



2003/2004 MSPPSA SERIES

# MOLECULAR BIOLOGY REAGENT SYSTEMS

## VOLUME 1. ISOLATION & PURIFICATION KITS

AN ANALYSIS OF  
MARKET SIZE & GROWTH  
MARKET SHARE, PURCHASE PLANS &  
SUPPLIER ASSESSMENT FOR  
THE U.S. LIFE SCIENCE RESEARCH MARKET

*A Multi-Client Report*

by  
PhorTech International  
San Carlos, California

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# I. BACKGROUND





## A. SURVEY OBJECTIVES

The purpose of this survey was to provide the management of our client companies with an analysis of the current U.S. market for molecular biology reagent systems used for the isolation and purification of nucleic acids from various sources, and of the attitudes of a cross section of researchers who utilize these kits in their work. This is a companion volume to the report on other molecular biology reagents, which covers the consumption of commercial kits for DNA sequencing, amplification, nucleic acid labeling and other applications. Identified as Volume 2, this report was released in September of 2003.

The surveying was blind, with no reference made to any clients for the survey. To encourage respondents to express themselves freely and without bias, the survey was anonymous, and made frequent use of open-ended questions.

The two demographic screens used to characterize respondents include years of experience with molecular biology techniques and the respondents' type of organization.

Early on in the survey, respondents were asked whether or not they currently used molecular biology reagents in their work, and to indicate whether they used reagents in kit format as opposed to purchasing all reagents individually. Researchers were also asked to indicate the reason for this decision. Those who indicated that they used kits were then directed to continue with the next question. Researchers purchasing individual reagents exclusively were directed to Question #8 and those not currently using nucleic acid isolation or purification reagents were directed to exit out of the survey as they are not qualified to continue. Respondents were then directed to the multiple choice question asking them to indicate which categories of isolation and purification kits they currently use from a list of 10 options. These include kits to purify plasmid DNA, genomic DNA, lambda DNA, M13 DNA, mRNA, total RNA, oligonucleotides, DNA from gels, amplification products, or auto-sequencing reactions.

Users were asked to itemize the nucleic acid isolation and purification kits they utilized, including the brand and type of kit, number of kits used annually, preps per kit, approximate price and the forecast percent change for each of the 10 categories of kits listed in the previous question. To compensate for any potential survey fatigue, two versions of the questionnaire were created and half of the respondents were directed to each of the two surveys. These differed in that the sequence of the thirteen categories of isolation and purification kits were reversed in one survey compared with the other.





Respondents were next questioned regarding their reasoning behind choosing these brands of isolation and purification kits, whether there were any brands that they would not buy and were asked to explain their reasons. They were then asked to detail desired improvements in isolation and purification reagents and to select the highest-rated manufacturer in six key areas. In particular, respondents were asked to choose the top-ranked supplier among eleven leading molecular biology reagent manufacturers in the following areas: best value for money, most consistent quality, fastest delivery, best application support, highest yield and greatest purity.

The remaining questions, addressed to both users of kits and individual reagents, asks researchers to describe any other applications which they would like to see in a commercial molecular biology reagent kit format, and to suggest any improvements to molecular biology reagent kits in general. Respondents were then queried regarding their current use or access to a laboratory robot for the preparation of nucleic acid samples. In particular, researchers having access or currently using a robot were asked to indicate the brand and model of their unit and those planning purchase in the coming year were asked to identify the brands or models under consideration. Current and future users were also queried as to the application areas in which a robot is either currently or expected to be used.

Major objectives of the survey were to estimate the present size and growth rate for the molecular biology kit market as a whole and for major segments within this market. Secondly, we wanted to determine the present market share for major kit categories among leading companies in the U.S. and to project which kit categories and suppliers have the best prospects for growth in the coming year. Profiles of respondents most likely to purchase the various kits would be carefully examined and, for the first time, the usage of laboratory robots for sample preparation is briefly examined.

The audit should permit the evaluation of our clients' present market positions, identify marketing strengths and weaknesses, and suggest strategies to develop or improve sustainable competitive advantage.

This report is the fifth 2003/2004 study in a growing series of market research analyses that began in 1993. We plan to continue the series, adding titles and alternating between U.S. and international markets, depending upon our clients' suggestions and support.

Reports already published in this 2003/2004 series covers the following U.S. topics:

Molecular Biology Reagent Systems, Vol. 2  
Protein Expression Systems  
Proteomics Research, Volume 1  
Proteomics Research, Volume 2.





Reports released in the 2002/2003 series include the following U.S. topics:

DNA Amplification Instrumentation  
DNA Amplification Reagents & Methodology  
Microplate Reader & Equipment Market

Topics in the U.S. series published in 2001/2002 include:

Electrophoretic Instrumentation & Reagents  
Molecular Biology Reagent Systems, Vol. 2

This series also includes the following reports covering international markets:

Densitometers & Image Analysis in Europe  
DNA Sequencing in the Far East.

