How does the "Cloud in a Bottle" work?

The cloud in the bottle works by imitating the variance of the air pressure within the Earth's atmosphere. By using the foot pump, the air inside of the bottle is compressed and the air pressure and temperature is thereby rising. When the cork is removed quickly, the air will escape very fast to adjust to the ambient pressure. This means, in the bottle air pressure and temperature drop rapidly and also the temperature of the water/alcohol vapour. This represents the rising of warm air and water vapour into higher atmospheric layers with lower air pressure and temperature. The dew point of the vapor is crossed and it wants to condense.

Aerosol particles inside the atmosphere alleviate the condensation, so every droplet inside the forming cloud in the bottle has a small particle inside as a condensation nucleus.

How does a Cloud form?

1. Warm air moves upwards.
2. Because of the Earth's gravity there are more air molecules near the surface and less higher up in the atmosphere. So higher up, the air pressure gets lower.
3. Less air pressure means the air can expand.
4. Expanding air also cools down.
5. Inside cooling air, water vapour wants to condense and become liquid water again.
6. Surfaces help the water vapour condense – like it can be observed on a glass filled with ice water.
7. The needed surface for the water vapour can be small particles from many different sources like dust from deserts, ashes from volcanoes, organic vapours from forests, or human emissions.
8. Those particles are called aerosol particles. Water vapour and an aerosol particle build a droplet.
9. Many droplets build a cloud.

Now, do you want to make your own Cloud?

All you need is ...

1. Get a normal water bottle and note that you have the air and aerosols you need already inside it
2. Put a bit of rubbing alcohol in the bottle and wet the bottle walls with it (this will be your water vapour)
3. Drill a hole into a cork and close the bottle with it afterwards
4. Faites un trou dans un bouchon et fermez la bouteille avec
5. Fit the end cap of a foot-pump into the cork and use the pump to build pressure
6. Quand la bouteille est sous pression, enlevez le bouchon rapidement (Attention, la bouteille est sous pression, cela va faire du bruit)
7. Watch a cloud instantly form
8. Those particles are called aerosol particles. Water vapour and an aerosol particle build a droplet.
9. Ces petites particules en suspension dans l'air s'appellent des aérosols. La vapeur d'eau et l'aérosol s'unissent pour former la goutte d'eau.

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