Chapter 33: Water

Water is a compound made up of hydrogen and oxygen (H_2O)

Blue cobalt chloride paper is used to test for water. (it turns pink when wet)

Properties of Water.

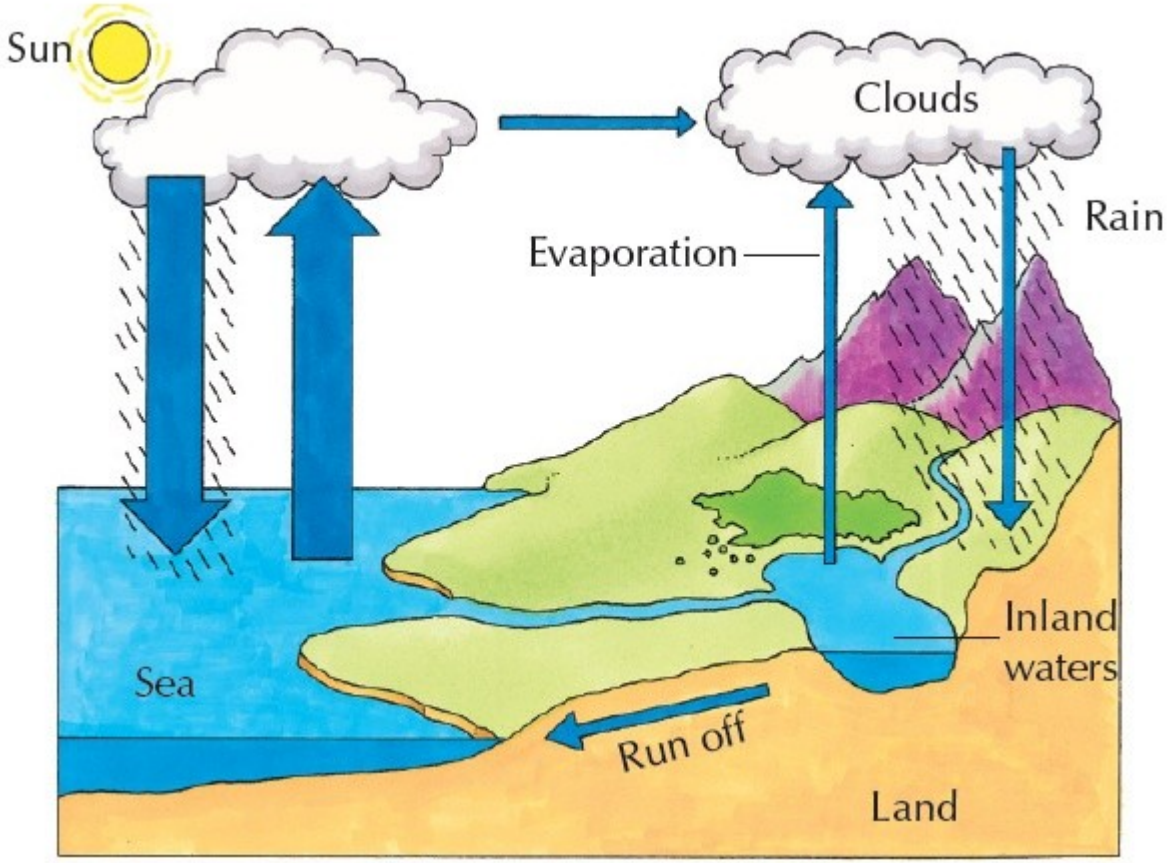
- Freezing point = 0^oC
  Boiling point = 100^oC