The 2000/2001 series covered the following three reports:

U.S. DNA Amplification  
U.S. Molecular Biology Reagent Systems, Vol. 1  
Molecular Biology Reagent Systems, Vol. 1 in the Far East.

In the 1999/2000 series, we have released three reports examining the following markets. These are:

Microplate Equipment in Europe  
DNA Sequencing in the U.S.  
Monoclonal Antibodies in the U.S.

The following nine titles have been released in the series for 1998/1999:

Cell & Tissue Culture in the U.S.  
Cytokines & Growth Factors in the U.S.  
DNA Amplification in the Far East  
DNA Sequencing in Europe  
Electrophoretic Gel Media in Europe  
HPLC in the Life Sciences in the U.S.  
Molecular Biology Reagent Systems, Vol. 1  
Molecular Biology Reagent Systems, Vol. 2 in the Far East  
Protein Expression Systems in the U.S.

The following titles have been released in the U.S. series for 1997/8:

DNA Sequencing  
Molecular Biology Reagent Systems, Vol. 1  
Molecular Biology Reagent Systems, Vol. 2  
Molecular Diagnostics.





Clients are reminded that additional copies of any of these reports that have been purchased in the past are available at a modest cost. Please contact us for further details. Those wishing to know publication dates for any of these reports, or wanting to read summaries of the 72+ reports in this series are invited to visit our Web site at: [www.phortech.com](http://www.phortech.com).





## B. SURVEY METHODOLOGY

E-mail invitations to take part in the survey were sent to an *nth* name selection of the PhorTech panel of U.S. life science researchers who have been in contact with us in the last year and previously indicated their involvement in work with nucleic acids, amplification or sequencing techniques. Customized email invitations to the web site survey were sent on June 15<sup>th</sup> with a final mailing on July 23<sup>rd</sup>. A total of 3,989 invitations were sent.

No reference was made to any of our clients as sponsors of the survey. The questionnaires were anonymous, a combination of tabular entry, check-offs, and open-ended probes. Apart from the prizes, no inducements were employed. However, the majority of respondents did identify themselves by filling in the prize form. This made it possible for us to double-check the responses to some questions by contacting respondents which improved the accuracy of the data.

A total of 511 invitations were returned as undeliverable, bringing the total number of invitations received by researchers to 3,489. By the close of the survey on August 8<sup>th</sup>, 371 responses had been received for an overall response rate of 10.6%, which met expectations.

We felt that respondents spent considerable time explaining their positions on the open-ended questions. We have no reason not to believe that the survey is representative of the entire U.S. population of molecular biology kit and reagent users.

Based upon these responses, the overall statistical results presented in this report are accurate to within  $\pm 5.1$  percentage points at the 95% confidence level. In our experience, 95% confidence levels are appropriate primarily for scientific experiments. Most business people making decisions are content to be right more often than they are wrong. In this case, a 65% confidence level, (in which you would be right twice as often as you would be wrong) is more appropriate. Conveniently, 65% confidence levels are nearly exactly one half the size of the 95 % level, thus our 65% levels would be  $\pm 2.5\%$  for both all respondents and all users.

According to the binomial distribution theory, these values are valid when the measured event has about a 50% probability. When the measured event is considerably more rare than this, the corresponding confidence intervals get smaller. On the other hand, these confidence intervals are valid for answers based upon the complete pool of respondents. When analyzing data for a group that includes only a small segment of respondents, the answers are less certain and confidence intervals are correspondingly larger.

In this report, we will calculate more exact individual confidence intervals when appropriate. In our comments, we will note whether given differences





are significant at either the 65% or 95% level. To aid our clients in determining the appropriate confidence interval for various combinations of sample size and measurements, we have created the following table. Just read the closest percentage on the left and find the closest sample size column. The intersection will show the confidence interval for that combination. For example, a measured 35% value with a sample size of 200 has a 95% confidence interval of  $\pm 6.6\%$ .

