Hello Mr. Martino,

First of all, thank you for doing this AMA. I am a high school senior graduating in June looking at studying chemistry at RIT, and I have a few questions that you might be able to answer:

1. What types of research are developing in Chemistry at the moment, and, as an extension, what do you think is the most interesting?

2. From your perspective, what is usually the minimum recommended level of education needed to start a career in Chemistry?

3. What are the pros and cons of the Pharmaceutical and Chemical industries, respectively?

4. I'm also looking at continuing into an M.S. program for Materials Science, do you know of any rising opportunities in that field?

Again, thank you for doing this AMA, and I look forward to your answers.

EDIT: wow this sparked a discussion

sriley081

Thanks for your question -- I'll answer in order: 1) Green chemistry is a hot area; so is material science. Formulations, as well as quality analysis and quality control are also hot areas. Interest is totally dependent on what you like and what you're passionate about doing. 2) You're best suited with at least an MS degree in chemistry, preferably from a school where the MS degree is not what is called a "terminal master's degree" -- in other words, a degree given to someone who cannot complete the requirements for a PhD program. Examples of schools that offer a non-terminal, professional MS degree are Villanova University and San Diego State University. University of Pennsylvania also is starting such a degree program. There are others. (Full disclosure: I earned an MS from Villanova University). 3) Pros of pharma: Diversity of scientific research, especially from a synthetic perspective. Cons of pharma: You're placed into a silo in one position -- especially with big pharma in general -- and it would be up to you to get exposed to other opportunities. Smaller pharma companies tend to lend themselves to wearing different hats, so there's less opportunities to exist in a silo. Pros of chem manufacturing: You wear multiple hats and get a strong foundation in industrial chemistry. You'll get...
exposed to different areas of the business, which allows you to transition into other opportunities. Cons of chem manufacturing: By definition, business is customer driven, so if you thrive on more creative synthetic problems as opposed to well-defined synthetic problems, then this may not be for you. 4) As I mentioned in answer to question 1, Materials Science is a hot area, so you should find opportunities. However, be prepared to be geographically flexible, too.

I am Raw Materials Chemist in the Pharmaceutical field and why do you think that the compensation is so low compared to non stem degrees?

I make slightly above the national average and even my buddies who do analytical work in Oil and Gas barely make more than I do. Now I love what I do but at some point in time I'll have to change careers if I wish to provide for a family or even buy a house at some point. What is a viable career path for a chemist? Or is the only option making the jump to management after a few years? Every lab I've been to seems to have a collection of people who seem stuck, and that's not where I want to be.

redactactyl

R&D is always going to be a cost center. In other words, R&D is going to spend more money as opposed to take in more money. Careers in sales, marketing, regulatory affairs and manufacturing are higher paying in general because they are profit centers and are closer to the revenue stream than R&D. This does not mean that there are not high paying jobs in R&D and it may mean doing some research and networking. If you're an ACS member, take a look at the ACS Salary Calculator to see where your pay range should be.

http://www.acs.org/content/acs/en/careers/salaries/salary-calculator.html

What do you think would be a good undergraduate study to get into pharmaceuticals? There is a university near me that has 'pharmaceutical sciences' as one of their offerings, but I wonder if a straight up chem background is more appealing.

cronowing

In general -- even for entry-level PhD chemists getting their first job in pharmaceuticals -- medicinal chemistry is taught for the most part on the job. You would be best served studying as much organic chemistry as you can and you should especially get connected with a solid undergraduate research project in synthetic organic chemistry. This is not to say that there are not good programs in pharmaceutical sciences. There are not as many of them yet.

What's your forecast for the future of Nuclear Magnetic Resonance? I'm currently an undergrad working at an NMR center and I love the blend of science that NMR is. Its such an interesting puzzle. My research adviser seems to think that NMR has hit and passed its golden age and will decline steadily over the next decade or so. Should I try to find something more sustainable?

