TO: **ALL MEMBERS OF THE RESEARCH GROUP**

FROM: **P. G. GASSMAN**

DATE: **February 1, 1988**

The following is an updated version of a letter which I have distributed to the group many times previously (last version 4/20/83).

1. **General Attitudes Expected of Individuals Working in My Group**

It is my opinion that both graduate students and postdocs come to a university to learn. This is the foremost reason for the existence of the university. Thus, I feel that individuals who are not here with a strong desire and commitment to improve their knowledge of chemistry and their ability to do chemistry do not belong. If anyone feels that they fall in either of these categories, I suggest they make arrangements to depart from my research group in a minimum of time. I am not particularly concerned whether they leave the university or merely transfer to some other research group where less of a premium is placed on chemical education.

I feel that anyone desiring to become a good organic chemist should be putting in a minimum of 60 hours per week in improving their knowledge and ability in the area of organic chemistry. At least ten hours of this time should be spent reading. There should be no one in my research group who does not regularly read the *Journal of the American Chemical Society*, the *Journal of Organic Chemistry, Chemical Communication, Tetrahedron Letters, Chemistry Letters,* and *Angew. Chem.* This is a bare minimum. In addition, I would anticipate that anyone really interested in chemistry would be regularly reading the two sections of the *Journal of the Chemical Society* which deal with organic chemistry, *Annalen, Berichte, Tetrahedron, Organometallics, Accounts of Chemical Research, Synthesis, Journal of Chemical Research, Nouveau Journal of Chemistry, Journal of Organometallic Chemistry*, and *Helv. Acta Chemistry*. In addition to the consistent and conscientious reading of these journals and others, I would recommend that people routinely read yearly reviews such as "Organic Reaction Mechanisms" and "Annual Reports." It also behooves the conscientious individuals to read books on subjects related to their research and their interests. It is a consistent observation on my part that people have more ideas about their research when they are writing their thesis than at any other time. This is generally due to the fact that they are finally doing the literature work they should have done early in their thesis work only at the time that they are trying to complete their dissertations.

The remainder of one's 60 hour week should encompass attending lectures, going to class, serving as a teaching assistant (if this is one's means of support) and doing research. The latter does not entail merely putting time in

at the lab. Some individuals feel that they are making progress if they show up in the morning, sit around all day gossiping and reading the newspaper and eventually leave in the late afternoon. This is certainly not being actively involved in chemistry. One can do an amazing amount of research in a relatively short amount of time if the following concepts are followed:

1. Never come into a lab without a detailed plan of what you are going to accomplish on that day.
2. Keep a running list of things that need to be done relative to your research (for instance, spectra that needs to be taken, reactions that need to be worked up, analytical samples that need to be prepared and sent out, starting material that needs to be brought along so that you will not run out of the chemicals you need in your next step, etc.)

Many people are extremely disorganized in the laboratory. They have no concept of what they are going to try to accomplish on a given day when they arrive in the morning. After they have greeted everybody, had their coffee and donuts, read the paper, worked the crossword puzzle, and walked around until they are bored, they then try to decide whether there is some reaction that they might run in the small amount of time that is left in the day. This is an appalling and inefficient approach to chemistry. Those people who feel that they will eventually get a degree if they put their time in this way are badly mistaken. I do not desire to have students who intend to take in excess of five years to get a Ph.D. Thus, it is my policy that there will be no RA support coming from my grants to students who have been in residence for five years.

In regard to postdoctoral associates, I also have certain comments which I wish to make. Postdoctorals are supposedly accomplished chemists who can carry their own weight in any research group. People do postdoctoral studies for various reasons. Whatever any individual's reasons are, foremost among them should be the desire to learn and to do new chemistry. I expect a great deal from postdoctoral associates. I expect them to be well read, willing to work diligently in the laboratory, anxious to take on more than their fair share of modernizing the working conditions and thinking, and keeping the the laboratory running smoothly. I also expect that postdoctorals will contribute very significantly to their individual research problem. I feel that a postdoc should be able to take a research idea which is given to him/her and turn it into an accomplished piece of work with a minimum of effort and in a minimum of time. In addition, I expect postdocs to improve the general scientific atmosphere of the laboratories. Since postdocs are supposedly well-trained chemists, I anticipate that they will take an active interest in the research that is going on around them. In this regard, I would hope that they will offer helpful suggestions to other people in the group, particularly to graduate students and undergraduates who are working close to them. I must admit that over the years, I have been badly disappointed with the willingness of postdocs to "get involved." This deals not only with the introduction of new methods and new techniques,

