

[Forum: PheroTruth.com - Pheromone Reviews, Information and Advice](#)

Thread: [Sprayers, Scales, and Syringes](#)

gentlmentlemen - March 12, 2012, 1:07 am

Hello all.

I would like to find out about tolerances on a few things and get a good scale for some testing myself, as well as for more general purposes.

I recently created a simple way to control the plungers of syringes with incredible accuracy, probably far more than necessary. If there were no tolerances in the syringe, it ought to be about .5 microliters using a 1ml disposable syringe I had for medication purposes. I use these same syringes for pheromonal purposes since I can easily obtain them. I have yet to give my design a good and proper testing though because it seems that syringe tolerances are well above that.

I could probably decrease the tolerance in my plunger-pusher's design more, but first I want to know where the tolerances are for syringes, which syringes have the smallest tolerances, and how to further compensate for the ones already there.

First things first: the barrel size (obvious first way of increasing accuracy)

Any way in which I could reduce the proportion of area of a cross section of the barrel to length of it would obviously be the first and easiest way to increase the accuracy.

Well, I googled a bit, and found that among the normal syringes, the smallest I saw was a .3ml syringe, which is normally used as an insulin syringe for diabetic dogs. The barrel however is slightly shorter. And unfortunately, it would seem that no matter where I looked I could not find specs on the length or width of the actual barrel, only the needles. The needles however led me to think more about how a larger gauge (smaller width, so long as it could still properly suck up the material) and smaller length needle would be better because of something I had thought a bit of, but didn't (till recently) know the name. That name is...

Dead space (or waste space):

Waste space is the amount of space in the needle itself and in the gaps of the fitting between the needle and the barrel in which extra material is left behind.

After a bit of googling (haven't searched too hard yet though), the smallest amount of waste space I saw on a syringe (specifically with a 0.3 ml barrel) was .026 ml, or 26 microliters, which already should be well above the tolerances I can create with the plunger, even if I'm wrong about a few things. So I figured I might have already taken things over the top a bit. Which got me wondering for practical purposes at least...

What's the maximum concentration of a molecule anyone could practically dilute into a carrier? I believe I read somewhere about 5 mg/ml, but it could have been different, I don't remember too well. I figure in theory I'd like to be able to use the highest concentration possible to make mixes, but still with

How accurate is a sprayer? And which ones are the best to use? To be honest, I don't care at all if

the bias on the data is off compared to what the manufacturers say, only the accuracy. Extreme bias can be compensated for, inaccuracy on the other hand...

So in conclusion I figured I have to test (in order of greatest importance in my mind)

- 1) Sprayer Accuracy
- 2) Syringe Accuracy and some data of my own about dead space etc.
- 3) My little machine

I would love to test my little plunger pushing guy to find out if I'm right and where I'll still need to tighten up tolerances, but until I know how much tolerance there is in the other things that happens between the concentrate bottle and it diffusing from my skin, there's no point. I may be incredibly off or it may be even more accurate than I said, but there's no point discussing it or posting about it till we know the other stuff. So first...

I need a good scale. A really good scale. I'd like one that could measure micrograms if possible. After all, that's the measurement we love to use so much...

I could get just a milligram scale for some of the testing, but it would be a bit short. And if I want to find out not just the average of the data, but the spread (which is far more important imo), then I'll need a really accurate scale that at least shows tenths of mg. Idk if such a thing is at all affordable right now for me, but I'd like to look into the options. Right now I'd like to keep it under \$50, but I figure I'll have to go much higher... but I will if I have to. Anything for the name of science!

Also, I'd like to know what togos you guys would like me to test, as well as spray bottles in general. If I have an accurate enough scale I could also get us data on those first few weird partial sprays for an even more in-depth comparative analysis. I already am working on a small home-made robotic setup for mass testing the results so that all I have to do is press a button and record the results.

I currently have:

- 1 ml, 28 gauge, 1/2" needle length BD standard syringes
- Androtics togos and full sized sprayers (are these the same as the ones from TP? look the same...)

I currently need:

- Alpha-Dream togos (any way of getting them just empty?)
- Any other popular or good sprayers you guys want me to test:
 - Love Potion, Liquid Alchemy
- Different syringe sizes, needle fittings, and needle lengths

The questions I would like answered most are:

- What goes on with the waste space? Do individual needles have much lower tolerances of what is left behind than populations of needles, just more bias?
- Where can I find information about syringe barrel lengths?
- In general more syringe specs and info...
- Where can I get a great scale?

I have a decent bit of robotics stuff lying around from when I used to compete, and have had the urge to start a project for a while. Therefore I'm hoping to use it to significantly speed up my ability to

analyze data on certain phero-related stuff and return the results to you guys, as well as more projects in the future. Besides pheromones, that's one of my favorite things to mess around with.

Thanks all!
Gentlmentlemen

Edit: Grammar, mycode, and suggestions of togos to test

gentlmentlemen - March 12, 2012, 2:13 am

One more note: I figure to some extent, the dead space can be compensated in some way, even if the natural accuracy is low.

For example, in a gear chain, one can normally expect tolerances to build most of all in 2 places: the space between gear teeth where gears are not perfectly meshed anywhere where a structural element holding the gear chain together can become a spring and store energy. This is only prevalent when the force required is not enough to move the end of the gear chain with ease, or when the elements are not built or strengthened properly for their function.

The gear teeth can be a large problem when using pre-made parts which are meant to mesh easily without much effort, particularly in long gear chains. However...

If you are able to use a small movement in one direction before beginning actual movement, you can "take up the slack" in the gears, as all teeth will be contacting on the side they will be throughout the entire movement in that direction.

In this case, the plunger can be moved slightly upwards before lowering the needle into the liquid. This way, the slack is taken up between teeth to a level usually below visibility to the naked eye, and a reference point from which all liquid is then measured is created. There is no need for anything but a rotation sensor to take up this slack properly.

I wonder if a similarly simple and robust method of compensating for the dead space in the needle is possible. If the dead space is of consistent tolerance within one needle (just not within a sample of multiple needles), then it ought to be fairly easy to compensate for it, because when using the same needle multiple times, most of the inaccuracy observed within the sample of multiple needles would be translated into bias for a single needle, and bias can be compensated for.

EDIT:

Also, does anyone know of a good way of cutting the needles shorter? That ought to significantly reduce waste space.

I was thinking of using something inside it to keep it from collapsing, and wire cutters or something like that.

halo0073 - March 12, 2012, 9:12 am

Okay you are pretty damn smart. I have often wondered about those partial sprays and how much was actually coming out. You should ask Chris about getting some of his to go. I would love to see Love Potion's sprayers tested. I have a lot of their one ounce sprays. Also Liquid alchemy's.

Fly So Hi - March 12, 2012, 10:56 am

Jeez, 26 microlitres margin of error only in the needle?

The more i read, the more i convince myself i need a pipette.

Damn...

gentlmentlemen - March 12, 2012, 12:52 pm

(03-12-2012 8:12 AM)halo0073 Wrote: [](#)Okay you are pretty damn smart. I have often wondered about those partial sprays and how much was actually coming out. You should ask Chris about getting some of his to go. I would love to see Love Potion's sprayers tested. I have a lot of their one ounce sprays. Also Liquid alchemy's.

Well thank you!

I'm most excited to get some from chris. His seem to have the smallest sprays by description, and he's the only one I've seen so far who lists the approximate average volume per spray (55 microliters). That in addition to the fact that not only does he list margin of error for molecules, but also what are the constituents of said error makes me think he would only settle for pretty good stuff, or might even have some data himself.

I would like to get around 30 of each type of sprayer, but my budget for togo's is only about \$100, thats all I can spend on this stuff atm. I'll let you know how my cart gets split up and what sprayers I buy, and edit the first post above to show love-potion's and liquid alchemy's.

I'd like to get some regular sprayers too, but more and more I find myself making togos, especially when I make my own mixes. That and my limited budget mean I'll probably just be comparing togo's.

I don't really like making more than a few ml's of a mix at a time in case it turns out to be a bad mix, so I use togo's more often, and I think most people who make their personal mixes tend use togos for the same reason.

(03-12-2012 9:56 AM)Fly So Hi Wrote: [](#)Jeez, 26 microlitres margin of error only in the needle?

The more i read, the more i convince myself i need a pipette.

Damn...

Syringes, not pipettes, and thats only with the syringes from here:
http://fluready.mckesson.com/resources/vaccines/BD_Integra.pdf

This study is decent, though I kinda wish they would have used more than a measely 35 needles, and that they published the results of individual needles, not just groups. This is why I want a study of my own to find out exactly what goes on with that dead space.

I have yet to find data on similar products from other brands, but there's a special low wastage needle fitting for most brands.