DonomuT

NMR is intrinsically linked to synthesis, so opportunities would be attached to synthetic hubs, such as Boston and the West Coast. Also, and in my opinion only, considering that Bruker is virtually the single major NMR manufacturer at this point, NMR is more of a niche area than before. There would be a short-term demand for people experienced with Varian/Agilent NMR instrumentation to keep those instruments up and running now that Agilent has exited the NMR business. However, inevitably, and unless another NMR manufacturer increases their R&D efforts, I can see that universities and
companies would slowly be switching over to Bruker instrumentation. Such dynamics would affect where jobs would be located, so this is something to keep in mind.

Currently doing a PhD in computational chemistry after doing a masters in chemistry. I specialise in protein mutations specifically in making them more catalytically efficient. After my PhD I am not sure what I plan on doing. At the moment there are some really good post-doctoral opportunities, but from a financial viewpoint I think industry might be a better choice. Is there a lot of opportunity to progress in industry and make money?

troll_hard-ie

My opinion is to pursue the post-doc first then go into industry, especially with computational chemistry. Jobs in computational chemistry have been sparse for the past few years, so if you're passionate about being a computational chemists, you need to do everything that you can to stand out above the crowd, and in my opinion, a post-doc will help this.

Hello, Mr. Martino! Thank you for doing this AMA!

My question is simply what would you say to a high schooler who aspires to be a chemist? Is there anything I should avoid/pursue for more success in college and later in life? Thanks for this opportunity!

GreekAnalyzer

If you're aspiring to be a chemist, focus on what you are passionate about with regards to chemistry. Also, please keep this in mind, too: High School chemistry courses -- at least from my own experience -- tend to be very math-based. So is general chemistry, physical chemistry and analytical chemistry. Organic chemistry is really not math-based as much, and the same goes for inorganic chemistry. Students who have never been exposed to organic chemistry before -- which is usually taken in the Sophomore year of college -- usually are in a state of shock because they are exposed to a very different way of thinking where they are required to understand topics as opposed to performing rote memorization. If you keep an open mind with your education and pursue what you're passionate about doing, you won't go wrong.

What kind of advice would you give to a student who graduated Summa Cum Laude with an ACS certified Biochemistry degree and years of hands on lab and research experience who keeps getting job applications rejected? How does one successfully get a job these days?

maelstrom_soslow

I would suggest that you have someone check your resume. If you're an ACS member, you can utilize the services of an ACS Career Consultant such as myself at no cost to you. You can make an appointment at the C&EN Jobs website -- here's the link:

http://chemistryjobs.acs.org/ementor/

I'm a partial colorblind (because I think I can distinguish between most colours) with love for chemistry. I'm also currently pursuing chemical engineering. As you might have already realised, is being colorblind that much a downfall in chemical engineering? I mean, will I able to pursue a career in this?
Isuckmoms

Being colorblind is most certainly not a downfall and you should be able to pursue a successful career in either chemistry or chemical engineering.

How do I rebrand from 10 ten years as a PhD adjunct chemistry teacher to go back into industry.

yar530

I would recommend trying out a contract role in industry to get back to speed, obtain new contacts, and see if you really want to go back into an industrial role. Such contract work will help you to rebrand as well by giving you more recent and relevant experience, too.

Hello Mr. Martino,

I will be starting this fall at UT Austin as a graduate student, with a focus on inorganic / materials. What can I do while working towards my PhD to improve my chances of landing an industry job after I graduate?

Thanks!

MNDGone

Try to network outside of your research group as much as you can. You will be very busy with your PhD group, but any opportunity to network outside of the group -- especially with decision-makers in industry responsible for hiring -- is helpful. Also, if your research group has a collaboration with industry, you should actively campaign to work on that kind of project as that would put you right in the view of industrial companies.

What are your thoughts on career stability with regards industrial careers, particularly within the Pharmaceutical Industry?

rum_pirate

If you're looking at Big Pharma, you need to consider working in either the Boston area or the West Coast (San Francisco to San Diego). Otherwise, more basic R&D is being pursued at smaller companies. Job stability for an R&D chemist -- unfortunately -- is having the ability to land a job quickly if ever a downsizing occurs. Smaller pharmaceutical companies -- which is becoming more the normal - - are forming with the express purpose of being taken over by one of the Big Pharma companies. If this is the strategy that companies are pursing, then as chemists, we need to adapt our own career plans accordingly.