but also to the interest shown by postdocs in research going on around them. I have also been somewhat disappointed in the involvement of both postdocs and graduate students in group seminars. I feel that postdocs, in particular, should be able to contribute knowledgeably and constructively in group seminars. The lack of involvement of postdocs can only be interpreted as either a lack of knowledge or lack of interest. The presence of either of these factors in an individual's make-up greatly detracts from my ability to provide a strong recommendation.

As I am sure everyone is aware, most of you hope to obtain a more permanent position (sooner or later). One of the things that you expect from me is a recommendation that will get you the job you want. Unlike some people, I make a very strong effort to write recommendations which are quite honest. Thus, if a student never does anything without being told, I will note it. If a student pitches in and does more than his/her share of the work that needs to be done, this is spelled out in detail. If a person is an efficient lab worker, this is noted. If a collaborator contributes to his/her problem both in effort and ideas, this is strongly indicated. If an individual has a thorough knowledge of literature, this is emphasized. If a person is lazy, inconsiderate, wastes other people's time in the lab, doesn't contribute to his/her problem, is an inept experimentalist, and fails to take an interest in anything scientific, I will also say that. My attitude toward postdoctorals and graduate students is that it is the obligation of the individual to demonstrate their competence and ability, to show me that they are capable of carrying on research in a professional manner, both from the point of view of contributing ideas and turning these ideas into accomplished research. Since I also feel that doing good chemistry is a matter of pride, I expect all members of the group to take pride in what they are doing and what their lab mates are doing. This not only entails enthusiastic interest but also the development of an esprit de corps. Pride also entails keeping equipment running and clean, never leaving a mess for your lab mates to clean up, making sure that anything that is broken gets fixed. These are all part of keeping a smooth running operation. Pride means doing an experiment right the first time, using every bit of your ability to obtain maximum yields of high purity products and, in general, always trying to do things better.

I have indicated what I expect from you and I think it is only fair to say something about what you can expect from me. If you fulfill the requirements spelled out above, you can expect me to go all out in support of you. This means that I will do everything in my power to help you obtain a position which will lead to a productive and satisfying career. As you are aware, the vast majority of my students have obtained excellent positions (and in general, with the employers they wanted).

While you are here, you can expect me to use my ability to its utmost to help you in your problems. Literally, I am your thesis advisor, or, if you are a postdoctoral, your research advisor. This does not mean that I have to spoon-

feed you ideas and directions. But it does mean that my door is always open to you. I think one of the most disappointing aspects of running a research group is the meager efforts which are made on the part of the group members to take advantage of my knowledge and experience. It is my job to help you improve your ability as an organic chemist. If you don't come into my office and talk to me about chemistry, it will be very difficult for you to learn very much from me. My door is always open to my undergraduates, graduate students, and postdoctorals. However, it is up to you to walk through that door. I am always willing to discuss chemistry with you, be it related to your research problem, someone else's research problem, or something you have recently read in the literature. I feel that students and postdocs work for an individual because they respect the chemistry which he/she has done in the past and the way he/she thinks about chemistry for the future. Perhaps one of the most important aspects of the choice which a student makes in a preceptor deals with what the student can eventually gain from working with that individual. It is my opinion that the most important thing you can learn from me is how I think about chemistry. It will be very difficult for you to gain this insight if you never talk to me about chemistry. I strongly advise that you take greater advantage of me (in the right way, of course). I feel that we will both gain from the experience.

My basic philosophy is that those working with me are involved in a chemistry apprenticeship. It is my job to provide an environment in which research can be carried out, to set standards for research, to teach my collaborators to set high standards for themselves, to provide the nuclei of research ideas for my coworkers, to teach my coworkers how to effectively pursue research, and to evaluate critically my collaborators development as research scientists. It is my collaborators responsibility to learn all they can while they are here, to develop an understanding of what is important and what is trivial, to become expert in doing laboratory research, to think about their research and to contribute ideas to it, and to develop to the point where they will be respected scientists anywhere that they might work. It is neither my job nor my collaborators job to grind out publications. If we accomplish those aspects of our responsibilities outlined above, the publications will follow in the natural course of events. When faculty forget that the first and foremost goal is education, and replace that goal with publishing, they are well on their way to training technicians rather then scientists.