But that brings up a good point, it could be possible to use pipettes, but it would be very difficult to automate the ones where you squeeze a bulb at the top. In general I have yet to find a pipette that comes close to the accuracy of a syringe, ut then again I have yet to really look much. I hav the androtics pipettes, and the pale in comparison.

Most of this is beyond the accuracy you'd need, but I figure that if one part of the system is weak (the sprayer for example), then it becomes all the more important to tighten up the other parts as much as possible. Eventually I'd like to get this info out so that users can specify the margin of error

of sprayers and things like that. I mean if its 1mcg of some pheromone, but the margin of error brings it up even by 1 more mcg, you've already literally doubled your dose that time.

gentlmentlemen - March 12, 2012, 1:58 pm

Also, if someone knows a way to get the bottles more directly (from wherever the vendors get them), that'd be very helpful, because it would probably cost less and allow me to test more bottles.

shadowknight - March 12, 2012, 3:31 pm

(03-12-2012 12:58 PM)gentlmentlemen Wrote: [](#)Also, if someone knows a way to get the bottles more directly (from wherever the vendors get them), that'd be very helpful, because it would probably cost less and allow me to test more bottles.

I have several websites to get bottles not sure about the which the vendors use

<http://www.sks-bottle.com/>

<http://www.lotioncrafter.com/>

<http://www.specialtybottle.com/>

<http://www.newdirectionsaromatics.ca/>

<http://www.sunburstbottle.com/>

<http://www.essentialsupplies.com/>

gentlmentlemen - March 12, 2012, 3:48 pm

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Thanks a bunch. Still have a lot of looking to do, but just off a quick glance:

[This](#) looks awfully familiar.

Maybe I should contact the vendors and ask them exactly which bottles they use, just to be certain.

On my way to do that now.

Cman888 - March 12, 2012, 4:30 pm

I beleive Chris uses these

<http://www.sks-bottle.com/340c/fin11e.html>

gentlmentlemen - March 12, 2012, 6:01 pm

Can anyone comment on whether these are any good?

<http://www.americanweigh.com/index.php?cPath=99>

Geez these things can get expensive...

I need at least .001g accuracy though, because 1ml of water is ~1g in weight (depending on room temperature, height above sea-level, etc), so to measure things like the .026 ml syringe dead space, I would need at least .001 grams accuracy. It looks like there are a couple scales there that fit my budget, but if I could get more accuracy while still staying close to my budget that'd be great.

More importantly... if I were to buy the \$65 or \$50 ones, would they really be enough to do the job well? Because I see other scales there with much higher price tags but the same accuracy... maybe its just the range of weights they can handle that drives the price up, but I get the feeling that they have the descriptor of "analytical" for a reason.

Fly So Hi - March 12, 2012, 6:30 pm

(03-12-2012 11:52 AM)gentlmentlemen Wrote: [](#)...

But that brings up a good point, it could be possible to use pipettes, but it would be very difficult to automate the ones where you squeeze a bulb at the top. In general I have yet to find a pipette that comes close to the accuracy of a syringe, ut then again I have yet to really look much. I hav the androtics pipettes, and the pale in comparison.

...

Sorry man, i meant a micropipette. The ones like this:

gentlmentlemen - March 12, 2012, 6:38 pm

(03-12-2012 5:30 PM)Fly So Hi Wrote: [](#)Sorry man, i meant a micropipette. The ones like this:

OOooooooo! Looks fancy!

Where is that from? And what kind of accuracy is achieveable? I didn't realize there were plunger pipettes... I can automate a plunger pipette (or anything with a plunger) to be accurate far beyond human accuracy with the same plunger operated device.

Please, tell me more!

Fly So Hi - March 12, 2012, 6:44 pm

(03-12-2012 5:38 PM)gentlmentlemen Wrote: [](#)OOooooooo! Looks fancy!

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Please, tell me more!

This is a Gilson Pipetman L. This type of pipette is generally used in microbiology and other applications. They are really expensive, and can get to the mark of US\$ 300,00. Of course you can find cheaper ones. Gilson is a reference when it comes to micropipettes.

The maximum precision you can achieve is 200 nanolitres, that's 0.2 microlitres.

Take a look:

<http://gilson.com/en/Pipette/Products/47.280/Default.aspx#.T16J5J8wLT0> Oh, here's a video:

http://www.youtube.com/v/uEy_NGDfo_8&rel=0&fs=1

gentlmentlemen - March 12, 2012, 6:50 pm

(03-12-2012 5:44 PM)Fly So Hi Wrote: [](#)This is a Gilson Pipetman L. This type of pipette is generally used in microbiology and other applications. They are really expensive, and can get to the mark of US\$ 300,00. Of course you can find cheaper ones. Gilson is a reference when it comes to micropipettes.

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Take a look:

<http://gilson.com/en/Pipette/Products/47.280/Default.aspx#.T16J5J8wLTo>

Very cool. A bit expensive though. I'll certainly give micropipettes another look though. I wonder how much of that accuracy is from the motor, and how much is from a different pipette design. If you can find me a plunger operated pipette (I'll look myself after dinner), I could probably match that accuracy for pennies on the dollar.

EDIT: (as a DIY of course)

Fly So Hi - March 12, 2012, 7:05 pm

A plunger operated pipette would be a micropipette, i think. Not sure what you meant there.

Those are adjustable volume pipettes, as you can see on the video. However, you have the option to buy [fixed volume micropipettes](#) for as low as US\$ 21,00 in some websites. Of course, you'd need one for each desired volume though.

gentlmentlemen - March 12, 2012, 7:35 pm

(03-12-2012 6:05 PM)Fly So Hi Wrote: [A plunger operated pipette would be a micropipette, i think. Not sure what you meant there.](#)

Those are adjustable volume pipettes, as you can see on the video. However, you have the option to buy [fixed volume micropipettes](#) for as low as US\$ 21,00 in some websites. Of course, you'd need one for each desired volume though.

Hmmm...

You're right, its a micropipette.

What I wonder is how cheaply I can use some robotics stuff I have lying around to make an automated phero mix maker, with customizable mixes you can enter in yourself and have it remember the mix for later. Then I can just pick the mix I want and have it go at it while I'm in bed the night before, and wake up to having a fresh made togo. I got into making togos the night before often rather than making larger mixes mainly because if I use a larger mix, I don't want to be stuck with it if its bad. The downside to using togos is that I have to mix quite often, which is both time consuming and leads to much more risk with accidentally spilling bottles, etc. Also, I'm only so accurate with a syringe myself...

I was thinking of having about 30-50 bottles of various molecules, carriers, fragrances, and essential oils, and 1 final bottle which the mix would be put into. This would of course require at least one tip or syringe per bottle, to avoid them being mixed outside the mix bottle.

I think I could fit the machine for a fixed volume pipette though... and then I would only need the tips. I wouldn't think it would be necessary to change the tips out every single use, but I could be wrong. If the tips were kept with the same molecules, and weren't filled with things that need proper disposal or anything, I would think it would be fine, but I suppose it could lead to inaccuracy.

I'd like to see if there's a DIY way to make a phero-mixing machine though, and I'd like to keep it within \$50 to \$100 at absolute most for the whole package (motors for travelling between bottles, microcontroller (with program) and everything. I think that would be difficult, but possible. One motor to move from bottle to bottle, and another one or two for actually transferring the liquid from the concentrate bottle to the mix bottle.

For now, I think I'll still look into how accurately I can do things with a syringe, simply because of how much cheaper they are. Either one is a possibility though, especially if the syringes' dead space is a consistent, measureable thing within the same syringe being used over and over. I'd like to also get a single volume pipette, but the problem is that they have such small ranges, or have smaller accuracies with the larger ranges it looks like. With a syringe, it may be more inaccurate, but it is the same throughout...

Lots to think about...

For now, I still need to test the sprayers, because I'm pretty sure that will be the weakest link in the chain, and also the most variable (in consistency) from one sprayer type to another.

gentlmentlemen - March 12, 2012, 7:43 pm

http://www.labdepotinc.com/Product_Details~id~605~pid~59257.aspx

So I found a list of a few cheap single volume pipettes, and I guess I misunderstood about the range and inaccuracy.

There's a 1000 microliter (1 ml) one there that supposedly has an accuracy within plus or minus 3 microliters, or 6 microliters total. If that has the same accuracy when used at a fraction of the button's depression that could be an option, but now I have another question.

Are these single volume pipettes meant to be used with tips, or alone?

Fly So Hi - March 12, 2012, 9:11 pm

I'm pretty sure they have to be used with tips. But something like US\$ 45,00 for 1000 tips.

Okay, so you're serious about making a "Pheromixer 2000".

