

How to guess effectively in chemistry class

OK... let's assume that like every other person on the face of the planet, you sometimes don't know the answer to a question. And, for the sake of argument, let's say that you don't feel comfortable in a chemistry class and don't really know what's going on. Don't feel too bad – I felt the same way when I took French. And art. And about a million other things.

The good news for you is that chemistry is the ideal subject for guessing. Unlike history, where you're not exactly going to pull the coronation of Charlemagne out of your butt, you *can* pull the molar volume of carbon dioxide out of your butt if you're clever.

Let's see how.

Knowing what's wrong:

When you are taking a chemistry test, you probably try to find the answer before resorting to plain ol' guessing. However, is your answer right, or is it nonsense? With some common sense, you can probably figure out whether you're being silly.

Rule 1: Make sure your answer isn't intuitively wrong

Let's say that your teacher asks you how many molecules of carbon dioxide there are in 1.32 liters of carbon dioxide at STP. This is a pretty standard $PV = nRT$ problem, and coming up with an answer is pretty easy. Let's say that your answer is 3.88 molecules.

To see if this is right, visualize your answer. Molecules are pretty small, but for there to be 3.88 molecules in 1.32 liters they'd all have to be roughly the size of a can of soda. You may not know what the answer is, but you know that it's not 3.88 molecules.

Likewise, if you find that 34 grams of methane gas at STP has a volume of 9.73×10^{22} liters, this should strike you as wrong. After all, you've usually found volumes in the 1 – 100 liter range when solving problems before, so it would be odd if your teacher gave you a problem where the volume of gas would fill a box that could hold the sun five times. Though that would be a pretty cool box.

If your answer doesn't make sense, it's probably not right. So don't write it down!

Rule 2: Don't invent new equations

If you invent an equation, you'll probably get the wrong answer. I've seen many students come up with answers in the past that reflect clearly made-up equations, so before solving a problem, make sure you have an equation you're familiar with. Otherwise, a weird answer will follow.

Rule 3: Make sure your answer looks like an answer should

If you write the name of an ionic compound and it has three words in it, or if you write a Roman numeral in the name of a covalent compound, your answer is absolutely wrong. Even if you only have a 1:100 chance of getting the right answer by blindly guessing, that's still better than a guaranteed 0:100 chance by writing something that's not even in the right format.

Effective guessing techniques:

Now that we've established that you truly don't know what you're doing, let's switch gears and see if we can figure out the right answer. Though the tricks below seem to be the best tips for the lost and hopeless, they're nowhere near as effective as studying. In other words, review your notes, already!

Rule 1: "This looks like that."

If you don't know how to solve a problem, see if the problem looks like something that you *do* know how to solve. This may or may not actually give you an answer, but it will get you thinking in new directions – one of which may be handy.

Rule 2: On a multiple-choice test, eliminate obvious wrong answers. From there, take a wild guess.

I read somewhere that your subconscious mind can recognize things that your conscious mind doesn't. Your wild guess may not be random, but rather based on a scientific principle you don't remember.

Rule 3: Show your work.

Take a stab at the answer and, if you have no idea whether it's right or not, show your work. Though your answer may be nonsense, it's possible that your teacher will find something that's worth partial credit. If you're worried about looking dumb, don't be. We teachers have seen a lot of dumb answers, and they really don't surprise us.

Rule 4: Focus on the important stuff.

Like all chemistry teachers, I love my significant figures. However, if you're spending a lot of time worrying about significant figures to the point where you don't have enough time for the calculations, skip them and go back when you have time. Getting a significant figure wrong will cost you a point, but getting a whole problem wrong because you didn't have enough time will be far more costly.

Rule 5: Mess with the equations.

In the section above, I mentioned that using made-up equations is a certain way to fail. However, if you've gotten weird answers from real equations, it could be that you put the variables in the wrong place. Mess with it a little bit and see if you can get something better.

Rule 6: Surrender.

By this, I don't mean that you should give up. Instead, when you've decided that you've done the best you can on a problem, move on and forget about it. Even if you don't get it right, it's not exactly the end of the world.

Whether you're a chemistry genius or a chemistry dud, you'll definitely need to deal with a mystery problem. With these tips, hopefully you'll be better armed to do so.