – pressure distillation).



### 3-steam distillation

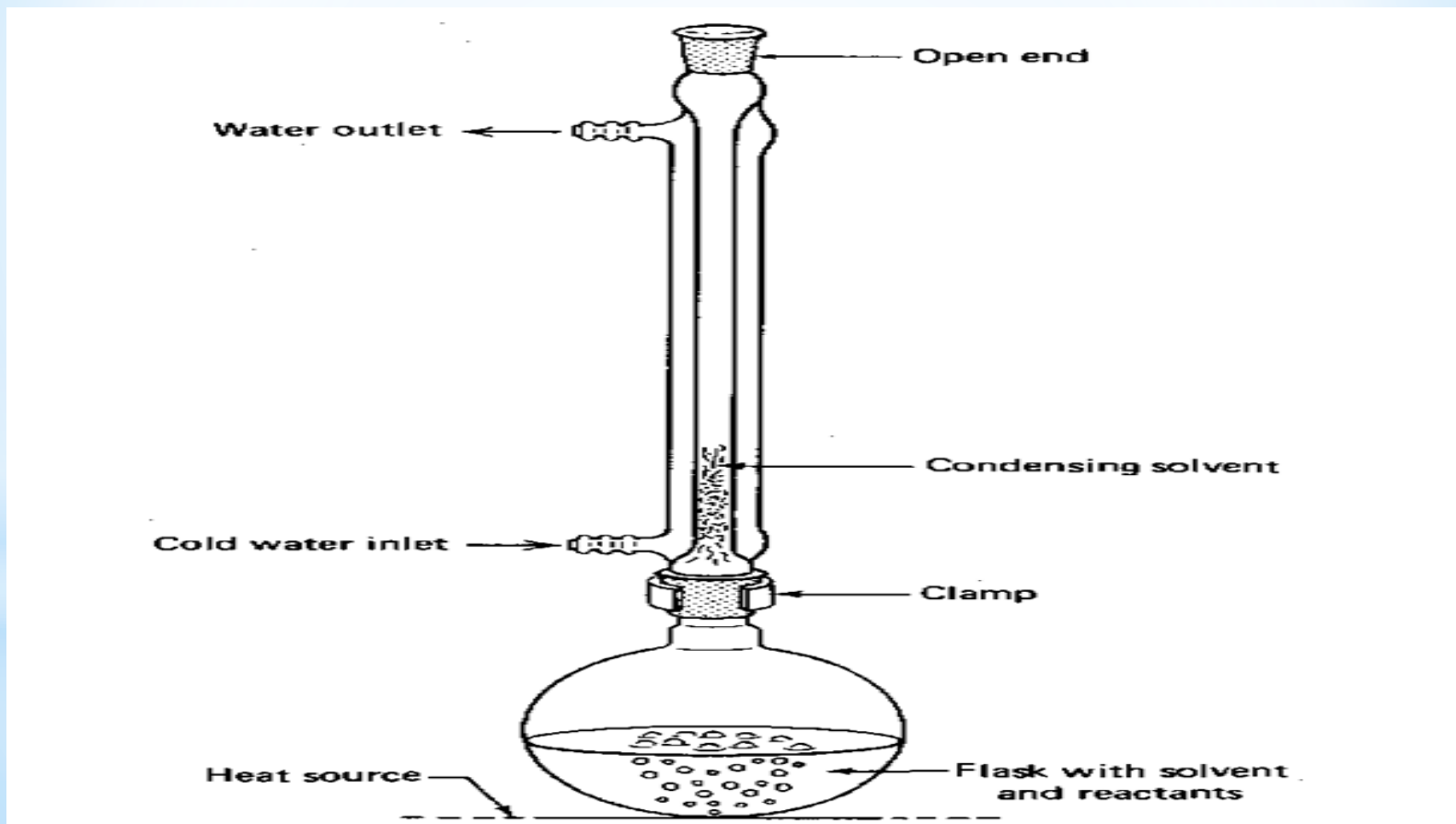
This method is used for the purification of non – volatile organic compounds and which are immiscible with water.