I think one of the things you might need is a [linear actuator](#) to act on the plunger, that would probably be a fixed volume pipette. Actually, there are pipettes/[pipettors that are made using exactly this model of actuator](#). Of course you'd need to figure it out how much turns your actuator would have to turn to draw exactly the desired volume. Actually, to keep it cheaper, and maybe more precise, you could use a stepper motor.

Second, you'd need yes, the motor, to move the "needle" on the horizontal axis (just like an inkjet printer) to draw the liquid out of the bottles. Remember you'd have to move the whole mechanism (actuator thing) left and right to make this work (again, just like a printer). A second stepper motor should be used for this function, instead of a DC motor.

Something like [this](#).

To make it easier, I suggest you use a third stepper motor to rotate some sort of plate/dish where your concentrate bottles will stand. Just like a roulette, got it?

<http://www.youtube.com/v/sRIBZF1xGIw&rel=0&fs=1>

Tricky part:

You have to make sure the needle/tip always stays below the liquid surface. Maybe you'd need another linear actuator to either push this plate up or the needle down.

The machine would also have to know which slot in the rotating plate contains which molecule. Once you're planning on using a microcontroller, it would probably be best if you throw a few more code lines so you could say to the machine which slot contains which molecule.

The resistor/transistor part of the circuit itself is really ease to make. Or maybe use an Arduino, don't know...

It would take a bit of work, but seems you're comfortable with mechatronics and programing, so it will be easy for you.

gentlmentlemen - March 12, 2012, 10:02 pm

(03-12-2012 8:11 PM)Fly So Hi Wrote: [I'm pretty sure they have to be used with tips. But something like US\\$ 45,00 for 1000 tips.](#)

Okay, so you're serious about making a "Pheromixer 2000".

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Second, you'd need yes, the motor, to move the "needle" on the horizontal axis (just like an inkjet printer) to draw the liquid out of the bottles. Remember you'd have to move the whole mechanism (actuator thing) left and right to make this work (again, just like a printer).

Something like [this](#).

To make it easier, I suggest you use a step motor to rotate some sort of plate/dish where your concentrate bottles will stand. Just like a roulette, got it? The tricky part of this is that you have to make sure the needle/tip always stays below the liquid surface. Maybe you'd need another linear actuator to either push this plate up or the needle down.

The machine would also have to know which slot in the rotating plate contains which molecule. Once you're planning on using a microcontroller, it would probably be best if you throw a few more code lines so you could say to the machine which slot contains which molecule.

The resistor/transistor part of the circuit itself is really ease to make.

It would take a bit of work, but seems you're comfortable with mechatronics and programing, so it will be easy for you.

Great minds think alike I suppose.

This is pretty much exactly what I was thinking and planning. I started by building my own linear actuator which I talked about in the first post, figuring that while the tracking from bottle to bottle and programming would be no less difficult, it would be far less important as far as how well it does the job. The linear actuator on the other hand is one of the most important parts, the other stuff is pretty much just to move it around. However after I had gotten a fairly satisfying result using 2 chained worm gears (probably the best thing to use in this situation) and slight springs to apply pressure to them to better mesh the gears, I realized I might have been more accurate than the syringes I was

going to be using anyways.

I was thinking rotary as well for holding the bottles at first, but I'd also like to fit this into a relatively small place if possible. This will be a "Pheromixer 2000, Home Edition" so to speak if I can manage it. I set a goal for myself to try to make it fit in a shoebox. Might be useful as well to have it fit onto the fridge shelf.

I was thinking a grid would be most space efficient. So I was thinking a track built above this grid of bottles with a track curving from one row to turn the thing around to go down the next row, thus using a single motor to go back and forth down the rows.

I was also planning on having a covering which went over the grid of bottles with a soft sealing material to seal them when it is lowered. I think the motor that drives it around the track could initially slide this covering off like a drawer and then slide it back on when it gets to the end of the track. This way, the need for having the machine deal with the caps is removed, but if I forget or don't have time, they still will be sealed at the end. Also it should work pretty well even with different bottle sizes if I add set screws to the bottom of the platform to raise or lower the heights of the bottles properly.

As far as lowering the syringe/pipettes, I agree there needs to be something to do that, and while technically it should be possible to gear things from the same motor that drives it around the track, the gearing on that track motor would start to be a nightmare, and I think if you had independent control over that it would be better, because of what you just said. The microcontroller would also need to keep track of the height of the liquid in each bottle, which it would have to calculate based on being given the radius or other dimensions. I might have an option for adding another shape to the bottle at the bottom (besides the cylinder part) such as a cone, because bottles with tapered bottoms would work much better. But if I have it keep the tip well enough below the surface, it shouldn't be an issue for most bottles.

I was thinking that the same motor moving the pipette/syringe as a whole up and down could also rotate the mix bottle underneath when the pipette/syringe is raised to its highest point.

So in conclusion it would happen something like this:

You put the bottles in, tell it how much fluid is in each, and an approximate of their dimensions. Give it a mix's instructions and off it goes.

The track motor starts up, and the lid/cover is slid off exactly one bottle ahead (behind in the other direction) of the linear actuator.

The linear actuator is pushed towards the pipette tip/syringe by the main track's motor, and after making good contact with the parts holding those up, is able to control them. The linear actuator then takes up any slack by moving a little in the upward direction.

The motor for moving the syringe/pipette as a whole lowers the tip into the liquid, and rotates the mix bottle down and out of the way.

The linear actuator pulls the liquid into the syringe while the motor lowering/raising the whole thing keeps the tip in the liquid.

The motor raising/lowering the linear actuator raises the pipette/syringe and rotates the mix bottle up beneath the pipette/syringe.

The linear actuator puts the pipette/syringe all the way back to the "0" calibration, expelling all the fluid it can into the mix bottle.

The track motor moves the whole thing down another bottle.

Rinse and Repeat.

Shouldn't be too hard, which is why I'm going to try to fit it into a shoebox and see if it is possible to make one for as cheap as possible. The first time around though I don't think I'll worry about how cheap it is too much just to avoid the hassle, but eventually I'd like to get to something simple enough and cheap enough for lots of people to build.

BUT

Without getting too far ahead of myself (haha little too late)

It will be more important to find out how these sprayers perform I think, and will also give the community immediate info they can work with, rather than some yet-to-be-optimized design that will likely have some kinks in it to work out at first. And like I said, the sprayer will probably be the weakest link in the chain of events delivering the molecules to the skin, so it would be the best use of time to look into tightening up that first.

gentlmentlemen - March 12, 2012, 10:19 pm

Wow. No idea why I didn't think of using the computer to control it though... could hold a lot more info without making the thing more expensive and would probably make programming easier too but...

Well gosh darn it, I know I had a reason when I first started thinking of this stuff, but now I can't remember it. It'll probably come back eventually though.

Fly So Hi,

You seem to have a decent amount of experience in this stuff as well. Are you just someone who has played around with it a lot? Or do you do stuff with this in your job or in competitions like I used to?

Fly So Hi - March 12, 2012, 10:20 pm

The whole descriptions sounds great. The part that i'm worried is the needle/tip that gets in contact with the liquid. I mean, the pipette tip **MUST** be changed after it gets in contact with any liquid. So maybe, after step 7 (return to 0) it should blink a led or something for you to change the tip.

P.S.: Make it return to +1 THEN to 0 to make sure ALL the liquid is expelled.

And yes, the atomiser is the weakest link in the chain. At <http://www.sunburstbottle.com> where i buy my bottles, they say it's 140mcl per spray for the normal sprayer bottle. It's always best to keep things as precise as possible, but remember that the essential here is the ratios/proportions among all the molecules. So the machine needs to be as precise as it can be.

P.S. 2: Ever saw briefcase PCs? Maybe in the future you could make the machine fit into a briefcase. Portable mixing anywhere you go, wow, haha. Makes me think of conspiracy/special agents movies where everything cool is inside a briefcase!

Sorry, i digress, as always. Blame my ADHD.

Fly So Hi - March 12, 2012, 10:22 pm

(03-12-2012 9:19 PM)gentlmentlemen Wrote: [](#)Fly So Hi,

You seem to have a decent amount of experience in this stuff as well. Are you just someone who has played around with it a lot? Or do you do stuff with this in your job or in competitions like I used to?

Oh, i did a technical in Telecommunications some years ago. Messed around with some electronics there and sometimes with my father when i was a child. I'm rusty, but if you need i can help with some simple things.

gentlmentlemen - March 12, 2012, 10:45 pm

(03-12-2012 9:22 PM)Fly So Hi Wrote: [](#)Oh, i did a technical in Telecommunications some years ago. Messed around with some electronics there and sometimes with my father when i was a child. I'm rusty, but if you need i can help with some simple things.