Hello, I am currently in high school, and would like to pursue a career in pharmaceutical development. When I get to college, what classes would you advise me taking. By then, I will have taken AP chemistry, Post AP Chemical engineering, and Post AP organic chemistry. Thank you

grant_anderson

From your post, it sounds like you might have an organic chemistry course in high school, so I'll answer your question as if you have that option available to you (and I don't often hear of it). If so, keep in mind you will most likely need to re-take organic chemistry in college regardless of how well you did.
in the high school class. General chemistry is something colleges typically consider for AP credit. Organic chemistry is typically not, especially if a college has an organic class taught by a well-known organic chemist. Otherwise, you need to discuss this with your academic advisor in college as all colleges have different requirement.

Good day Joe. Glad to have you here.

What’s your point of view and how would you encourage young chemist graduates to search for job opportunities beyond their niche field?

Question comes up because I’m a chemical engineer with a specialty in food chemistry. Thing is: back in my town the only jobs I could apply with those credentials were “chief of staff” for industrial cafeterias or quality inspector for some food processing companies. However after trying out for a job with a chemical company focused on metalworking I ended up landing a job that turned out to be a very good career. Basically because a lot of things you need to take care of in food also apply with industrial chemicals (ph, temperature, storage, etc).

Thanks again for taking the time for an AMA

FoodMentalAlchemist

What you did -- taking skills that you have and fitting it to another position -- is something that I would encourage all graduates to consider as this ability will make them more marketable and help them land jobs faster. That and to network -- this is also a must.

If you live in an area with chemical manufacturing, do you think its a good idea to try for a manufacturing technician/operator job straight out of high school before going to college?

I think it would be advantageous, because you would get experience in manufacturing which would enhance lessons in the classroom whether you go on to study chemistry or chemical engineering. Also, there’s good money in operator jobs, so you wouldn’t graduate with a large amount of debt.

P.S. Where do you think the Phillies will finish in the NL East this year? :)

ednigma1

Do both -- go for the degree and try to work at the plant in the summer. You get the experience you want, some cash to pay down student debt, and a degree that will help to make you even more marketable.

Go Phillies! :-)

I’m currently completing my ACS certified BS program, and I was wondering how effective it is for a BS to get employed in the industry, if there is any particular field that will or won’t look at candidates with only a BS.

Second question is how advisable is it to pursue a masters in Analytical or Physical Chemistry while working? Would it be smarter to just solely focus on grad school instead of balancing work with it?

Thanks so much for taking your time to answer, cheers!

RRizzo
Unfortunately, it is becoming more difficult -- not impossible, but difficult -- for BS-level chemists out of school to obtain employment. That said, if you have an undergrad research experience or an internship with a company while you are an undergrad, that would be most helpful.

Regarding pursuing a degree while working: As you mentioned, you would need to balance work, school and personal life if you were pursuing a Master's degree while working. If you can do this and thrive on it, then go for it. Otherwise, if balance is important to you, then you should pursue obtaining the MS degree first.

Thanks for doing this AMA! I was enrolled at ASU from 2006-2009 and due to tragic life circumstances, I had to leave and haven't been able to return. I loved Chemistry and really wanted to pursue a career in material science and eventually, I wanted to go into research. In your experience, do you know of any possible career paths that would consider someone who is self taught? Or if there are any accredited self-taught programs that would be viable in achieving a career in Chemistry?

Ramrodtastic

Your best option would be to get in touch with a contract recruiter to explore your chemistry career options in your geographic area. You may need to be geographically flexible. It is possible for someone to get into chemistry in your circumstances, but please be aware that it will not be easy. Chemists is -- for better or worse -- an extremely pedigree-driven business which places great value on a college degree, the level of college education that you have received, and who advised you in laboratory research. If there is any possibility to finish your degree, doing so will make this easier. That said, even though you may face difficulty, it is not impossible.