2. Water expands when it freezes.

3. Ice floats on water because it is less dense.

4. Water is a solvent: this means that many substances dissolve in it.

The Water Cycle



1. Heat makes water evaporate from the ocean

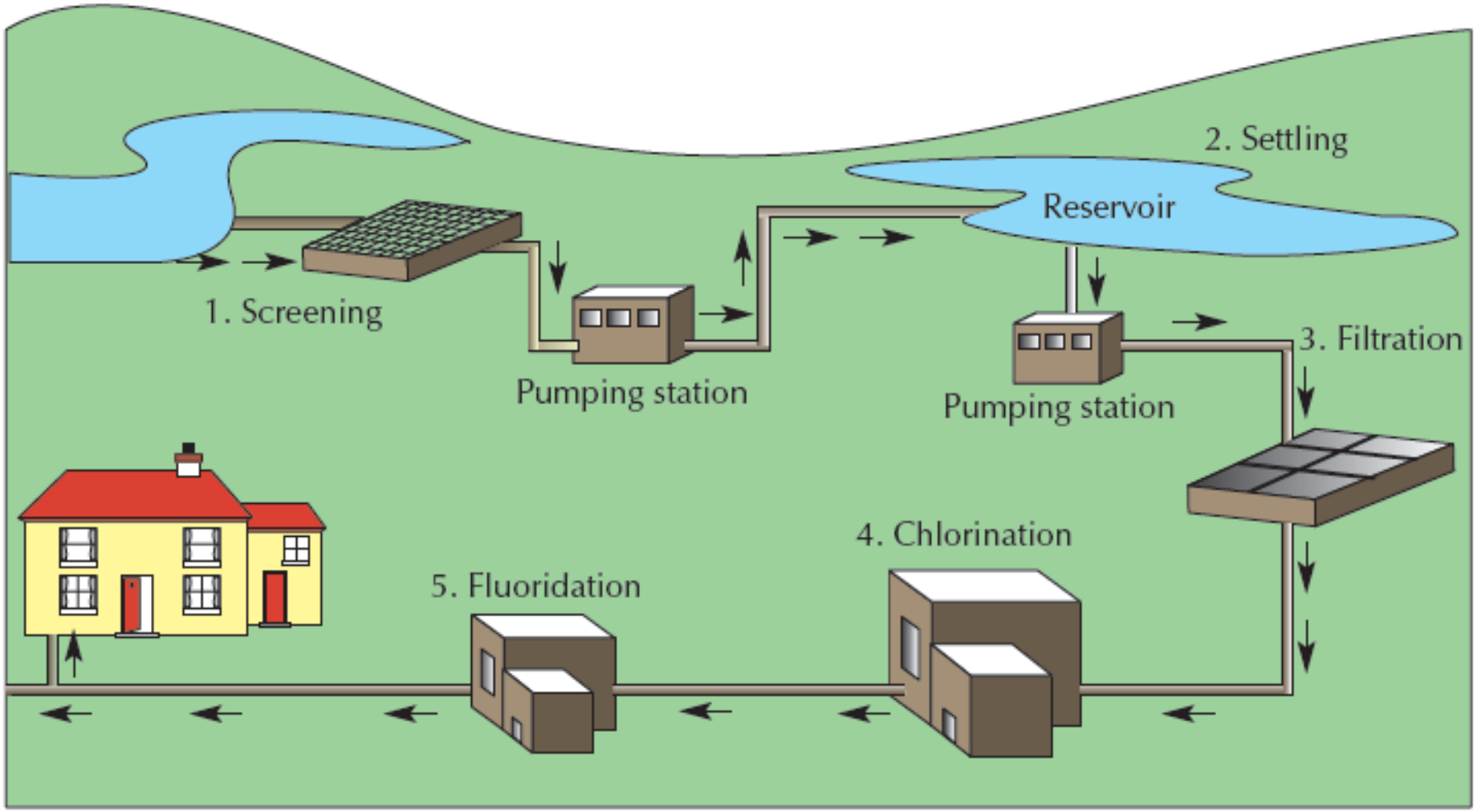
2. The water condenses and forms clouds

3. The clouds cool and form droplets of water called rain.

4. Rainwater soaks into the ground and seeps into the rivers.

5. The rivers carry the water back to the ocean.

Water Treatment



1. Screening: Wire mesh removes large pieces of dirt and rubbish.

2. Settling: The water settles in large tanks where the dirt falls to the bottom.

3. Filtration: Filtration beds (sand beds) removes the small dirt particles.

4. Chlorination: Chlorine is added to kill bacteria.

5. Fluoridation: Fluorine is added to help prevent tooth decay.

However water is hardly ever pure, it always contains some dissolved particles.