Cool! I very well might... I actually have much less expericience with the circuitry and much more with the programming, but because I'm only used to a few microcontrollers, I'd have to learn a new program, but generally speaking that isn't too hard. I've had to do that a few times with absolutely no outside help. One didn't even have a forum or anything when I was trying to learn it, and the help was terrible. Fortunately the guy had programmed the SDK aspect of it (which was otherwise terribly made at that time) such that things were color coded, and it was c-based. I didn't know c, but I had just started a class n java, so I figured it out. Thats probably the hardest time I've had learning a language though, and I expect it always to be. Not that the conditions of learning another one might not be worse, but that was my first experience like that, and it really hardened me for more.

I also got some experience from my father (step-father really), and I could ask him for help, but then I'd have to deal with all the questions as to what its for hahaha.

(03-12-2012 9:20 PM)Fly So Hi Wrote: [](#)The whole descriptions sounds great. The part that i'm worried is the needle/tip that gets in contact with the liquid. I mean, the pipette tip MUST be changed after it gets in contact with any liquid. So maybe, after step 7 (return to 0) it should blink a led or something for you to change the tip.

Must it? That's a little dissapointing, but not killer. But ya, I was thinking it would need some led lights for things anyways, so not a big deal to add another one from the pack. If I use the computer I could also easily add a 'ding' type noise when it finishes.

Why is it that the tips must be changed though, if there is one tip for each molecule? Just so risidual doesn't build up and mess with the measurements?

(03-12-2012 9:20 PM)Fly So Hi Wrote: [](#)P.S.: Make it return to +1 THEN to 0 to make sure ALL the liquid is expelled.

Is this just to let the last bit of liquid settle at the bottom before finishing it? And ya, I was planning on doing so, because I was planning on taking it up to +1 at the beginning for taking up slack, but I suppose if there is an additional reason to stop, then keep going, I could just push it down to +2, then 0, or something like that.

(03-12-2012 9:20 PM)Fly So Hi Wrote: [](#)And yes, the atomiser is the weakest link in the chain. At <http://www.sunburstbottle.com> where i buy my bottles, they say it's 140mcl per spray for the normal sprayer bottle. It's always best to keep things as precise as possible, but remember that the essential here is the ratios/proportions among all the molecules. So the machine needs to be as precise as it can be.

Very good point sir, +1 interwebz to you! I hadn't thought about it that way. I still will probably focus

on the sprayers first though, because my automated sprayer is already setup.

(03-12-2012 9:20 PM)Fly So Hi Wrote: [](#)P.S. 2: Ever saw briefcase PCs? Maybe in the future you could make the machine fit into a briefcase. Portable mixing anywhere you go, wow, haha. Makes me think of conspiracy/special agents movies where everything cool is inside a briefcase! OH. MY. GOD. YESSSSSS!!!!!!

DAMN YOU! NOW I MUST HAVE ONE!

Actually for practicality purposes, that would be great for going on vacation, there's just the tiny bit about putting a briefcase with a ton of bottles with fluids and electronics through airport security...

But now you really have me thinking... would there be a way to get that through airport security if it wasn't a carry-on? I've only been flying a couple times and never had the issue of taking mones or electronics with me haha.

(03-12-2012 9:20 PM)Fly So Hi Wrote: [](#)Sorry, i digress, as always. Blame my ADHD. Trust me I understand. Your digressions are much appreciated though, and have been very helpful, so thank you!

EDIT:

I will spread the love and come back to you later! Damn love, always needin spread... hahaha

Fly So Hi - March 12, 2012, 11:13 pm

(03-12-2012 9:45 PM)gentlmentlemen Wrote: [](#)Why is it that the tips must be changed though, if there is one tip for each molecule? Just so residual doesn't build up and mess with the measurements?

Precisely. You see, at [this thread](#) Chris tell us to use 1/100 part of Alpha-THDOC for this particular mixture. Probably due to it's potency or sedative effects. If you dive a tip into A-THDOC concentrate, then the same tip dives into A-nol concentrate, for example, it would cross-contaminate both the concentrate and the final mix.

(03-12-2012 9:45 PM)gentlmentlemen Wrote: [](#)Is this just to let the last bit of liquid settle at the bottom before finishing it? And ya, I was planning on doing so, because I was planning on taking it up to +1 at the beginning for taking up slack, but I suppose if there is an additional reason to stop, then keep going, I could just push it down to +2, then 0, or something like that.

By "go to +1" i meant that the plunger should go into "negative motion" to expel the residual liquid that eventually hangs into the pipette tip. That would be the equivalent of the "push beyond the first stop" you saw on the video at 4:54.

(03-12-2012 9:45 PM)gentlmentlemen Wrote: [](#)Trust me I understand. Your digressions are much appreciated though, and have been very helpful, so thank you!

Ah, good!

Hitting the pillows now, talk to you tomorrow.

gentlmentlemen - March 12, 2012, 11:36 pm

(03-12-2012 10:13 PM)Fly So Hi Wrote: [](#)Precisely. You see, at [this thread](#) Chris tell us to use 1/100 part of Alpha-THDOC for this particular mixture. Probably due to it's potency or sedative effects. If you dive a tip into A-THDOC concentrate, then the same tip dives into A-nol concentrate, for example, it would cross-contaminate both the concentrate and the final mix.

I think you misunderstand what I was planning on doing though. I was planning on having 1 tip per bottle, and only ever using the same tip for that molecule. So the A-nol tips stay with that (and only

that) A-nol bottles, the A-THDOC tip stays with that particular A-THDOC bottle, and so on and so forth. I was planning on changing tips anytime the molecule or concentration changed. So this isn't a concern of cross contamination from residual, I'm asking whether the pipette tips work as well or measure as accurate of amounts after multiple uses. I could see small amounts of crystals building up at the tip possibly affecting it... so probably best to change as often as possible anyways. They're cheap though I guess. Would be interesting to see what it would take for it to change its own tips. Right now no practical designs come to mind, but its late.

Also I was planning on changing the bit of rubber-like sealing material (still haven't decided what to use exactly) for that section of the grid anytime the bottle for that slot got changed. I don't see the need to change it more often than that. Part of me is slightly concerned though about drips building up from evaporation on the material. If they did, that could be a HUGE problem for my lid that slides off like a drawer, or any lid that did anything but go vertically. The obvious solution though would be to keep it in the fridge. Besides that, all I can think of right now would be some kind of "drop shield" to slide underneath the sealing lid after lifting the sealing lid, but before sliding it away to intercept any drops falling from the sealing parts of the lids.

(03-12-2012 10:13 PM)Fly So Hi Wrote: [](#)By "go to +1" i meant that the plunger should go into "negative motion" to expel the residual liquid that eventually hangs into the pipette tip. That would be the equivalent of the "push beyond the first stop" you saw on the video at 4:54.

That's what I figured, and I agree. I was planning on using the extra room I would have created for slack in the gears to compensate for the slack in the pipette all in one, and that ought to work. Would just have to make said "slack taking" movement slightly larger.

(03-12-2012 10:13 PM)Fly So Hi Wrote: [](#) (03-12-2012 9:45 PM)gentlmentlemen Wrote: [](#)Trust me I understand. Your digressions are much appreciated though, and have been very helpful, so thank you!

Ah, good!

Hitting the pillows now, talk to you tomorrow. Haha see ya in the AM! Oh wait it already is! Hahaha

Great discussion. If only we had actually heard back from the vendors on which spray bottles they use...

I suppose I could also do some searching to find out what spray bottles are supposed to be most accurate, regardless of if they are sold by pheromone vendors.

Fly So Hi - March 13, 2012, 9:14 am

(03-12-2012 10:36 PM)gentlmentlemen Wrote: [](#)...I'm asking whether the pipette tips work as well or measure as accurate of amounts after multiple uses. I could see small amounts of crystals building up at the tip possibly affecting it... so probably best to change as often as possible anyways. They're cheap though I guess. Would be interesting to see what it would take for it to change its own tips.

...

I'm sure no crystals would build up in the tip of the tip, but they're so cheap that it's just better to use one tip per bottle every time you use the machine.

(03-12-2012 10:36 PM)gentlmentlemen Wrote: [](#)Also I was planning on changing the bit of rubber-like sealing material ...

Part of me is slightly concerned though about drips building up from evaporation on the material.

...

I don't really think evaporation could happen and condensate on the bottle cover with just ambient temperature. But if you're willing to spend more electricity/money on the device, you could use a

peltier cooler (thermoelectric cooler) to cool down each slot, to make sure the temperature would not cause condensation.