95% Confidence Intervals for Various Percentages & Sample Sizes

Percent	n=10	n=20	n=50	n=100	n=200	n=500	n=1000
5%	$\pm 13.5\%$	$\pm 9.6\%$	$\pm 6.0\%$	$\pm 4.3\%$	$\pm 3.0\%$	$\pm 1.9\%$	$\pm 1.4\%$
10%	$\pm 18.6\%$	$\pm 13.1\%$	$\pm 8.3\%$	$\pm 5.9\%$	$\pm 4.2\%$	$\pm 2.6\%$	$\pm 1.9\%$
20%	$\pm 24.8\%$	$\pm 17.5\%$	$\pm 11.1\%$	$\pm 7.8\%$	$\pm 5.5\%$	$\pm 3.5\%$	$\pm 2.5\%$
35%	$\pm 29.6\%$	$\pm 20.9\%$	$\pm 13.2\%$	$\pm 9.3\%$	$\pm 6.6\%$	$\pm 4.2\%$	$\pm 3.0\%$
50%	$\pm 31.0\%$	$\pm 21.9\%$	$\pm 13.9\%$	$\pm 9.8\%$	$\pm 6.9\%$	$\pm 4.4\%$	$\pm 3.1\%$
65%	$\pm 29.6\%$	$\pm 20.9\%$	$\pm 13.2\%$	$\pm 9.3\%$	$\pm 6.6\%$	$\pm 4.2\%$	$\pm 3.0\%$
80%	$\pm 24.8\%$	$\pm 17.5\%$	$\pm 11.1\%$	$\pm 7.8\%$	$\pm 5.5\%$	$\pm 3.5\%$	$\pm 2.5\%$
90%	$\pm 18.6\%$	$\pm 13.1\%$	$\pm 8.3\%$	$\pm 5.9\%$	$\pm 4.2\%$	$\pm 2.6\%$	$\pm 1.9\%$
95%	$\pm 13.5\%$	$\pm 9.6\%$	$\pm 6.0\%$	$\pm 4.3\%$	$\pm 3.0\%$	$\pm 1.9\%$	$\pm 1.4\%$







## II. DEMOGRAPHIC SEGMENTATION





## QUESTION 1.

### Question:

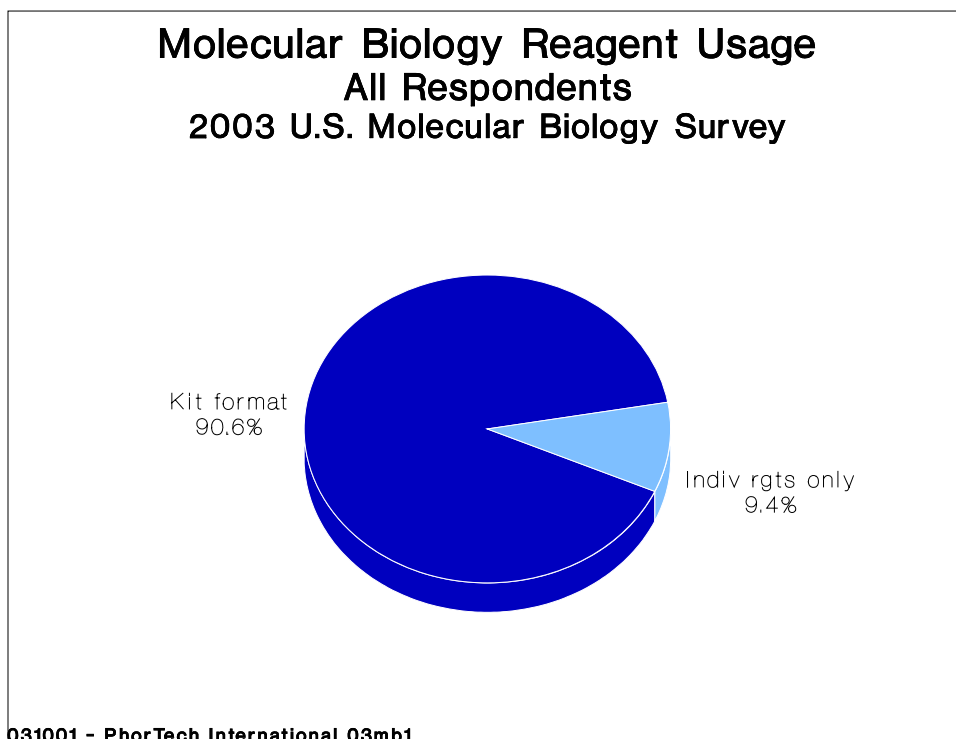
Do you currently use any nucleic acid isolation & purification kits or reagents in your work? (*Please explain your answer*): No nucleic acid isolation or purification reagents used (*Sorry, but you must be currently working in this area. Please stop now by pressing the BACK button on your browser.*); We use individual reagents only (*Please proceed to question #8*); We use some or all reagents in kit format.; Why? \_\_\_\_\_.

### Rationale:

This question is a primary screening question which identifies our respondents' involvement with molecular biology reagents, measures the proportion of users purchasing reagents in kit format and examines the reasoning behind choosing the format. Those not currently working with molecular biology reagents are directed to exit the survey.

### Results:

As depicted in the following pie chart, 336 of the 371 respondents to this survey, equivalent to 90.6%, currently purchase some or all of their molecular biology reagents in a kit format.



This is not significantly different from either the 92.8% of respondents to the 2000 study who purchase reagents in kit format, or the 89.3% using kits





reported in the 1997 report covering the US molecular biology reagent market. Earlier studies of kit usage amongst international researchers produced similar results. In particular, 90.1% of Far East researchers indicated using kits in 2000 and, in 1995, a near equal 90.4% of European researchers fall into this category.