2. **Absence from the Laboratory.**

The University and the granting agencies have rules concerning various absences from the laboratory. There could be serious consequences if someone was away from the city and a serious accident should occur in the lab. Thus, I have always in the past required that students tell me when they are going to be gone from the University, where they can be reached, and when they will return. In the last few years, this customary operation seems to have broken down. To

avoid problems I want everyone to be aware that any time they are going to be away from the University for one day or more, they are to let me know when they are going, when they will return, and how they can be reached. In addition, they are to let me known if they have left reactions running, and what the nature of these reactions are. This will avoid any serious repercussions should anything happen in the laboratory.

3. **Journals and Books.**

As I have repeatedly told you, all members of the research group are allowed to use the journals and books in my office. Journals are not to be removed! Books may be borrowed, but must be signed out. Recently, this type of recording keeping has become lax. As a result, I have lost Vol. IV of "Carbonium Ions," four copies of Smith's "Molecular Orbital Methods in Organic Chemistry," three copies of le Noble's "Highlights of Organic Chemistry," one copy of Greenberg and Liebman's "Strained Organic Molecules" and two copies of Mundy's "Concepts of Organic Synthesis." No theses are to be removed from my office. One further note needs to be made. This deals with reshelving books and journals. Books have had the covers ripped off by incompetent book shelvers. If you don't know how to reshelve a book, please ask me to show you how. With the shelving in my office and conference room this is critical.

4. **Analytical Samples.**

All analytical samples are to be sent out through my office. Before analytical samples are sent out, I want to see an infrared, ^{1}H NMR, ^{13}C NMR, and mass spectra on purified material, in addition to the sample itself.

5. **Attachment to this memo.**

I have attached copies of two somewhat dated memos which Professor A. I. Meyers has circulated to his coworkers. I agree with the philosophy presented in these letters.

Meyer's Memos

I.[1] Graduate Education in Chemistry - Who Pays the Bills?

II.[2] Graduate Education (Post-Baccalaureate, Post-Doctoral)
Part II. What Employers (Industrial, Academic and Postdoctoral)
Look for in a Candidate.

[1]September, 1976
[2]August, 1977

I. GRADUATE EDUCATION IN CHEMISTRY - WHO PAYS THE BILLS?

Many of you are completely unaware of the cost of your graduate studies since virtually every graduate student entering the department is awarded a teaching assistantship with a stipend and pays only a modest service fee to the University. The latter covers your medical and student activity expenses.

When you choose a research advisor and begin a research program, the overwhelming percentage of cost of your chemicals, supplies, and equipment does not come from the University or the State of Colorado, but from your advisor's research grant funds. In the pre-Federal grant years (up to 1955) students were charged for the chemicals and supplies they consumed and if these bills were not paid by the time their studies (M.S. or Ph.D.) were completed, no degree was awarded. This practice still exists in many universities unless the student works for a faculty member who has possession of "outside" research grants.

In this department, it is fortunate that many of you are engaged in research collaboration with faculty who hold outside research grants and hence your graduate education is not only without charge, but you draw a stipend in addition. Contrast this to students pursuing degrees in the humanities (languages, literature, philosophy), social sciences (psychology, sociology, government, history), medical and other professional schools (law, dentistry, veterinary medicine). Not only do these individuals, who are as dedicated to an advanced degree as yourself, pay full tuition ($2000-5000/year) but they must also find some source of income to support themselves; a rather different set of circumstances than those in which you find yourself. In addition, because of the high cost of education at the graduate level, many non-science graduate students take 8-10 years to complete their studies, frequently interrupted so they may replenish their financial resources.

The situation is so different in chemistry that those of you who are TA's, which is only a nine-month appointment, can usually be paid the additional three months from your advisor's research funds. Since almost every graduate student in this department eventually becomes a research assistant (RA), then 100% of your stipend is paid from outside funds. The University does not award RA's to graduate students. Furthermore, all of your chemicals and supplies which you take for granted in your work come from these "outside" research funds. Very little, if any, of the cost of doing your thesis research comes from the University budget. In fact, the University does not allocate funds to support graduate research. If this surprises you, a check with friends you may have pursuing similar degrees in other schools will verify that this is the normal state of affairs throughout the nation.