Thoughts on pharmaceutical chemistry as a career after receiving a phd in it? My girlfriend is finishing her's in 2019 and I'm interested in where you think her best options might lie.

jrmoreau

For Big Pharma, look at pursuing a career in the Boston area or the West Coast. Smaller companies offer opportunities, too, and being geographically flexible will help. Keep in mind, too, that there is a technical career ladder, which is science-based, and a management career ladder, which can be science based but does transition into more business roles. For some companies -- not all -- there is more opportunity to advance on a management ladder, and for some -- not all -- companies, a glass ceiling may be eventually hit on the scientific ladder.

I graduated a few years ago with a Bachelor's degree in Chemistry. I've worked other jobs just to pay the bills but haven't had any luck landing a job in the sciences. Is there a particular job I can go for at this point or do I have to go for a Masters? I am looking to stay in New York City if that is relevant.

Alchem1stX

I would explore contract work if I were you -- that would help get your foot in the door. If you did decide to explore a Masters' degree, this would certainly help you.

First year science student, definitely majoring in Chemistry and hopefully going straight into a masters (but unlikely to do a PhD, at least not full time). Where do you see people with chemistry qualifications going that isn't lab or research work?
Regulatory affairs is a hot area. So is technical writing, especially involving Chemistry, Manufacturing and Controls (CMC). Patent law is always in demand, whether becoming a patent agent or a patent attorney. Technical sales and marketing -- whether it be for chemical manufacturing, pharmaceuticals or instrumentation and equipment vendors, are always in demand, too.

Hi Mr. Martino,

I'm so excited to see this AMA on here and to learn that you are a Villanova grad! I am a rising sophomore chemistry major there currently and I would love to ask you a few questions. I noticed that after school, you started working in industry.

Would you say that this is common place for chemistry majors to land a job in industry after graduating? What do you recommend doing during my college years that would help me achieve this? I already have a research position lined up for this summer. Would seeking ACS certification be advisable?

Additionally, what do job prospects look like directly after getting a BS? Would it make sense to delve into the job market for a few years before getting a Master's or would it be better to get it all done first?

I am very grateful to have all the opportunities that Nova provides, but I would love to hear any other tips you could throw my way.

As a follow up question, I think one of my biggest pet peeves is the social stigma attached to the word "chemical." How do you think we can combat this fear to make people more aware of what chemicals actually are?

Thank you, and Go Cats!

grotesque7

GO NOVA NATION!

To answer your questions: 1) Yes, industry is a common destination for graduates with a BS or MS degree. Kudos for doing undergraduate research -- this is critical and will only help you. ACS certification is not necessary but it won't hurt having that, too. 2) You would have more opportunity in this job market if you go for the MS degree first. Companies are less willing to train on the job, so getting more education (i.e.: the MS degree) beforehand will only help to make you more marketable. 3) Regarding stigma on the word "chemical": I agree that there is a stigma on chemistry, but part of the reason for this is that, unfortunately, chemists are not necessarily the best of communicators outside of the chemistry community. The better we can all communicate what we do, the more effective we can be to remove fear and replace it with understanding. Any communications training is very helpful with this. I took a public speaking course at Villanova as an undergrad -- it has served me very well overall.

Too bad this wasn't a year or two ago. I've pretty much given up on getting to use my chemical engineering degree. But I guess I may as well ask, what cities/states have the most job opportunities? I'm giving presentations at my college, so I could pass the info on to the graduating students.

InSane_We_Trust

Pharma is big in the Boston area and on the West Coast. Chemical Manufacturing is still strong in Pennsylvania, New Jersey and Delaware despite the Dow-DuPont merger. Key to a graduate pursuing a science career who is fresh out of school is to be geographically flexible and to not be dismissive of a
contract position. Contract work does not place a negative mark on one’s career as it may have decades ago, and salaries for contract work can be as competitive or even better than direct hire work in some circumstances.

Go Nova!(live 10 minutes from there) I am currently working through organic chemistry in college and I am growing more and more concerned at my inability to remember specifics of mechanisms learned from previous chapters. In your career, have you found it key to have a working knowledge of all chemical mechanisms or was it not frowned upon to glance at the reference books from time to time? Thanks in advance.

funymouth

GO NOVA! The best advice that I was ever given in learning organic chemistry was to waste paper. Get the Sn1, Sn2, E1 and E2 mechanisms down, and try to draw out on paper the mechanisms for the reactions that you learn. Getting comfortable with pushing electrons around is half the battle.

