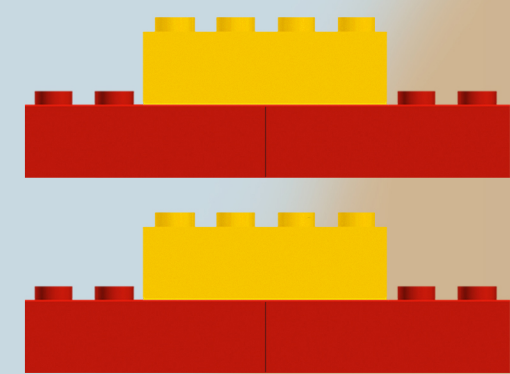


# Vog is from Volcanoes!

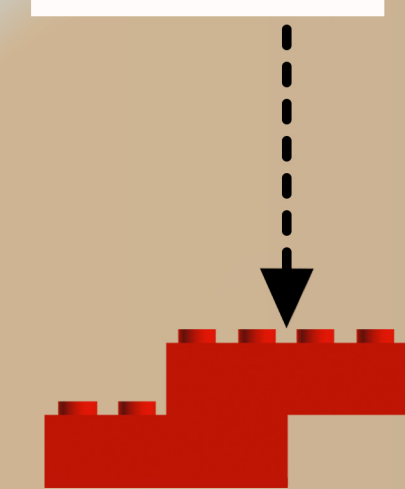
Follow the numbers 1 through 10 to learn about the chemistry of vog.  
 \*EXTRA BUILDING INSTRUCTIONS are in the box at the bottom.

**1** Oxygen and water molecules are normally present in air. **Build a molecule of O<sub>2</sub> and 6 molecules of H<sub>2</sub>O. Place them on their pictures up in the air.**

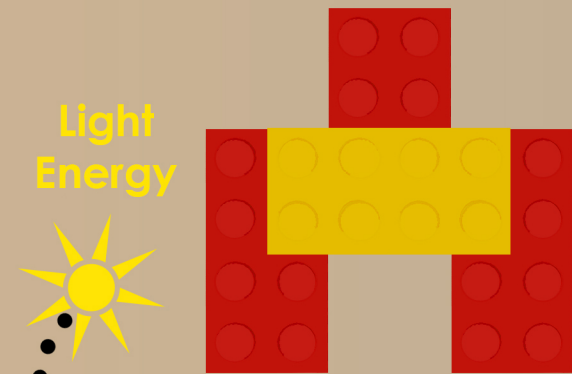
**2** Erupting volcanoes release a mixture of gases including sulfur dioxide (SO<sub>2</sub>). **Build 2 SO<sub>2</sub> molecules and place them on their pictures.**



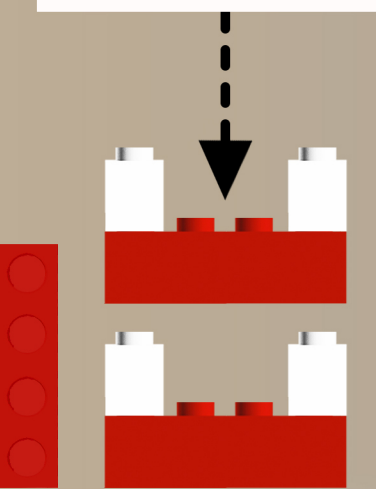
**3** Move the O<sub>2</sub> molecule into the reaction as shown with the dashed line.



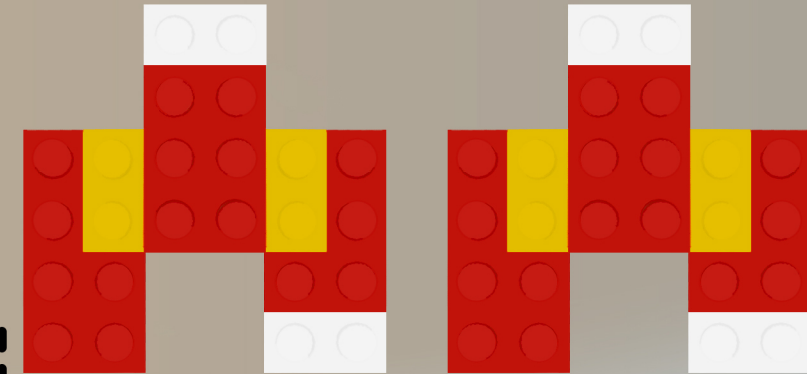
**4** Light energy helps oxygen molecules (O<sub>2</sub>) react with sulfur dioxide (SO<sub>2</sub>). The result is sulfur trioxide (SO<sub>3</sub>). **Take apart the O<sub>2</sub> molecule and the 2 SO<sub>2</sub> molecules. Use the bricks to build 2 molecules of sulfur trioxide (SO<sub>3</sub>)\*. Place them on their pictures.**