From the above, it is clear that "outside" funds represent the lifeline to your graduate education and these in turn are related to your advisor's ability to acquire them. In the event that you may be unaware of the fierce competition to acquire these funds, it would be instructive to relate some statistics recently obtained.

Agency	Proposals Received (1975)	Proposals Funded (1975)
NIH	855	263
NSF	595	93
PRF	320	80
ARO	165	20

In almost every case, the proposals funded were cut from the original request an average of 32%. Even more frustrating is the fact that only 60% of proposals approved for funding were actually funded.

The above clearly states that your research advisor puts in an enormous amount of effort to get research funds and the frustration he has experienced in achieving some support for his programs is usually prominent in his personality. This comes about because an awardee of a grant is expected to show considerable progress each year if he hopes to obtain renewal funds. If this fails to occur, not only is the grant terminated, but the student finds himself without a stipend and funds to carry out the work. It is amazing to find out how few students are cognizant of the responsibility they have undertaken.

Thus, when you do not perform your research duties with diligence, dedication, and efficiency, is it any wonder your advisor seems to always climb all over you? From his point of view, he is making it very easy, in a material sense, for you to pursue an advanced degree, by absorbing virtually 100% of your expenses and stipend as an RA, and feels it is a privilege for you to be collaborating with him and not your guaranteed right.

The postdoctorals who are also in residence are, in effect, continuing their graduate education and this experience not only brings them a higher-paying position, but enhances their expertise so that they may become leaders in their research field. As in the case of RA's, the outside grant support acquired by their advisor pays 100% of their stipends and salaries. No U.S. university will pay postdoctoral salaries, making this category entirely faculty supported.

This summary of graduate education costs is to serve as a reminder that your bills for an advanced degree are in fact paid through the dedication and effort of your advisor and not the University. The next time your advisor becomes concerned over your research effort and attitude, you will understand why. Of course, you can always pursue an advanced degree in the same manner as they do in the liberal arts or professional schools.

A. I. Meyers
Professor of Chemistry
Colorado State University

September 1976

GRADUATE EDUCATION (POST-BACCALAUREATE, POST-DOCTORAL)
PART II.[1] WHAT EMPLOYERS (INDUSTRIAL, ACADEMIC AND POSTDOCTORAL) LOOK FOR IN A CANDIDATE

A. I. Meyers
August, 1977

In a previous article to graduate students and postdoctorals, the source of expenses to carry out graduate-level research was discussed along with the responsibilities of faculty and students. In this article, I wish to provide you with the prevailing attitudes of employers (industrial, academic, and postdoctoral) when they are considering a candidate that is frequently one of many for a research position. First, allow me to assure you that the following discussion is one which is based upon nearly twenty years of interaction with scientists in industry, academia, and government dealing both with chemical and personnel problems. You may, therefore, consider this article as "highly authoritative".

When an individual is nearing completion of his tenure (predoctoral or postdoctoral) he usually writes a letter to a number of laboratories indicating his interest in joining that laboratory. A curriculum vita, containing place and time of degrees, coursework, title and general description of research experience, publications, honors, and references is also included. Replies to you from your inquiry usually vary from "we are interested in your qualifications..." to "sorry, but we do not have any openings for someone with your qualifications...".

What you are probably not aware of is the course of events that occurred between your submission of an inquiry letter and receipt of one of the replies mentioned above. It is to this period of time that this article will address itself and the underlying factors which bring about the type of reply you receive from a prospective employer.

Upon receipt of your inquiry letter, the type of position you are seeking will dictate the fate of your inquiry. For a post-doctoral position, it is clearly the scientist to whom you write who will contact me (letter or phone) to inquire about your abilities.[2] For an industrial position, your inquiry will be circulated throughout the various research groups and one or more of these will contact me concerning your abilities. I can say with some accuracy that over 80% of the contacts are made by phone and the conversation goes essentially like this:

"...I have an application from one of your students by the name of _____ who has expressed interest in our (my) research laboratory. Can you spare a few moments to answer some questions concerning the scientific abilities of this individual?..." Then the caller proceeds to ask (almost without exception) the following questions pertaining to the applicant (X):

a) Does X require constant supervision?

b) Does X contribute a significant amount intellectually to his/her research problem?