Considering that in each of our studies of the US market (spanning the last 6 years) close to 90% of researchers purchase molecular biology reagents in kit format, we believe that, in general, there will be approximately 10% of users which will purchase individual reagents only. Although based on single studies, our survey of the European and Far East markets suggest that this is universal.

The reasoning behind this choice is examined next. In the following table, the four reasons given for purchasing individual reagents only are listed first in alphabetical order, followed by the 292 verbatim comments describing reasons for purchasing reagents in a kit format. In cases where a large number of respondents provide identical comments, the verbatim text is listed once, followed by the total number of responses in italics.

#### Verbatim Comments Regarding Reasons Behind Format Selection

##### Individual Reagents Only

Because I like to pick and choose  
Individual reagents are cheaper.  
Individual reagents for process control  
What I am accustomed to

##### Reagents in Kit Format

All reagents in kit format, big lab, hard to make your own solution  
Because it is easier to purify the DNA, takes less time and the DNA is of good quality  
Because it's convenient  
Because kits are more convenient and yield more reproducible results  
Because they are convenient and reliable  
Because they are easy to use  
Cheap and comfortable  
Cleaner DNA or RNA  
Consistency and cost effective  
Consistency and ease of use  
Consistency of purification, avoid ethanol precipitation, avoid potential contamination from common laboratory reagents  
Consistency, ease of use  
Consistent results  
Convenience (*x15*)  
Convenience and for baseline protocol development  
Convenience and good results  
Convenience and improved quality of final product  
Convenience and reagents are standardized  
Convenience and reliability in our experience





Convenience and reliable performance  
Convenience and reproducibility  
Convenience and reproducibility  
Convenience and speed  
Convenience and speed  
Convenience and yield  
Convenience of kit, preference for non-phenol isolation  
Convenience!!!  
Convenience, consistency  
Convenience, fast  
Convenience, price  
Convenience, quality control  
Convenience, reliability  
Convenience, reliability, speed  
Convenience, reproducibility  
Convenience, reproducibility  
Convenience, reproducibility  
Convenience, speed, reproducibility  
Convenience, standardization, quality assurance, efficiency  
Convenience, time efficient  
Convenience, works good  
Convenience; saving time  
Convenient (x7)  
Convenient and quality  
Convenient and reproducible  
Convenient and straight forward and save a lot of hassles  
Convenient, reasonable price  
Cost and convenience of use  
Cost and ease of use  
Depending on the protocols  
Depending on what we are isolating; We use kits or a non-kit protocol with proteinase K/SDS followed by organic extractions.  
DNA and RNA purification  
DNA extraction from soil and river sediments  
Ease  
Ease  
Ease  
Ease and consistency  
Ease and reproducibility  
Ease of use - We do not have the staff to waste on preparing reagents.  
Ease of use (x9)  
Ease of use and consistency  
Ease of use and ease of training new students, reliability  
Ease of use and good reproducibility  
Ease of use and reproducibility  
Ease of use and timesavings  
Ease of use, and quality product  
Ease of use, and reliability  
Ease of use, consistency  
Ease of use, consistency





Ease of use, ensure positive results  
Ease of use, price per reaction, quality  
Ease of use, quality, time  
Ease of use, reproducible results, consistency  
Ease of use, saves time and economical  
Ease of use, uniformity of reagents  
Ease, accuracy, and quickness  
Ease, convenience  
Easier  
Easier  
Easier and faster  
Easier and faster  
Easier and faster  
Easier and faster and at the long run, cheaper  
Easier and higher yields  
Easier due to our low volume  
Easier for ordering process  
Easier for student use  
Easier than reagent prep  
Easier to get less-skilled workers to produce clean DNA  
Easier to use  
Easier to use, no individual solutions to make; This is the lab protocol and I didn't change it.  
Easier when you are not an expert  
Easier, proven, convenient, good results  
Easy  
Easy  
Easy and better quality control  
Easy and convenient  
Easy and fast  
Easy and faster isolation  
Easy and good  
Easy and ready to use  
Easy and reliable  
Easy and reliable  
Easy to handle  
Easy to have all the components  
Easy to manipulate, fast and reliable results  
Easy to use  
Easy to use and uniformity- Some people in lab use individual reagents.  
Easy, cost effective  
Easy, fast  
Easy, good QC  
Easy, quick, and better quality  
Easy, reliable  
Efficiency and speed  
Epidemiologic studies on wildlife  
Fast  
Fast and convenient  
Fast and easy