EDIT: I thought you'd keep the bottles in the fridge or something and only place them on the rotary when you need to use them, right? Maybe there's no need for a cover. That way you could keep the Pheroprinter out of the fridge, hehehe.

gentlmentlemen - March 13, 2012, 10:50 am

(03-13-2012 8:14 AM)Fly So Hi Wrote: [](#)I'm sure no crystals would build up in the tip of the tip, but they're so cheap that it's just better to use one tip per bottle every time you use the machine. Well tbh, after using the same syringe for a long while, I'm pretty sure I can see these little crystals that have accumulated as the small amount of liquid left behind will result in the carrier evaporating and leaving behind the molecule. Maybe its just in my head, but I have used that syringe a lot of times... Also there's the possibility of corosion and erosion on a very small level I suppose, but idk how much of an issue that would be with most molecules.

But like you said, probably better just to change tips. I'm thinking that function could probably be added to the track's motor... but I'll worry about that when I get the earlier functions stated down. That poor track motor already does so much in this design...

Speaking of track motors, I forgot to mention that I would not be using a step motor to keep track of which bottle it is at, but instead a hole along the track at each stop. A button (significantly smaller than the hole) would then ride along the track such that it is depressed until it reaches a bottle. Or vice versa, either way. This sacrifices short term accuracy, but doesn't allow any inaccuracies to build long term, increasing long term accuracy. And with lining up to these bottles, only a certain amount of short term accuracy is really needed, and it isn't near as much as the linear actuator and parts like that. For keeping the linear actuator and the other motor's long term accuracy in check, I could either keep absolute track of which microstep it is on, even once you turn it off after finishing a mix, or I could have a physical stop which they align themselves to at the beginning of every mix. That way even if it occaisionally misses a microstep here or there along the way, it doesn't accumulate those inaccuracies over the course of many, many mixes.

(03-13-2012 8:14 AM)Fly So Hi Wrote: [](#)I don't really think evaporation could happen and condensate on the bottle cover with just ambient temperature. But if you're willing to spend more electricity/money on the device, you could use a peltier cooler (thermoelectric cooler) to cool down each slot, to make sure the temperature would not cause condensation.

EDIT: I thought you'd keep the bottles in the fridge or something and only place them on the rotary when you need to use them, right? Maybe there's no need for a cover. That way you could keep the Pheroprinter out of the fridge, hehehe.

Well, the rotary design is much less space saving, but in a rotary design, yes, you could do that more easily. In the grid, I suppose you could as well... But it could be pain to take the caps of 30 to 50 bottles off, set them in, take them out when its done, and put the caps back on again. Part of the reason for this as well is to reduce spillage, and while the machine is intended to be largely stationary, if something (like clumsy old me) bumped it and sloshed the bottles... that could be bad. And if I have to change the bottles all the time, I would think I would have almost as much accidental spillage as if I was just making the mix myself.

I doubt evaporation would be much of a likelihood, but if it is any likelihood at all, then it will be a problem. In general I just want everything to be really robust, so I may add a drip shield or something. I want this thing to still work even if my AC and fridge go out in the middle of the summer. Not that I will normally run into that problem, just trying to think of all the potential problems it could run into. The first design probably wouldn't actually have a drip shield, though I'll

probably leave space for it just in case I decide I want to add it.

Hmm... a thermocooler... how much do those cost? If it was really cheap, I might consider that. It would be nice not to have some weird box in the fridge for people to ask about or clog the fridge up in general.

However, I kinda doubt they are cheap. Also that would raise running costs because it would run while idle, but once again idk how much more that would cost. Probably would depend somewhat on how well the whole thing is sealed to keep the cool in... which is a whole added level of design issues that I'd rather not delve into in the first go-round.

Still, the "Spy's Essential PheroMixer" briefcase would probably include one. Hell, if that was just some no-expense-spared thing, you could even add gyros and parts such that it always stays level and can operate even during the most exhilarating of car chase scenes...

EDIT:

If I was to put it in the fridge, it would probably only be parts of it. possibly only the grid pf bottles, and then I'd store the rest somewhere else. At the very least it might be important to store the battery outside the fridge, and in general I don't want water condensing on the electronics. So basically the same concept as just placing them on the rotary when operating, yes. Instead I would just be setting the motors on the track above the grid.

gentlmentlemen - March 13, 2012, 11:28 am

I wonder if the whole "touching the tip of the drop to the wall of the container" thing will be an issue. If the carrier is 100% DPG I could see that being an issue... and just in general for anything with high enough surface tension that will tend to happen...

Perhaps the motor that rotates and raises the mix bottle underneath the pipette could do that somehow, but if that's the case I'll have to increase the accuracy of that significantly, and it still might be difficult. Besides having to then keep track of the mix bottle's liquid's height, I don't know if it would be easy to touch it to the side, the pipette's width would probably get in the way. So a rotating and raising design would probably need to also rotate the pipette or bottle very slightly at the end to touch the drop, but then if you touch it to the same place on the side of the bottle every time, there's a lot more potential for cross-contamination.

Maybe if the mix bottle wasn't rotated and raised, but translated sideways, then raised.

Tbh though that issue might be a big pain to deal with... might be better to use concentrates dissolved in alcohol than in oil... then just add any fixative liquids as the last part. Even alcohol might have small drops though, I know it does with my syringe... and not dealing with the drops left at the tip will likely decrease the accuracy...

OH.... did you also mean that the pipette tips must stay in the liquid of the mix bottle for the entire time it is expelling liquid? Because that might solve it, but you'd definitely need to change the tips after that.

So basically fill it with however much PA and the like it needs, then fill it with the molecules?

Fly So Hi - March 13, 2012, 12:15 pm

(03-13-2012 9:50 AM)gentlmentlemen Wrote: [](#)... but I'll worry about that when I get the earlier functions stated down...

Hehe, yes, we're planning too much in advance here.

(03-13-2012 9:50 AM)gentlmentlemen Wrote: [](#)I would not be using a step motor to keep track of which bottle it is at, but instead a hole along the track at each stop. A button (significantly smaller than the hole) would then ride along the track such that it is depressed until it reaches a bottle. Or vice versa, either way

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That way even if it occasionally misses a microstep here or there along the way, it doesn't accumulate those inaccuracies over the course of many, many mixes.

True, but you could implement a reset XY position for that in the code. Your system sounds great actually, use whichever is more simple. We can always upgrade the machine on future versions. Let's remember that the focus/goal here is to make a working machine. We can make it work with tridium later, but for now, let's make it work.

(03-13-2012 9:50 AM)gentlmentlemen Wrote: [](#)...

But it could be pain to take the caps of 30 to 50 bottles off, set them in, take them out when its done, and put the caps back on again.

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The first design probably wouldn't actually have a drip shield, though I'll probably leave space for it just in case I decide I want to add it.

I'll draw you my idea for this when i get home.

(03-13-2012 9:50 AM)gentlmentlemen Wrote: [](#)Hmm... a thermocooler... how much do those cost? If it was really cheap, I might consider that. It would be nice not to have some weird box in the fridge for people to ask about or clog the fridge up in general.

All ranges of prices. Abut US\$ 6,00 for this:

http://www.amazon.com/Velleman-6A-PELTIER-THERMO-ELECTRIC-MODULE/dp/B000TAAJ3E/ref=pd_sxp_grid_i_0_2

(03-13-2012 9:50 AM)gentlmentlemen Wrote: [](#)Still, the "Spy's Essential PheroMixer" briefcase would probably include one. Hell, if that was just some no-expense-spared thing, you could even add gyros and parts such that it always stays level and can operate even during the most exhilarating of car chase scenes...

Haha, no accelerometers or gyroscopes for now. Let's keep it simple for the average Joe to be able to replicate it.

Fly So Hi - March 13, 2012, 12:52 pm

(03-13-2012 10:28 AM)gentlmentlemen Wrote: [](#)I wonder if the whole "touching the tip of the drop to the wall of the container" thing will be an issue. If the carrier is 100% DPG I could see that being an issue... and just in general for anything with high enough surface tension that will tend to happen...

Let's assume all is alcohol for now. We worry about DPG later.

(03-13-2012 10:28 AM)gentlmentlemen Wrote: [](#)Besides having to then keep track of the mix bottle's liquid's height, I don't know if it would be easy to touch it to the side, the pipette's width would probably get in the way.

We could use a cone-shaped container like you said yourself. That way, the tip would almost touch the bottom of the cone without touching the walls.

(03-13-2012 10:28 AM)gentlmentlemen Wrote: [](#)Maybe if the mix bottle wasn't rotated and raised, but translated sideways, then raised.
Sounds even better than the rotating thing!

(03-13-2012 10:28 AM)gentlmentlemen Wrote: [](#)OH.... did you also mean that the pipette tips must stay in the liquid of the mix bottle for the entire time it is expelling liquid? Because that might solve it, but you'd definitely need to change the tips after that.
Actually, that was shown on the video, but not emphasised. I honestly think that's not a must.