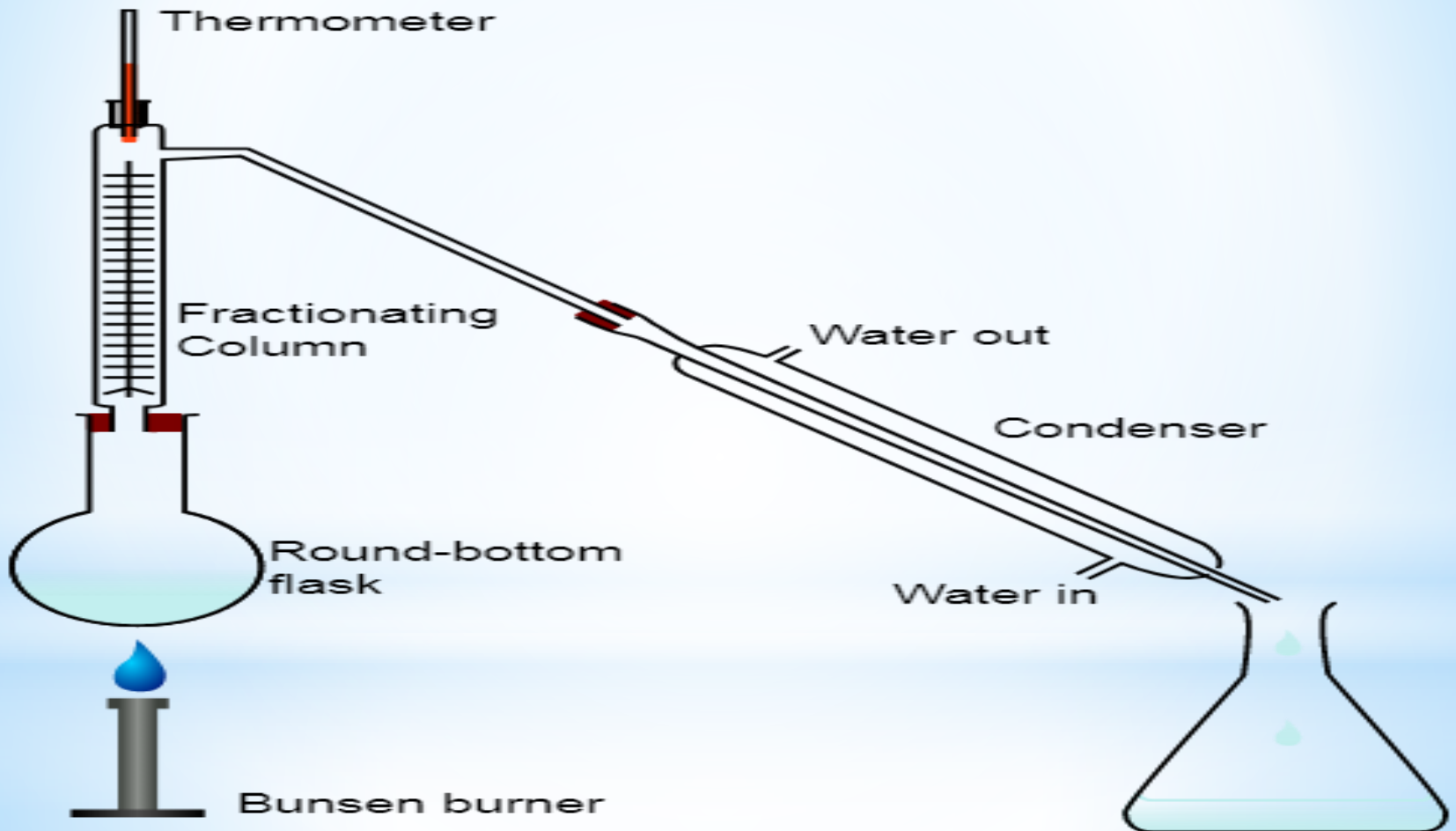
## 4-Reflux distillation

This method is used to keep or prevent the reactants from loss by evaporation during a reaction.



## 5-Fractional distillation

This method is used for the separation of two or more liquids with different boiling points.





## **Simple distillation**

A single individual organic substance is readily distilled with ordinary distillation apparatus which consists of a distillation flask fitted with a thermometer and water –cooled condenser. Two or three pieces of broken porcelain chips are placed in the flask with the substance to be distilled, they prevent bumping by producing a constant stream of bubbles that keeps the liquid in motion. If the liquid is quite volatile ( low-boiling ), the flask is heated by a water bath rather than by a flame.

## **Discussion**

Pure compounds distill over a very narrow range of temperatures.

The boiling point is affected by impurities, some may increase the boiling point, others may decrease it, and some may not affect it. For example the addition sodium chloride to water results in raising the boiling point of water.

The effect observed here is the lowering of the vapor pressure of water, that is the tendency of the molecules to escape has been diminished.

Usually the first few milliliters contain water or volatile impurities , the second portion contains the pure substance.

## Procedure

1. put 100 ml of ethanol in a boiling flask
2. Add 2-3 pieces of boiling chips.
3. start the water running slowly through the condenser.
4. Heat until boiling .
5. Adjust the temperature so that distillation proceeds at 2-3 drops per second. Discard the first 2-3 ml of the distillate.
6. Continue distillation until you collect 30-60 ml.
7. Record the boiling point of your liquid, ethanol.

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