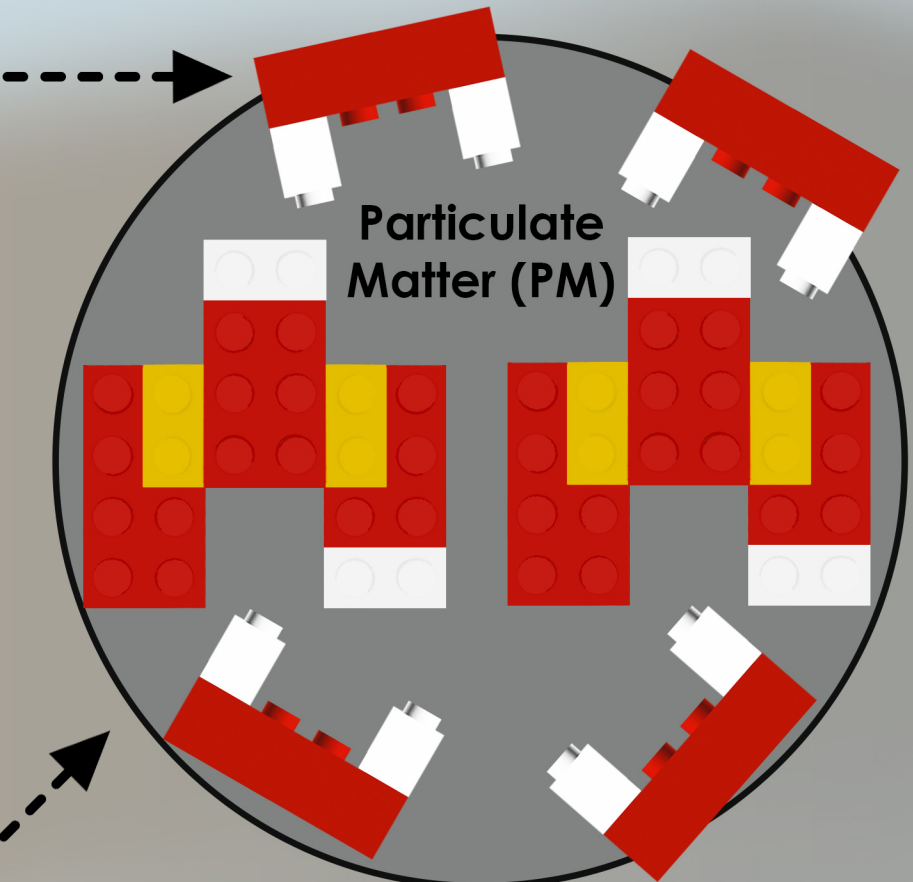
**5** Move 2 water molecules into the reaction as shown with the dashed line.



**6** Water (H<sub>2</sub>O) can react with sulfur trioxide (SO<sub>3</sub>) to produce sulfuric acid. **Take apart the 2 H<sub>2</sub>O molecules. Add the bricks to the 2 sulfur trioxide (SO<sub>3</sub>) molecules to create sulfuric acid (H<sub>2</sub>SO<sub>4</sub>)\*. Place them on their pictures.**

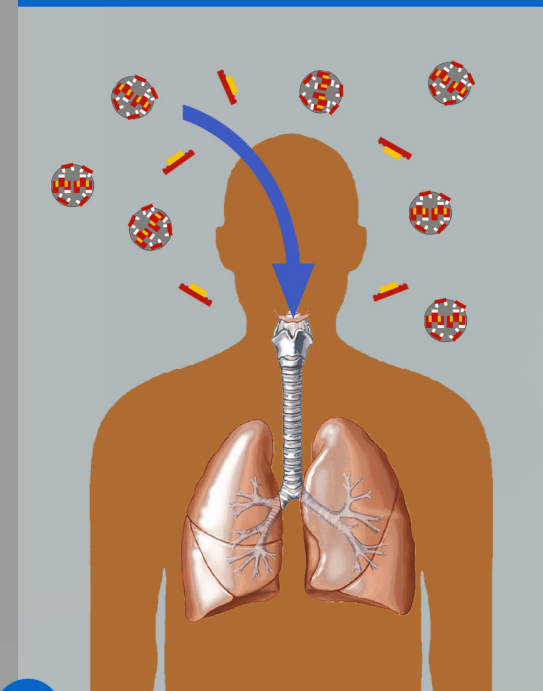


**7** Sulfuric acid and water molecules form a mixture in tiny droplets called particulate matter (PM). **Move the 4 H<sub>2</sub>O molecules from the air into the droplet as shown with the dashed line.**



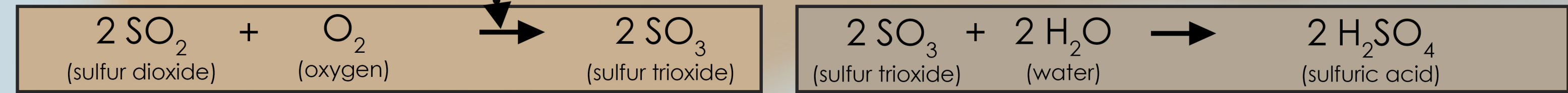
**8** Move the 2 H<sub>2</sub>SO<sub>4</sub> molecules into the droplet as shown with the dashed line.

## Health Effects of Vog

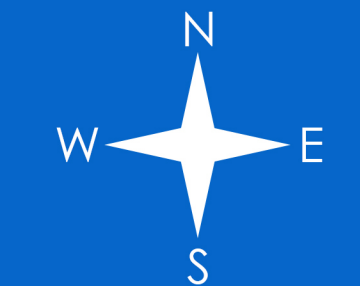


**9** Vog contains both SO<sub>2</sub> and particulate matter (PM). When people breathe in vog, the SO<sub>2</sub> and particulate matter can damage their lung cells.

**10** Winds can blow vog in different directions. Near the volcano, vog is mostly SO<sub>2</sub>. Further away from the volcano, vog is mostly particulate matter (PM). **Track how vog moves around the island.**



## ISLAND OF HAWAI'I



**\*EXTRA BUILDING INSTRUCTIONS**

How to build SO<sub>3</sub> (sulfur trioxide):

- 1
- 2

How to build H<sub>2</sub>SO<sub>4</sub> (sulfuric acid):

- 1
- 2
- 3