(03-13-2012 10:28 AM)gentlmentlemen Wrote: [](#)So basically fill it with however much PA and the like it needs, then fill it with the molecules?
Yes, that's how i do my mixes. 1st fixative, 2nd alcohol, 3rd molecules.

gentlmentlemen - March 13, 2012, 2:40 pm

(03-13-2012 11:15 AM)Fly So Hi Wrote: [](#)Hehe, yes, we're planning too much in advance here.

Oh most definitely, although it's always good to give the next step some thought before making the steps at lead up to it so that the later steps are kept in mind in the earlier designs. When things that will be added later aren't kept in mind in initial designs, it tends to lead to the need to completely start over to add anything.

But agreed.

(03-13-2012 11:15 AM)Fly So Hi Wrote: [](#)True, but you could implement a reset XY position for that in the code. Your system sounds great actually, use whichever is more simple. We can always upgrade the machine on future versions. Let's remember that the focus/goal here is to make a working machine. We can make it work with tridium later, but for now, let's make it work...

... Haha, no accelerometers or gyroscopes for now. Let's keep it simple for the average Joe to be able to replicate it...

I like the button system. Ought to make it cost less too, in addition to saving some time programming. It might need 2 stops per bottle though: one to pick up the pipette tip from some holder near the bottle, and one to actually interact with the bottle itself.

Tridium... NOW you're thinking! Hahaha

With slight seriousness though: if we do make it spill proof for car chases and such, it would be better if it could achieve that purely through a mechanical design. That applies to most everything here I think, until the mechanical design becomes more complicated and less robust than the programming solution, but that would be unusual for most of what we're doing I think.

(03-13-2012 11:15 AM)Fly So Hi Wrote: [](#)I'll draw you my idea for this when i get home.
Can't wait! I'd draw mine, but I figure we should go with the rotary for the initial design anyways and worry about space saving stuff later. I'm thinking the main linear actuator design comes first in importance, then design for interacting with the bottle (raising/lowering said main linear actuator) and expelling the liquid into the mix bottle, then lastly transporting from concentrate to concentrate. After that it's just final touches like the user interface.

(03-13-2012 11:15 AM)Fly So Hi Wrote: [](#)All ranges of prices. Abut US\$ 6,00 for this:

<http://www.amazon.com/Velleman-6A-PELTIER-THERMO-ELECTRIC-MODULE/dp/B000TAAJ3E/re>

[f=pd_sxp_grid_i_0_2](#)

Cool! About how many would you think we would need? I still think this would be a very final touch, but no reason to rule it out if it isn't difficult or expensive.

(03-13-2012 11:52 AM)Fly So Hi Wrote: [](#)Let's assume all is alcohol for now. We worry about DPG later.

Sounds good. Might still be a slight problem as I notice it still has a small bubble when I use my 28 guage syringes with alcohol, but that may just be from the dead space and just from using inferior equipment in general. Also might have something to do with the needle being steeply beveled, increasing the surface area for the bubble to cling to.

But I agree, should be good enough to just ignore it initially.

(03-13-2012 11:52 AM)Fly So Hi Wrote: [](#)We could use a cone-shaped container like you said yourself. That way, the tip would almost touch the bottom of the cone without touching the walls.

I meant more just whether it would be physically able to reach a place to touch the drop of liquid to.

(03-13-2012 11:52 AM)Fly So Hi Wrote: [](#) (03-13-2012 10:28 AM)gentlmentlemen Wrote: [](#)Maybe if the mix bottle wasn't rotated and raised, but translated sideways, then raised.

Sounds even better than the rotating thing!

If it were as easily achievable I would agree, but after thinking about it I think it would be slightly more complicated. Not tons, but enough to merit using the rotating thing if we can. Either one could work though.

I was thinking that in order to have both functions from a single motor, it would just run the lifting gear chain until it jammed, which would then activate the gear chain which moved things sideways. Or maybe vice versa would be better... not sure.

In both cases, it should be very easy in future designs to add more mix bottles at a time, so that if you're making 2 different mixes at once which both include the same molecule, it doesn't have to rotate the rotary (or go around the track) again for each extra mix bottle. That way it could make 2 mixes in one trip and only make 1 stop per bottle. Could be useful for seperating mixes, like into say social and sexual components, or self-effects and others' effects so that those affected by Androstadienone with depression could more easily apply that part of the mix on the back of their necks or the like.

(03-13-2012 11:52 AM)Fly So Hi Wrote: [](#)Actually, that was shown on the video, but not emphasised. I honestly think that's not a must.

Well that's good, because I wouldn't think it would be, and that helps for some other stuff too if it isn't a must. I figure it can't be too much of a must other than to touch the liquid's surface for the drop that sticks to the end, and it doesn't need to be submerged for that to work. Obviously we don't want to squirt it from miles away, but as long as its relatively close to the surface such that there isn't splashing I figure it will be fine.

(03-13-2012 11:52 AM)Fly So Hi Wrote: [](#) (03-13-2012 10:28 AM)gentlmentlemen Wrote: [](#)So basically fill it with however much PA and the like it needs, then fill it with the molecules?

Yes, that's how i do my mixes. 1st fixative, 2nd alcohol, 3rd molecules.

Wouldn't it work better to go from lightest and thinnest to heaviest and thickest? That way the heavier stuff has to sink through the lighter stuff to get to the bottom and would have a greater tendency to seperate and be dilluted and would do so more quickly than if it was sitting on the bottom below the lighter stuff. So wouldn't it work better to go: 1st alcohol, 2nd fixative, 3rd molecules? Probably isn't a huge deal, but just my thoughts.

gentlmentlemen - March 13, 2012, 2:48 pm

Also, do you know of any cheap or free CAD type programs we could possibly use to share designs? It isn't essential or anything, but might speed things up especially as far as re-designs go. I used to have a program a long time ago from one of the competition years, but I forget what it's called and didn't use it much. I doubt I still have it.

I don't have a whole lot of experience using CAD programs, but I'd be willing to learn more and I figure they're generally speaking straightforward to use after an initial learning curve.

Would probably be superior to just drawing things and sending the pictures, but for now it isn't really a big deal. Just a thought I had.

Fly So Hi - March 13, 2012, 5:52 pm

(03-13-2012 1:40 PM)gentlmentlemen Wrote: [](#)I like the button system. Ought to make it cost less too, in addition to saving some time programming. It might need 2 stops per bottle though: one to pick up the pipette tip from some holder near the bottle, and one to actually interact with the bottle itself.

Good point, a tip holder near each bottle on the grid.

(03-13-2012 1:40 PM)gentlmentlemen Wrote: [](#)I'm thinking the main linear actuator design comes first in importance, then design for interacting with the bottle (raising/lowering said main linear actuator) and expelling the liquid into the mix bottle, then lastly transporting from concentrate to concentrate.

I was thinking the same thing!

(03-13-2012 1:40 PM)gentlmentlemen Wrote: [](#)Cool! About how many would you think we would need? I still think this would be a very final touch, but no reason to rule it out if it isn't difficult or expensive.

Enough to cover about a quarter of the grid's surface, i think. Check this video, they can get to 2.5 Å, Å°F

<http://www.youtube.com/v/3x-wxLEfLEQ&rel=0&fs=1>

(03-13-2012 1:40 PM)gentlmentlemen Wrote: [](#)...I notice it still has a small bubble when I use my 28 guage syringes with alcohol, but that may just be from the dead space and just from using inferior equipment in general.

Very likely the empty space. This problem goes away with pipettes/tips.

(03-13-2012 1:40 PM)gentlmentlemen Wrote: [](#)I meant more just whether it would be physically able to reach a place to touch the drop of liquid to.

Now you got me thinking. Very well observed. Maybe extra pressure for the small ammounts, so it squirts the concentrate. We'll have a problem if it sprays instead of squirts... I'll think of something.

(03-13-2012 1:40 PM)gentlmentlemen Wrote: [](#)In both cases, it should be very easy in future designs to add more mix bottles at a time, so that if you're making 2 different mixes at once which both include the same molecule, it doesn't have to rotate the rotary (or go around the track) again for each extra mix bottle. That way it could make 2 mixes in one trip and only make 1 stop per bottle.

I know what you mean, and that's a good idea, i just think we gotta walk before we can run. Let's focus the basics first to keep it simple and practicable.

(03-13-2012 1:40 PM)gentlmentlemen Wrote: [](#)Wouldn't it work better to go from lightest and thinnest to heaviest and thickest? That way the heavier stuff has to sink through the lighter stuff to get to the bottom and would have a greater tendency to separate and be diluted and would do so more quickly than if it was sitting on the bottom below the lighter stuff. So wouldn't it work better to go: 1st alcohol, 2nd fixative, 3rd molecules? Probably isn't a huge deal, but just my thoughts. I usually mix the components in this particular order because a more viscous component like DPG evaporates much slower than Alcohol, for example. The moment I add alcohol to DPG, the alcohol is already "fixed", so it will evaporate less, not spoiling the measures.