The purest water found is Distilled Water.

Hard water is water that does not easily form a lather with soap.

Soft water is water that forms a lather easily with soap.

Calcium ions dissolved in water makes it hard. They form a scum when mixed with soap.

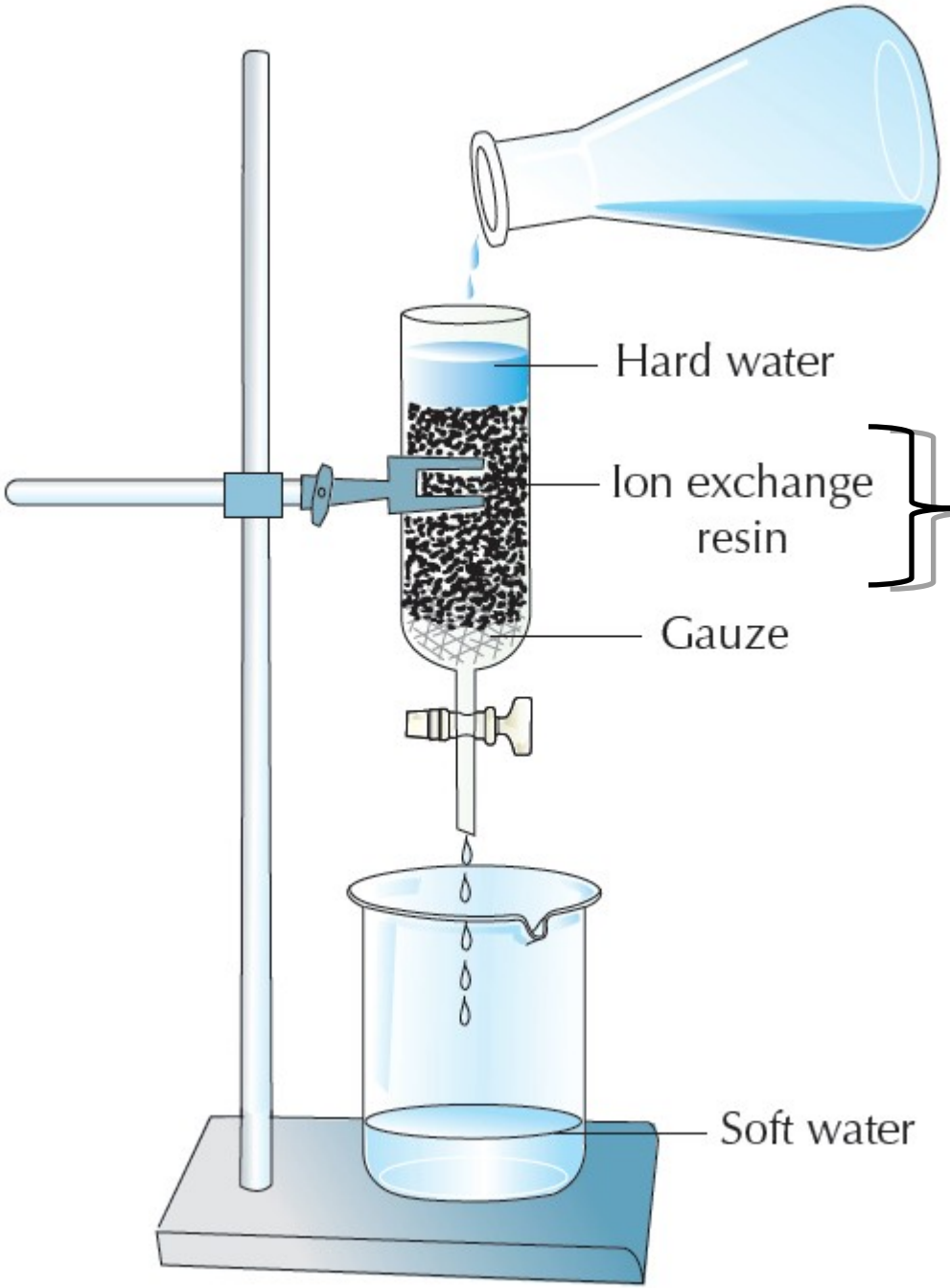
Hard water is found in area's where water comes into contact with limestone rocks. (The acidic rain helps to release ions.)

