Vog is from Volcanoes!

Follow the numbers 1 through 10 to learn about the chemistry of vog.

**EXTRA BUILDING INSTRUCTIONS** are in the box at the bottom.

1. **Oxygen and water molecules are normally present in air. Build a molecule of O₂ and 6 molecules of H₂O. Place them on their pictures up in the air.**

2. **Erupting volcanoes release a mixture of gases including sulfur dioxide (SO₂). Build 2 SO₂ molecules and place them on their pictures.**

3. **Move the O₂ molecule into the reaction as shown with the dashed line.**

4. **Light energy helps oxygen molecules (O₂) react with sulfur dioxide (SO₂). The result is sulfur trioxide (SO₃). Take apart the O₂ molecule and the 2 SO₂ molecules. Use the bricks to build 2 molecules of sulfur trioxide (SO₃). Place them on their pictures.**

5. **Move 2 water molecules into the reaction as shown with the dashed line.**

6. **Water (H₂O) can react with sulfur trioxide (SO₃) to produce sulfuric acid. Take apart the 2 H₂O molecules. Add the bricks to the 2 sulfur trioxide (SO₃) molecules to create sulfuric acid (H₂SO₄). Place them on their pictures.**

7. **Sulfuric acid and water molecules form a mixture in tiny droplets called particulate matter (PM). Move the 4 H₂O molecules from the air into the droplet as shown with the dashed line.**

8. **Move the 2 H₂SO₄ molecules into the droplet as shown with the dashed line.**

9. **Vog contains both SO₂ and particulate matter (PM). When people breathe in vog, the SO₂ and particulate matter can damage their lung cells.**

10. **Winds can blow vog in different directions. Near the volcano, vog is mostly SO₂. Further away from the volcano, vog is mostly particulate matter (PM). Track how vog moves around the island.**

**ISLAND OF HAWAIʻI**

- Trade winds blow from the northeast.
- Fresh vog (mostly SO₂).
- Aged vog (mostly PM).
- Airborne ash.
- Volcanic ash.

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**EXTRA BUILDING INSTRUCTIONS**

**How to build SO₂ (sulfur dioxide):**

1. Construct SO₂ molecule.

2. Move O₂ molecule into the reaction to form SO₃.

3. Use 2 H₂O molecules to form H₂SO₄.

**How to build H₂SO₄ (sulfuric acid):**

1. Construct H₂O molecule.

2. Add SO₃ molecule to form H₂SO₄.

3. Move water molecules into the droplet.