c) Is X an efficient worker; that is, does he/she obtain meaningful results in reasonable amounts of time?

d) Is X familiar with the literature and background of every problem he/she undertakes?

e) Does X have good laboratory skills, is X neat, how many times does X have to do an experiment before it is done correctly?

f) Can X carry out several experiments simultaneously and obtain meaningful results?

g) Does X show enthusiasm when good results are obtained, and extended dispair when things go poorly. Does X work harder to overcome poor results or does X retreat from the problem?

h) Does X work nights and weekends to complete an exciting or interesting experiment or does X wait for the next day or over the weekend?

i) Is X a clock-watcher or calendar-watcher performing scientific duties only between weekday working hours? Would X be adverse to working nights and weekends if the position occasionally demands this?

j) Does X frequently talk chemistry and interact with his colleagues so as to be aware of other projects?

k) Does X speak well at meetings and seminars? Does the audience appreciate the information delivered?

l) Does X contribute meaningfully at group or seminar meetings? Does X rarely say anything?

My answers to these questions will determine whether you hear anything positive from this employer. None of these questions are surprising, I'm sure, to any of you in our group since I have for

years assumed that these characteristics are the recipe for a sound, successful career. What is interesting is that virtually everyone else also asks these same questions and you should never be lulled into thinking that once you leave here, your professional life style will be different.

There are a number of research advisors who will answer the above queries with a distorted sense of loyalty to a particular student even though the student does not meet this criteria and the student will be made an offer. However, over the years there is a growing tendency for employers to "screen out" recommendations for potential employment because of the inaccuracy of the professor's assessment of a student. This has resulted in considerable skepticism of the recommendation by Professor X, Y, or Z. The sad fact arises when the student is employed (as a postdoc or permanent scientist) and after a period of time (1-3 years) is functioning nowhere near the level of his recommendation. Thus, a number of industrial laboratories are literally "stuck" with unproductive individuals while in academia they are denied tenure which resolves the problem. The solution to this problem of whom to believe or not to believe when considering a recommendation has, in recent years, taken an unfortunate turn. Even though hundreds of graduate students and postdoctorals apply each year for research positions, many of these applications are brushed aside if they come from laboratories run by Professor X, Y or Z. The employers simply cannot put any faith in his recommendation and this results in some excellent candidates failing to find meaningful employment. On the other hand, other applications are immediately consumed for potential employment, because they come from laboratories run by Professor A, B, or C. In

this regard, I should now say that every application that comes from our group is followed by an inquiry to my office, regardless of whether a position is available or not. An active file will always be kept on excellent candidates for high level research positions (industry, academic, or postdoctoral).[3]

It would be delightful if every student who has worked in this group was given high marks to questions (a-l), but this is simply not the case. The seventy or so co-workers who have shared my laboratory and are now employed came very close to the right answers to these questions. Unfortunately, 8-10 others did not and those individuals are under employed (or unemployed) in very low-level positions loosely termed "research". Some are out of chemistry completely. What this amounts to is the fact that I will be very critical (as I have always been) when it comes to recommendations for any positions.

As you can appreciate, my recommendation will depend not only on your performance during your tenure here, but also to some degree on the type of firm, laboratory, and intellectual demand made by these. I may give you higher marks to the questions (a-l) to one laboratory, while lower marks are given to another. In effect, I am choosing where I think you should go in your professional career. This is an awesome task with considerable control over your life and I accept this responsibility with the utmost sense of concern.

The above comments are issued to you so that you will know when the time comes to write for positions in organic chemistry, why certain employment (or postdoctoral) opportunities are yours and others are not; why some individuals get several offers, others get none,

why some get offers from laboratories that they never even considered, while others have a pile of reject letters. All of these events take shape without your knowledge, and should quickly dispel the notion that a research position is out there waiting for you by the mere fact that you have a graduate degree. Advanced degrees are not passports to employment, but a good recommendation is.

FOOTNOTES

1. Part I. Graduate Education in Chemistry - Who Pays the Bills?, September, 1976.

2. In some cases the professor may reply with a request that you ask me to write on your behalf.

3. In all too many cases, all the applications are brushed aside and the laboratory seeking additional personnel will call several academic laboratories to see if anyone is available that meets the criteria set forth in questions a-l. Ten to twenty such calls are received in my office each year.