Calcium Carbonate + Rainwater ⟶ Calcium ions.

Removal of Hardness by Ion Exchange

Water is passed through **resin** to remove the hardness.

- The Ca^{2+} in the water are swapped for the H^{+1} in the resin
- Negative ions in the water are swapped with the OH^{-1} in the resin.
- Then the H^{+1} and the OH^{-1} combine to form water.



Ca^{2+} Swap → H^{+1}

– ions Swap → OH^{-1}

Advantages of Hard Water.

2. Provides calcium for teeth and bones.
3. Good for brewing and tanning.
4. Tastes better.

Disadvantages of Hard Water.

2. Blocks Pipes, damages kettles and washing machines. (limescale)
3. Wastes Soap.
4. Produces scum with soap.

Electrolysis of Water.

Electrolysis is a chemical change brought about by an electric current.

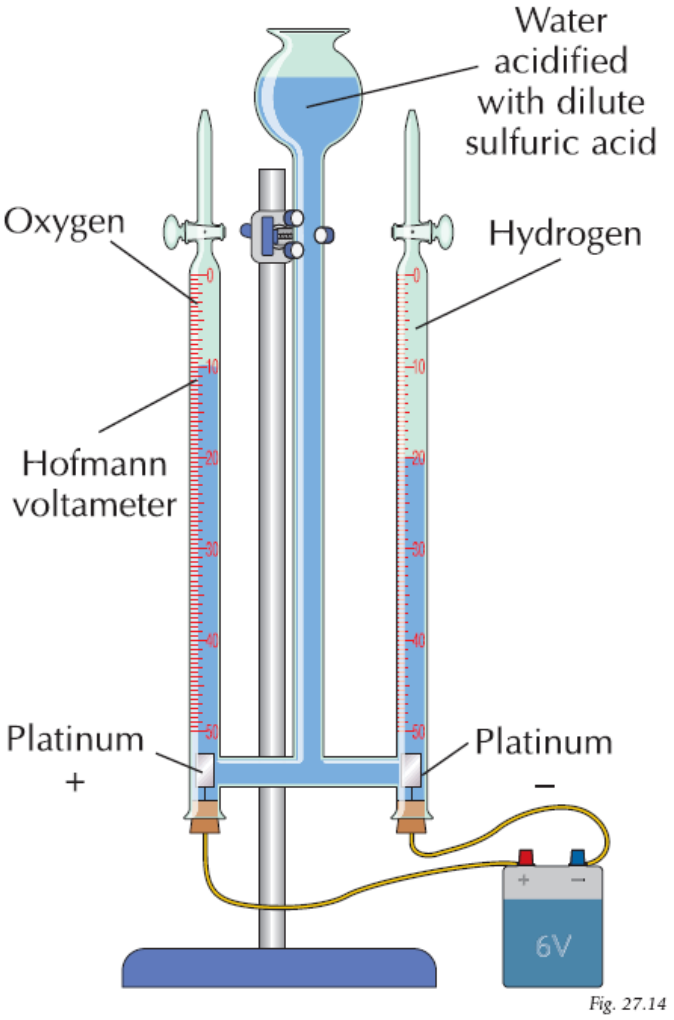


Fig. 27.14

The **Hoffman Voltameter** is used to separate hydrogen and oxygen from H_2O

- Sulfuric acid is added to the water so it will conduct electricity.
- Hydrogen gathers at the negative electrode. (because H is always a + ion.)
- Oxygen gathers at the positive electrode. (because O is always a – ion.)

Why is there twice as much hydrogen produced??

Because its 2 H for every 1 O. (H_2O)