Fast and effective  
Fast, easy, uniform results  
Fast, reliable and easy to follow  
Fast, reliable, easy to use - I use also individual reagents (CsCl, electroelution...)  
Faster  
Faster  
Faster than ethanol ppt  
Faster, easier, more reliable for sequencing - less training  
Faster, easier, no phenol, more reproducible for new workers  
Faster; Don't do it on a weekly basis, more like monthly.  
For better DNA quality  
For convenience  
For convenience and quality  
For diagnostic isolation of DNA, we use a kit.  
For ease of use  
For gel purification and large scale DNA isolation only, we use kits, otherwise homemade due to cost.  
For gel purification of PCR products and for minipreps  
For QT-PCR and plasmid purification, kits are easier and cleaner.  
For simplicity and quickness  
For some things we make up our own kits, for other things we just buy a commercial kit for convenience.  
GENECLEAN kit worked for me in the past and my lab continues to use it.  
Good and easy  
Good quality controls, and if something does go wrong, it's easy to track lot numbers.  
Good yield  
High quality, reproducibility, easy of use  
High yield and great purity  
Improved quality of DNA  
It is convenient and usually works.  
It is convenient.  
It is convenient.  
It is easier and if something goes wrong- you have a better shot at trouble-shooting.  
It is easier and money isn't really a problem at the moment.  
It is easier.  
It is easy and gets good results.  
It is good.  
It is quicker.  
It is reliable.  
It's convenient, and reproducible.  
It's convenient.  
It's just easier to use them in this format.  
It's more convenient and the yield is very good.  
Kit format is quality good.  
Kit format saves time and reduces variability.  
Kit is convenient.  
Kits are cheaper than techs and work quite well.  
Kits are easier to use!  
Kits are easiest to use and to train undergraduates to perform isolation.  
Kits are faster, and guaranteed to be nuclease free.





Kits are generally simpler to use.  
Kits are more reliable.  
Kits make training easier for new students into the lab.  
Kits used when need purer DNA for sequencing or other applications.  
Less variability in purity of isolated nucleic acid, especially with RNA isolation  
Makes it easier and more uniform  
Makes the process so much faster  
More convenient  
More convenient and not so expensive  
Most of the DNA isolation and purification we do is small-scale and so the kits (primarily Qiagen) are much easier for 1 or 2 samples. In addition, I have always obtained clean DNA quickly!  
Mostly Qiagen and Promega kits due to ease of use and quality of results  
Much easier to get everything together  
Need high purity of DNA/RNA  
Obtain quality RNA  
Practicality, consistency  
Price, ease, time  
Purification of plasmids and kits get good reproducible yields  
Qiagen kits, Mini through Mega  
Quality and consistency  
Quality and easy to use  
Quality assurance and ease of use  
Quality control  
Quality control/consistency  
Quality is good.; ease of use  
Quick  
Quick and easy  
Quick and easy  
Quick and not so expensive  
Quicker  
Quicker prep time and equivalent results, but only slightly more expensive.  
Reliable  
Reproducibility  
Reproducibility and speed  
Reproducibility, ease of use  
Reproducibility, reliability  
RNA in kit form, DNA blood separation tubes and then our reagents  
RNA isolation requires more specialized reagents, and we process smaller numbers of samples, so kits are convenient. For genomic DNA samples, the individual reagents are inexpensive, and we process large numbers of samples for PCR, so it does not make sense to purchase the more expensive kits. For large-scale plasmid preps, we use a kit to obtain very pure DNA for many uses. For small quantities for screening cloning expts, it would be too costly.  
Roche  
Save money  
Save time, good quality, reproducibility  
Saves time  
Saves time and cost effective  
Saves time and produces high quality products





Simple and easy  
Simple and reproducible  
Simple and time saving  
Simple, straightforward and convenient  
Simpler and faster to finish and organize for experiments  
Simpler, faster and consistent  
Simpler, quicker  
Simplicity  
Simplicity and reproducibility  
Simplicity--easier and more consistent to buy than to make!  
Some students have trouble getting plasmids clean enough to sequence w/o a kit.  
Sometimes it is easier.  
Sometimes the kit is cheaper than individual reagents.  
Speed  
Speed  
Speed and cost savings  
Speed, convenience, reproducibility  
Speed, cost  
Speed, simplicity  
Supplied off the shelf in central stockroom  
The ease of using kits  
The kit is handy than individual reagents.  
The kits, although a bit more expensive, are very convenient and greatly reduce prep time.  
They were free.; ease of use  
This gave the best results.  
This is the quickest way to get the nucleic acid of interest.  
Time and money  
Time saving, reproducibility  
Time savings, consistency  
Time savings, convenience  
Time savings, ease of use and uniformity of results  
Time, reproducibility  
Time-saving  
To get better quality and yield  
To get more reproducible results  
To keep consistency between preparations  
To save the time and to avoid the personal error in preparation and to keep the constantly results  
To save time  
To save time and money  
Try to use complete protocol  
We design and manufacture kits, also we perform massive amounts of purification.  
We find some work better from transfection of Mammalian cells than others, but others may have a higher yield.  
We find that using the manufacturer's kit per their instructions gives the highest yields.  
We generally use kits for sequencing and home made reagents for routine isolation.  
We get the best results using kits.  
We like Qiagen products.  
We think the result be better.