For me, I found that I learned organic chemistry best when I actually did it in the lab. No class can compare with actual lab experience to strengthen your knowledge of organic chemistry. Also, whether it be in industry or academia, most researched will have reference books as well as their undergrad and grad school texts on their shelves, and they have been known to take a peek and reference some things in them from time to time.

Not knowing much about the field, I would have presumed “optimizing organometallic synthetic processes for transfer to pilot plant, for exploring applications development with tin catalysts in polyester resins, and for optimizing processes for tin catalyst synthesis” would be more the domain of a chemical engineer than a chemist. is there significant overlap in the two fields? does traditional chemistry coursework adequately prepare a student for engineering-ish work?

jvttlus

If you're a process chemist, there can be overlap. A process chemist -- especially if you're responsible for testing a process for transfer to a plant facility -- will interact with chemical engineers. A basic understanding of what a chemical engineer wants is most helpful. ACS actually offers a short course on the subject:

http://proed.acs.org/course-catalog/courses/chemical-engineering-for-chemists/

Hello! I did my PhD in the US and am doing a postdoc in France (I'm American). That's not a traditional path but it's been a great experience that I don't regret. Now I am looking for work in the US polymer industry. Any tips for finding work from abroad? Should I expect that I'll need to come back to the US to interview or are there other options (e.g. video interview or interviewing at a location in Europe). Thanks!

tystuke

Obtaining a post-doc from outside the US is not necessarily uncommon. That said, you should expect to come back to the US to interview, especially if the employer is very interested in bringing you on-site. Employers usually cover travel expenses for on-site interviews, so that should not concern you.

Hi! I am also a high school Senior graduating this year and going to study chemical engineering along
with a minor in astrophysics. I was wondering how viable theoretical chemistry or astrochemistry is as a career or if there is another profession that would be better to focus on. I know it is probably still too early to decide a career, but I would like to have an idea of it. Edit: Thank you for doing this AmA!

Kurt_910

You’re welcome! Theoretical chemistry and astrochemistry are more academic in nature, so career opportunities in those fields would be more plentiful in academia. The challenge will be geographical flexibility and how plentiful or niche these career opportunities are.

Recent synthetic organic chemistry PhD grad here. Really want to get out of the lab for a while and possibly switch careers. Have a genuine interest in economics and often see Phys/Eng PhD’s (due to quantitative maths experience/ability) and Bio PhD’s (mainly financial analysts roles) move into finance.

But how realistic is this for Chem PhD’s such as myself?

922WhatDoIdo

It can be done, especially if you have some business training somewhere in your education. Alternative, if you did work in a lab role -- especially with a chemical manufacturer -- and pursued a management track, this would help you as well. Pursuing an MBA while working can be helpful, too.

I have a chem degree but my GPA was not that great, mostly due to general ed classes and having to work to partially support myself in school. I graduated just after 911, so there were not many jobs, and didn't really get off to a good start. Then I had health problems for a few years, and just took a labor job with health insurance. Its been years since I have really used my degree. I did undergrad research in organic synthetic, but most jobs are QA/QC. What should I do to try and get back into chemistry?

Bailie2

Two things: 1) Contract work in organic chemistry, if available. 2) Land a QA/QC job in a company that practices organic chemistry, network with organic chemists, and pursue an internal position in organic chemistry with that company.

Thank you for doing this AMA. During my bachelor of science in chemistry I worked in a lab for a 3 years and was published. I am now working for a consulting firm in Pharmaceutical Compliance but am interested in moving on. I do not feel I am helping the world enough in my role. How can I get back into a more science based position where I can use my skills to make a difference? Where do I start?

I have thought about working for a nonprofit organization. Is that a viable path?

walternates

You should get in touch with your established network -- people at your old lab-based job -- as well as network on your own to hear of new opportunities. There are non-profits that do lab work -- research universities and foundations being among them -- so they can be viable options for you as well.

