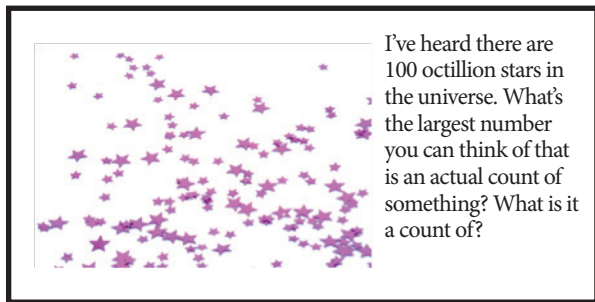


# Puzzle #81: Holy moley!



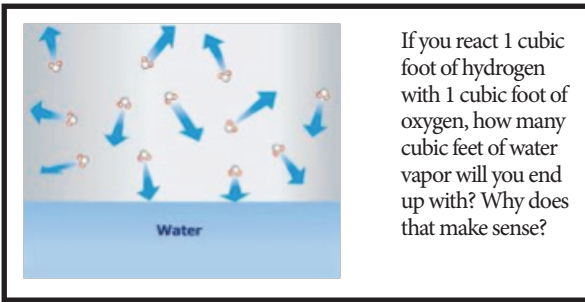
I've heard there are 100 octillion stars in the universe. What's the largest number you can think of that is an actual count of something? What is it a count of?

ELEMENTARY

Send any solutions by Oct. 29, to Moe Benda at [mbenda@d.umn.edu](mailto:mbenda@d.umn.edu).  
Best solutions and next puzzle will appear in HTF on Nov. 3.

# MoeZone

Real challenges for people living in the real world



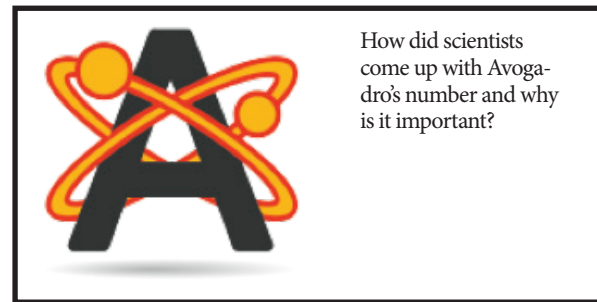
If you react 1 cubic foot of hydrogen with 1 cubic foot of oxygen, how many cubic feet of water vapor will you end up with? Why does that make sense?

ADVANCED



Be safe!

Can you get hurt?  
Can someone else get hurt?



How did scientists come up with Avogadro's number and why is it important?

PROFESSIONAL

**Moe's quote:**  
Happy Mole Day, 602,200,000,000,000,000,000,000 times over!

## MoeZone Puzzle #80 solutions: Sticky business!

### ELEMENTARY PUZZLE

*I was trying to glue two parts of my chair and I just couldn't get the glue to work. It got me thinking, "How does glue work?"*

Mary P (9, Virginia): It's sticky! It's kind of like when you're making syrup and at first you have just water, then it starts getting thick and it sticks to you. I think it's probably like stickers you get in the woods.

**MOE'S NOTE:** *Mary, that's a fun way to look at it. The glue holds on like a sticker!!*

### ADVANCED PUZZLE

*There are several types of glue depending on what material you are gluing. What's different about these glues and how do they glue?*

If you think about the molecular structure of the things you're trying to glue and of the glue itself, it makes sense that some glue works better on wood or on plastic. Would you believe that we still don't know exactly why things stick together, but we have a lot of good ideas and other physical evidence that points us in a good direction? As for me, I say it's the Van der Waal's forces—normally when we react two things together, they change their structure and give and take electrons. If I like my neighbor enough that we are just magnetically attracted, we can "glue" ourselves to them and not change who we are. The glue we use today acts as a go between—it sticks to both sides!

**MOE'S NOTE:** *Check out this great commentary: <http://www.explainthatstuff.com/adhesives.html>. I really like their comments on the jelly sandwich!*

### PROFESSIONAL PUZZLE

*Sometimes we want glue to be permanent, sometimes we want it to only last a little while; sometimes we want it to be strong, sometimes weak. What are some examples?*

Most of the time, when I think of glue, I want things to stick permanently—like fixing a broken piece off a desk lamp—and sometimes it should hold but be removable, like a Post-It note from 3M or that gummy material they use to stick cards onto a magazine. In the later case, they want the glue to hold but be able to be removed from both the card and the magazine. Pretty ingenious!