We use kit format for plasmid DNA and some tissue or cell culture RNA preps because we know the reagents work together and the number of samples is not so high to be cost prohibitive, but individual reagents for our genomic tail preps because of the large number (and hence cost) and because we know our method works (tradition).

We use kits for convenience, but make up or own reagents when doing large numbers of samples.

We use kits for purification because of ease, speed and cost-effectiveness.

We use kits when we need high purity, or when some protocol asks for a specific kit.

Otherwise, we use individual reagents to save money.

We use Qiagen and Sigma kit.; ease of use

We use the kit format because of ease of use and speed.

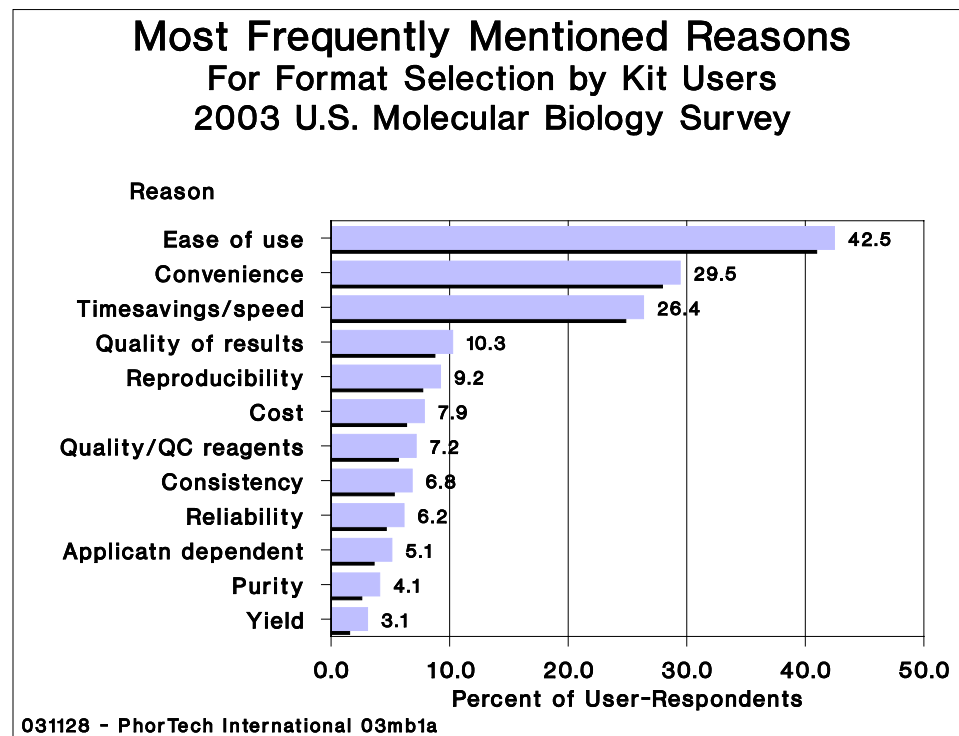
Work better in our hand

Working with fixed (paraformaldehyde) and ancient samples

Works predictably and gives reliable quantities.

### Analysis:

The following bar graph depicts the proportion of the 292 kit users mentioning each of the most frequently mentioned themes.



According to these results, the increased ease of using reagents in a kit format is cited by the highest number of researchers followed by the near 30% mentioning convenience. The reduced time required, referring to either the hands-on time or the speed of the separation, is the third most common reason for preferring kits over the purchase of individual reagents purchased separately.





Substantially fewer respondents, at most, just over 10%, mention each of the remaining 9 themes presented here. However, most of these are, or could be related to the quality of the product obtained. While general comments are grouped under the heading 'quality of results', certainly reproducibility, reliability, purity and yield most likely refer to the results of the nucleic acid isolation or purification. Even comments including 'consistency', which might refer to the reagents themselves, produce more reproducible results.

The only two distinctly different themes are cost, in which some respondents may have factored in additional laboratory time (and therefore salaries) required when purchasing individual reagents, and those indicating that kit use is dependent on the application. An example of the latter was provided by a respondent who selects the format of reagents based not only on the application, but also the typical volume of samples. 'RNA isolation requires more specialized reagents, and we process smaller numbers of samples, so kits are convenient. For genomic DNA samples, the individual reagents are inexpensive, and we process large numbers of samples for PCR, so it does not make sense to purchase the more expensive kits. For large-scale plasmid preps, we use a kit to obtain very pure DNA for many uses. For small quantities for screening cloning expts, it would be too costly.'

We highly recommend that clients read through the comments to extract more detailed information including descriptions of situations in which individual reagents are preferred over kits.





## QUESTION 13.

### Question:

How would you best describe your organization?: Academia/university, Hospital/medical school, Industry, Government agency, or Private research foundation.