Hi Mr. Martino, I have been working as an analytical chemist at a pesticide plant for about four years now. Having been on rotating 12 hour shifts the whole time, I am pretty well fed up and looking for a new job. Something I have noticed about many of the postings I have seen is that they are often
looking for someone very specialized. For example, I work primarily with GC and GC/MS, but I see interesting positions that are looking for someone with experience with ICP MS or HPLC. Is it worth applying to these positions with different instrumentation, or am I pretty much pigeon holed if I want to progress in my career rather than start over?

Also, another thing that I have noticed about the job market as a whole is that it is nearly impossible to get in touch with an actual human being right off the bat. I feel like I'm having to play key word bingo with my resume to get flagged by HR's search algorithms. A good way I've found to help is to add a microprint tag line with various key words to my resume, but it still feels like a soul crushing struggle.

What is your opinion on the modernization/dehumanization of the hiring/career process?

Thanks

Penguin154

Networking is key. Try connecting with your local ACS section or other groups to talk to people and get the word on the street about any job opportunities. Also, regarding instrumentation, you should pursue either ACS Short Courses (http://proed.acs.org/products-services/short-courses/) or an instrumentation vendor for training on the instruments that you are interested in using to gain some experience. Pursuing a contract job in these areas helps, too.

Hello Mr. Martino! Do you have any advice on possible career path for computational chemists other then pharmacology? I recently graduated with a PhD and my research was on molecule-based quantum computing. All jobs related to quantum computing I found so far require US citizenship and security clearance which I'm not going to get for at least two more years. Is a post-doc position really the only option in my situation? Thank you in advance.

saintshish

Materials science can use computational chemists as well.

Hi Mr Martino,

I'm a sophomore chemical engineering student thinking about what field or sector I'd like to join after I complete my education. Right now I'm thinking about how I could use my degree to get a job in energy production or pharmaceuticals, but am also curious if there's any interesting sectors that could see a ton of growth/increase their demand for workers within the next 10-15 years.

Thanks!

C0nch

Formulation chemistry, green chemistry and QA/QC are hot areas from a technical perspective. So is materials science.

Hello! Thank you for taking the time to answer questions! I'm currently getting my BA in chemistry and was wondering how important is the GPA? I honestly just want to work in a lab somewhere. Probably Montana even though I live in California.

Sacramento_Babe

GPA of 3.0 or better is standard. In lieu of that, being able to demonstrate and communicate any lab experience that you have obtained and demonstrate that you know it well will make up for any
deficiencies in GPA.

Should I get a master's in chemical engineering with an undergraduate in environmental chemistry? Problem is it's not an accredited undergraduate so it might make it harder to become a professional engineer. I live in Ontario.

**haddad**

Having an undergrad degree in environmental chemistry should not deter you from getting a master's in chemical engineering provided you have the chemical engineering requirement that the Master's program is looking for going into it. If by "accredited undergraduate" you are referring to an ACS-certified undergraduate degree program, then that's not necessarily an issue. I'm not sure how schools are accredited in Canada. In the US, if a school is not accredited by the regional accrediting agency, then odds are good there is a serious problem with the school.

If you are looking for a job industries instead of teaching, what are the benefits of finishing your doctorate vs mastering out?

EDIT: My wife is an inorganic chemistry graduate student.

**scrotty544**

If you finish the PhD, you'll have more opportunities on the technical and management ladders. Finishing with an MS will allow you to get a job in industry. However, from a technical side, companies have various cultures. Some companies will allow an MS chemist to contribute independently. Others do not allow MS chemists to independently contribute. Coming from a PhD program where the development of independence is expected, the possibility of lack of independence as a career MS chemist and acceptance of that lack of independence should be strongly considered. With the PhD, there is no such issue in industry.

Hello Mr. Martino,

I am graduating next spring with a degree in biochemistry and I am 4 classes away from a cell/molecular degree, will it be helpful in my career if I finish it?

**meimouto**

If you can finish the cell/molecular degree, than do so as there is a demand for molecular biologists as well as biochemists.