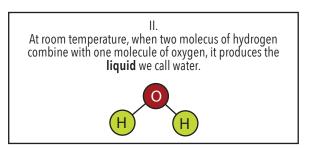
Emergence of Novel Properties in a Simple Physical System

From H's and O's to H2O:

How we get a liquid from the combination of two gasses.

I.
Separately, at room temperature, hydrogen and oxygen are gasses

H



Question:

Here, we have what we might regard as a **qualitative** transformation -- from gas to liquid.

As a liquid, water has **different properties** than its base elements, which are gasses.

A liquid **emerges** from the combination of two gasses.

How is this possible?

Oxygen carries two pairs of unshared electrons. Electrons repel eaach other. This causes the water molecule to have a slightly bent structure.

Unshared Electrons

H + polar covalent bond

The O atom keeps electrons away from the H atoms, causing the O atoms to have a slighly more negative charge.