### Rationale:

This basic demographic question identifies where our molecular biology reagent users are located. In particular, our respondents are classified into one of five basic types of organizations: academia, hospitals or medical schools, industrial, government agencies or privately funded research laboratories.

### Results:

Before we could analyze these results, the original responses were edited for consistency. The largest number of edits involved researchers located at medical schools who identified themselves as academics. These have now all been included in the hospital/medical school category. In addition, privately funded and non-profit organizations, such as the Mayo Clinic, are classified as private organizations. Furthermore, researchers located at the National Institutes of Health and Veterans Administration hospitals are grouped under government agencies.

In the pie chart located at the top of the next page, we present the distribution of the 371 respondents based on the revised data.

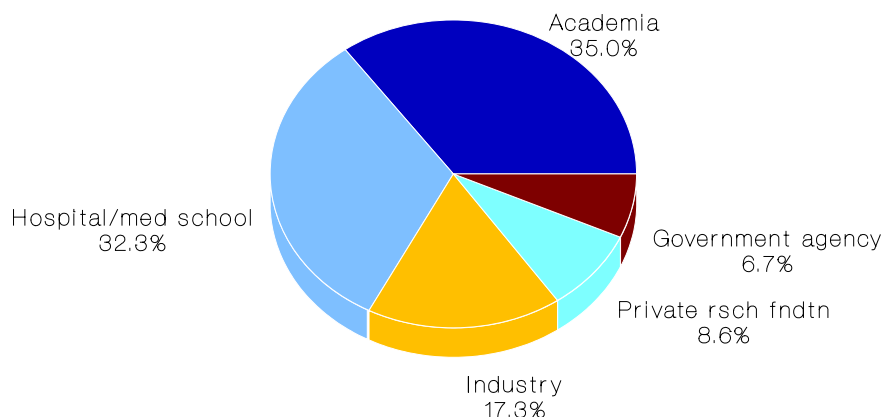
The proportion of respondents in academia just exceeds those working in a hospital or medical school setting. In comparison, industrial researchers account for approximately half as many respondents while the remaining are nearly equally divided between private organizations and government agencies. Since a very small proportion, totaling only 38 respondents, do not purchase molecular biology reagents in a kit format, it is not surprising that the comparable distribution of our 336 kit users, shown at the bottom of the next page, is not significantly different.

These results are virtually identical to those published in our previous 2000 report covering nucleic acid isolation and purification kits.



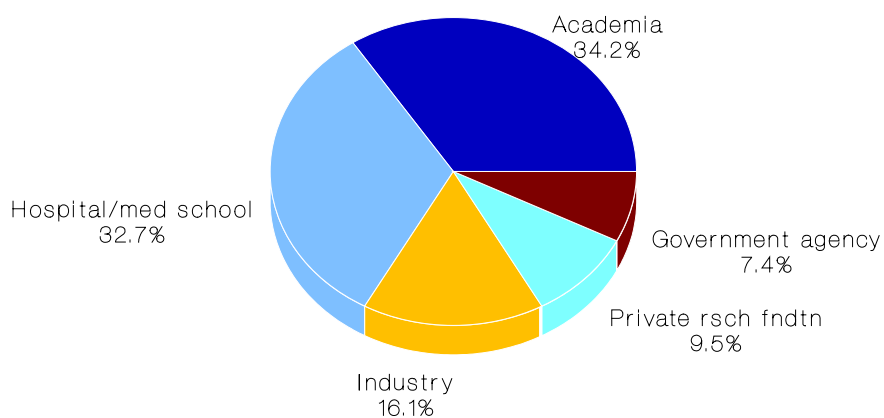


### Distribution by Type of Organization All Respondents 2003 U.S. Molecular Biology Survey



031002 - PhorTech International 03mb13

### Distribution by Type of Organization Resps Purchasing Reagents in Kit Format 2003 U.S. Molecular Biology Survey



031102 - PhorTech International 03mb13a

#### Analysis:

For the respondent's information, we next list the organizations represented by respondents to this survey. These have been sorted first by type, and then placed in alphabetical order. We will present the types of organizations in





descending order beginning with the classification with the largest representation, academia.

#### Organizations Represented by Respondents to this Survey

##### Academia/University

Brigham Young University  
California Institute of Technology (Caltech)  
Carnegie Mellon University  
Case Western Reserve University  
Catholic University  
Central Catholic High School  
CHUL Research Center  
Claremont Colleges  
Clemson University  
Colorado State University  
Columbia University  
Cornell University  
Cornell University College of Veterinary Medicine  
Emory University  
George Washington University  
Georgia Institute of Technology  
Haverford College  
Hope College  
Indiana University-Purdue University Indianapolis (IUPUI)  
Iowa State University  
Johns Hopkins University  
Loma Linda University  
Loyola University Chicago  
LSU School of Veterinary Medicine  
Massachusetts Institute of Technology (MIT)  
Michigan State University  
Montana State University  
Moss Landing Marine Laboratory/Symbio Technology Services  
Ohio State University, Edison Biotechnology Institute  
Ohio University, Athens  
Ohio University, Gunnison  
Olympia High School  
Penn State University  
Point Loma Nazarene University  
Purdue University  
Queens College  
Rockefeller University  
Saint Louis University  
Saint Xavier University  
San Diego State University  
St John's University  
Stanford University  
SUNY, University at Buffalo  
Texas A&M University  
Texas Tech University