Here's the drawing I wanted to show you:

Fig. 1 - The light grey part is the top layer.

Fig. 2 - The dark grey cover is the middle layer, between the top layer (grid) and the bottom layer (tube with liquid). It slides back revealing the liquid inside the tube. (03-13-2012 1:48 PM) gentlmentlemen Wrote: [](#)Also, do you know of any cheap or free CAD type programs we could possibly use to share designs? I'll google something.

gentlmentlemen - March 13, 2012, 7:21 pm

(03-13-2012 4:52 PM)Fly So Hi Wrote: [](#)Good point, a tip holder near each bottle on the grid. Yup. I was thinking the only other way would be to somehow integrate the pipette tip into the bottle. While that would be cool, it would be annoying to do, and even if there were pre-made bottles like that, I'd like to not have to use special bottles just for the machine eventually. That tends to be annoying and in general if this is something to be built by others in the future, then we should avoid the need for specific parts which might be unavailable at a later date.

(03-13-2012 4:52 PM)Fly So Hi Wrote: [](#) (03-13-2012 1:40 PM)gentlmentlemen Wrote: [](#)I'm thinking the main linear actuator design comes first in importance, then design for interacting with the bottle (raising/lowering said main linear actuator) and expelling the liquid into the mix bottle, then lastly transporting from concentrate to concentrate. I was thinking the same thing! Cool! In that case, let's talk linear actuators!

We could probably buy one premade, but we might have to add onto it after that, idk. We would need accuracy relative to the distance which the single volume pipette must travel, and as such the first and most important thing in my mind is to look at how far the button/plunger on the back of pipettes travels for various pipettes, or whether it's all the same.

(03-13-2012 4:52 PM)Fly So Hi Wrote: [](#)Enough to cover about a quarter of the grid's surface, I think. Check this video, they can get to 2.5 Å, Å°F

<http://www.youtube.com/v/3x-wxLEfLEQ&rel=0&fs=1>

Woah. That's pretty crazy. Well, giving the bottles a 3" by 3" square each (I doubt we'd need more than that on average, maybe a couple crazy big ones just for fixatives and PA), we'd have a grid from somewhere around 270 to 450 square inches for the whole grid, but I'm shooting pretty large there. Probably wouldn't have to be near so big. I don't like the idea of a lot of different bottle-holder

sizes though, I figure we may want some bigger ones for convenience of not changing them out, but with all the concentrates (which will constitute the vast majority of the bottles), we probably would only need something like 1.5" by 1.5" squares even for the largest bottles.

(03-13-2012 4:52 PM)Fly So Hi Wrote: [](#)Very likely the empty space. This problem goes away with pipettes/tips.

That's what I figured. I noticed that in the video it was a pretty intensely thick liquid that was beading up there. In contrast, pretty much any normal liquid will have a small bubble you can push out to the end with my syringe.

(03-13-2012 4:52 PM)Fly So Hi Wrote: [](#) (03-13-2012 1:40 PM)gentlmentlemen Wrote: [](#)I meant more just whether it would be physically able to reach a place to touch the drop of liquid to.

Now you got me thinking. Very well observed. Maybe extra pressure for the small amounts, so it squirts the concentrate. We'll have a problem if it sprays instead of squirts... I'll think of something.

Well let's see how much of a problem it is first. It may turn out that it only is a problem for fixatives, and then we can focus on a more specific solution for those. One solution (for those) might be to use pipette tips with larger openings for the thicker stuff, but maybe that would just make things worse, idk. But I think that as soon as you touch it to another material (including the surface of the liquid in the mix bottle) then the same strong cohesive and adhesive forces keeping it stuck to the tip of the pipette would be combined with gravity, and if you still have room left with the linear actuator, you could throw in it's force of air pressure by depressing it past the "second stop" to the "third stop" so to speak after you've touched the drop to the liquid. Ought to work. The only significant problem I see right now would be dealing with the variance of drop size, but I would think that would primarily be determined by the carrier, and in addition I'm willing to bet that it will either be fine, or it will be a really large drop compared to the accuracy of the machine.

Still, if we have a way to touch the side of the bottle that would be nice, but then it might have to be a different side for every touch needed.

Which brings me back to my earlier point: let's observe what happens first.

(03-13-2012 4:52 PM)Fly So Hi Wrote: [](#) (03-13-2012 1:40 PM)gentlmentlemen Wrote: [](#)In both cases, it should be very easy in future designs to add more mix bottles at a time, so that if you're making 2 different mixes at once which both include the same molecule, it doesn't have to rotate the rotary (or go around the track) again for each extra mix bottle. That way it could make 2 mixes in one trip and only make 1 stop per bottle.

I know what you mean, and that's a good idea, I just think we gotta walk before we can run. Let's focus the basics first to keep it simple and practicable.

Agreed. All I meant by that was that if we wind up with a choice between walking on our hands vs walking on our feet, then let's be sure to walk on the ones without opposeable thumbs. If we have to go all frankenstein and piece a thumb onto our foot, so be it, but the ones already built in tend to work better and take less work.

But I'd rather it become a walking freak with weird sewn on thumbs than a cool drawing that can't walk at all of course.

(03-13-2012 4:52 PM)Fly So Hi Wrote: [](#)I usually mix the components in this particular order because a more viscous component like DPG evaporates much slower than Alcohol, for example. The moment I add alcohol to DPG, the alcohol is already "fixed", so it will evaporate less, not spoiling the measures.

Ah... makes sense. I was going to mention something about some of the accuracy being ruined by evaporation... very smart indeed.

(03-13-2012 4:52 PM)Fly So Hi Wrote: [](#)Here's the drawing i wanted to show you:

Fig. 1 - The light grey part is the top layer.

Fig. 2 - The dark grey cover is the middle layer, between the top layer (grid) and the bottom layer (tube with liquid). It slides back revealing the liquid inside the tube.

Very cool. So just to be clear on it, its basically the same sliding lid idea I had, but individualised for every bottle? That would actually make things a ton easier... no drip problems... and changing out the covers is as easy as changing out the bottles!

(03-13-2012 4:52 PM)Fly So Hi Wrote: [](#) (03-13-2012 1:48 PM)gentlmentlemen Wrote: [](#)Also, do you know of any cheap or free CAD type programs we could possibly use to share designs?

I'll google something.

Can't wait! I'll try as well and see what I find. Any way we have of showing each other what we mean and of sharing designs can then later be attached to the posts showing where to get the materials and how to build it, etc.

Fly So Hi - March 13, 2012, 8:32 pm

(03-13-2012 6:21 PM)gentlmentlemen Wrote: [](#)Yup. I was thinking the only other way would be to somehow integrate the pipette tip into the bottle. While that would be cool, it would be annoying to do...

Yes, agreed. That wouldn't be as nice.

(03-13-2012 6:21 PM)gentlmentlemen Wrote: [](#)We would need accuracy relative to the distance which the single volume pipette must travel, and as such the first and most important thing in my mind is to look at how far the button/plunger on the back of pipettes travels for various pipettes, or whether it's all the same.

For fixed volume pipettes, i think the distance is the same. For variable volume ones, the distance changes. Anyway, we could work with a large pipette, like 1000uL. As i see it, the amount of liquid drawn will be based on the number of turns the linear actuator will do to pull up the plunger, not on the volume of the pipette itself, am i right?

(03-13-2012 6:21 PM)gentlmentlemen Wrote: [](#)...we'd have a grid from somewhere around 270 to 450 square inches for the whole grid, but I'm shooting pretty large there.

How many concentrate bottles are you thinking of?

(03-13-2012 6:21 PM)gentlmentlemen Wrote: [](#)It may turn out that it only is a problem for fixatives, and then we can focus on a more specific solution for those. One solution (for those) might be to use pipette tips with larger openings for the thicker stuff,...

They'll be needed for sure.

(03-13-2012 6:21 PM)gentlmentlemen Wrote: [](#)But I think that as soon as you touch it to another material (including the surface of the liquid in the mix bottle) then the same strong cohesive and adhesive forces keeping it stuck to the tip of the pipette would be combined with gravity

Good point. So the tip must dive into the final bottle. The way i can think of now is if we use a [tip rack](#) and after each liquid is dispensed, the tip is replaced.

(03-13-2012 6:21 PM)gentlmentlemen Wrote: [](#)The only significant problem I see right now would be dealing with the variance of drop size, but I would think that would primarily be determined by the carrier, and in addition I'm willing to bet that it will either be fine, or it will be a really large drop compared to the accuracy of the machine.

Remember pipettes work with volumes, not drops. 200uL of crude oil is, to a pipette, the same as 200uL of alcohol. Besides, fixative is not something you need microscopic precision for. And if we implement the item above, this issue is history.

(03-13-2012 6:21 PM)gentlmentlemen Wrote: [](#)Very cool. So just to be clear on it, its basically the same sliding lid idea I had, but individualised for every bottle? That would actually make things a ton easier... no drip problems... and changing out the covers is as easy as changing out the bottles!

Oh that's cool. I just illustrated it because i wasn't sure that's what you meant. Anyway, i drew only one bottle but my idea was that the dark grey part is just one big part serving all bottles.

Roughly like this:

This way we just use a single mechanism to uncover all of the bottles, be it a magnet or whatever.

gentlmentlemen - March 13, 2012, 9:37 pm

(03-13-2012 7:32 PM)Fly So Hi Wrote: [](#)(03-13-2012 6:21 PM)gentlmentlemen Wrote: [](#)We would need accuracy relative to the distance which the single volume pipette must travel, and as such the first and most important thing in my mind is to look at how far the button/plunger on the back of pipettes travels for various pipettes, or whether it's all the same.

For fixed volume pipettes, i think the distance is the same. For variable volume ones, the distance changes. Anyway, we could work with a large pipette, like 1000uL. As i see it, the amount of liquid drawn will be based on the number of turns the linear actuator will do to pull up the plunger, not on the volume of the pipette itself, am i right?

Just to be clear then, the fixed volume ones don't change button depression distance from brand to brand then?

And I was also thinking a 1000uL one. Anything else would have potential to take waaayyyy too long with the fixatives and carriers. Or at least I expect it would with how much we'll be slowing down the linear actuator's motor to achieve the accuracy we want. But time issues outstanding, there's also the issue of increased inaccuracy from having to repeatedly draw liquid and expell it from the same bottle.

(03-13-2012 7:32 PM)Fly So Hi Wrote: [](#)(03-13-2012 6:21 PM)gentlmentlemen Wrote: [](#)...we'd have a grid from somewhere around 270 to 450 square inches for the whole grid, but I'm shooting pretty large there.

How many concentrate bottles are you thinking of?

A lot. Total bottles I'm thinking 30 to 50. The main reason I think it should have a lot is because if you look at the DIY stuff and the huge number of molecules being uncovered by Chris and dbot (big list at HtH), we'd need actually quite a bit more than that I think. Even without that insane amount of additions I could probably justify 30 to 40, theres just so freakin many... and thats not even counting the various cover fragrances for adding, and at least 2 carriers.

Which reminds me: it should remember which bottle type you used for later. There's a lot of stuff

like that it should remember though... gah. I've got to remember to leave that user interface for last.

Either way, I'm thinking 30 to 50. It sounds crazy, but if its going to become the main way I make mixes, having less than that many might require semi frequent to frequent changing of bottles. Maybe that isn't so bad though...

For the first design (that uses the grid anyways), I'm thinking like 2 rows of 5. First row for testing if it can make it down the track, 2nd row for testing if it can make it around the bend in the track.

(03-13-2012 7:32 PM)Fly So Hi Wrote: [](#)They'll be needed for sure. We'll see. I hope not but I expect you're right.

(03-13-2012 7:32 PM)Fly So Hi Wrote: [](#) (03-13-2012 6:21 PM)gentlmentlemen Wrote: [](#)But I think that as soon as you touch it to another material (including the surface of the liquid in the mix bottle) then the same strong cohesive and adhesive forces keeping it stuck to the tip of the pipette would be combined with gravity

Good point. So the tip must dive into the final bottle. The way i can think of now is if we use a [tip rack](#) and after each liquid is dispensed, the tip is replaced.

Well, if the machine can accurately enough keep track of the height of the liquid in the final bottle, then it ought to be able to just touch the drop to the surface, but we've already accumulated more than enough reasons I think for replacing the tips, so I say plunge it in.

(03-13-2012 7:32 PM)Fly So Hi Wrote: [](#) (03-13-2012 6:21 PM)gentlmentlemen Wrote: [](#)The only significant problem I see right now would be dealing with the variance of drop size, but I would think that would primarily be determined by the carrier, and in addition I'm willing to bet that it will either be fine, or it will be a really large drop compared to the accuracy of the machine.

Remember pipettes work with volumes, not drops. 200uL of crude oil is, to a pipette, the same as 200uL of alcohol. Besides, fixative is not something you need microscopic precision for. And if we implement the item above, this issue is history.

I was talking about the size of the drop which hangs off the pipette at the end with the thicker liquids, which depends on surface tension.

But agreed, lets just implement the method of plunging the tip in slightly and be done with it. If we're replacing the tips anyways, it should pretty much be a non-issue. The only thing I can think of would be residue on the sides of the tip of the pipette adding to the amount put into the final mix bottle, but if they don't worry about that with the .2uL accuracy ones, then I figure it probably isn't really an issue. If it is, then we'll just minimize the amount that goes below the surface --mainly on the expulsion that is. The stuff on the outside of the tip may be an issue, but the air bubbles from not keeping the tip submerged in the concentration bottle are a known issue.

(03-13-2012 7:32 PM)Fly So Hi Wrote: [](#)Oh that's cool. I just illustrated it because i wasn't sure that's what you meant. Anyway, i drew only one bottle but my idea was that the dark grey part is just one big part serving all bottles.

Roughly like this:

This way we just use a single mechanism to uncover all of the bottles, be it a magnet or whatever. Looks good, although I have to say I'm pretty sold on the single bottle cover idea now. I just see the changing of lid covers when you change what bottle is in what slot and switch one out being a lot easier if each bottle has its own. Could allow for a more custom seal on each bottle too which would probably work better. Gets around any potential drip issues from condensed liquid getting on the

cover, or if the liquids get sloshed onto the top from the thing being bumped...

If we did single bottle covers, I would probably use the motor for raising and lowering the pipette tips into the bottles for opening the covers of the individual bottles instead of the track motor.

Also, this way only the bottle being worked with at any given time is open. Not only does that mean that the other bottles won't be open with their contents evaporating into the air during the mix making process, but it also means great things for if the whole rig gets bumped.

With the "one lid to rule them all" lid, if the machine gets bumped while mixing, every single bottle would get sloshed. Thus, one little accident could lead to a lot of wastage of product and money, as well as contamination of a lot of the bottles.

If each bottle gets its own lid though and it gets bumped, then whatever bottle is open at the time will still get sloshed and there will still be some wastage of product, but it will be far less and in addition there will be no risk of it getting into the other bottles.

The main reason I thought we should just have one lid at first was because I knew I didn't want to deal with the screw caps of each bottle, but I think we could come up with a cap that stayed with the bottle-holder and was attached to it with either a sliding track or a hinge.

The lowering of the pipette tip towards the bottle could open the cap, and the raising could close it. I'm thinking a hinge would be easier and cheaper for a single bottle cap design though. What type of securing of the cap do you think would work best? I'm thinking some type of latch one, like a snap close cap. The motor ought to still be able to operate that if the cap extends past the hinge or past the latch to give the motor lowering the pipette some leverage. Then it would just be a matter of a little stationary arm which preceeds and pipette tip to open/close the cap. At first I was thinking of maybe using some rubber bands to have the cap be self-closing, but then I thought that might be less reliable.

That reminds me of another problem which has been bouncing around in my head for the multi-cap lid solution. If it is all one lid, I would expect that a decent amount of force would need to be applied to make sure it is sealing all the bottles. If that force is not applied evenly, it may take a lot of force to seal the bottles which don't receive much of that force. Of course I suppose you could just add some lead weights above each bottle. That would be simple enough.

Still, I think it would also have a tendency to have worse seals unless we used only one bottle type, simply because it would be difficult to adjust the middle bottles' height correctly (which would be harder to view once more bottles are in there).

But the main reason is because that looming accident scares me. Having the entire phero collection all open at once is just asking for disaster to strike with her cruel hand imo.

The one other thing I forgot to mention is that in my seal's design I had pictured an uncut square of the sealing material being pressed down on the bottle's top. I think yours would work better (with the hole in the middle) for bottles of a specific top size and shape, but when dealing with a multitude of bottles I don't know how that would work.

awol - April 24, 2013, 4:57 pm

(03-12-2012 2:31 PM)shadowknight Wrote: [I](#) have several websites to get bottles not sure about the which the vendors use

<http://www.sks-bottle.com/>

<http://www.lotioncrafter.com/>

<http://www.specialtybottle.com/>

<http://www.newdirectionsaromatics.ca/>

<http://www.sunburstbottle.com/>

<http://www.essentialsupplies.com/>

I would like to add this website, good for some ultra small bottles that fit in the tightest pocket, as well as 3 ml glass atomizers:

<http://www.pilotvials.com/>

wiserd - April 26, 2013, 12:18 pm

New Directions Aromatics has awful customer service.