Towson University  
Tulane University  
Universidad Autonome de Coahuil Fac. Ciencias Quimicas  
Universite de Versailles  
University of Alabama  
University of Arizona  
University of California, Davis  
University of California, Irvine  
University of California, Los Angeles  
University of California, San Francisco School of Pharmacy  
University of California, Santa Barbara  
University of Cincinnati  
University of Colorado  
University of Denver  
University of Florida  
University of Georgia  
University of Georgia/Southeastern Cooperative Wildlife Disease Study  
University of Illinois, Urbana-Champaign  
University of Illinois, Chicago  
University of Iowa  
University of Maryland  
University of Michigan  
University of Michigan  
University of Minnesota  
University of Mississippi  
University of Missouri, Kansas City  
University of Missouri, Rolla  
University of Nebraska, Lincoln  
University of New Hampshire  
University of Notre Dame  
University of Pittsburgh  
University of Rochester  
University of South Florida  
University of Tennessee  
University of Texas  
University of Virginia  
University of Wisconsin, Madison  
Virginia Tech University

**Hospital/Medical School**

Arkansas Children's Hospital Research Institute (ACHRI)  
Baylor College of Medicine  
Brigham and Women's Hospital (BWH)  
Cancer Research Center of Hawaii  
Case Western Reserve University (CWRU)  
Center for Blood Research  
Center for Pediatric Research/East Virginia Medical School  
Children's Hospital of Philadelphia (CHOP)  
Children's Hospital Boston  
Cincinnati Children's Hospital Medical Center





Columbus Children's Research Institute  
Dana-Farber Cancer Institute  
Dartmouth Medical School  
Drexel University College of Medicine  
Duke University  
Emory University  
Facultad de Medicina Veterinaria y Zootecnia  
George Washington University Medical Center  
Georgetown University Medical Center  
Harvard University Medical School  
Hillman Cancer Center, University of Pittsburgh  
Johns Hopkins University School of Medicine  
Loma Linda University School of Medicine  
Louisiana State University Eye Center, New Orleans  
Louisiana State University Health Sciences Center, Shreveport  
Loyola University Medical Center  
Marshall University School of Medicine  
Medical College of Georgia  
Medical College of Ohio  
Medical University of South Carolina (MUSC)  
Mount Sinai School of Medicine  
New York State Psychiatric Institute (NYSPI)  
New York University School of Medicine  
Northwestern Medical School  
Oregon Health and Science University  
Pennsylvania State University College of Medicine  
SUNY Upstate Medical University, Syracuse  
Thomas Jefferson University  
Tufts University School of Medicine  
University of Alabama, Birmingham  
University of Alberta Heritage Medical Research Centre  
University of California, Davis School of Medicine  
University of California, Irvine  
University of California, Los Angeles  
University of California, San Diego  
University of California, San Francisco  
University of California, Santa Barbara Neuroscience Research Institute  
University of Chicago  
University of Colorado Health Sciences Center  
University of Delaware Medical Technology  
University of Guelph  
University of Hawaii  
University of Illinois at Chicago  
University of Kentucky  
University of Massachusetts Medical School  
University of Medicine and Dentistry of New Jersey  
University of Miami School of Medicine  
University of Minnesota Medical School  
University of Nebraska, Medical Center, Omaha  
University of North Carolina, Chapel Hill School of Medicine





University of Pennsylvania School of Medicine  
University of Pittsburgh  
University of Rochester Medical Center  
University of Southern California  
University of Tennessee Health Science Center  
University of Texas Health Sciences Center, San Antonio  
University of Texas Medical Branch, Galveston  
University of Texas Southwestern Medical Center  
University of Virginia  
University of Wisconsin, Madison Medical School  
Vanderbilt University  
Virginia Commonwealth University  
Wake Forest University School of Medicine  
Washington University, Medical School  
Weis Center for Research, Geisinger Clinic

#### Industry

Abbott Labs  
Ablynx NV  
Advanced Bioscience Labs, Inc  
Ambion, Inc  
American Water Company  
Amersham Biosciences  
Amphioxus Cell Technologies  
Bayer Corporation  
bioMerieux  
Cerus Corporation  
Charles River Laboratories  
Chiron (powderject) Vaccines  
Conforma Therapeutics  
Eli Lilly and Company, Indianapolis  
EMD Biosciences, Inc.  
ENZO Life Sciences  
EraGen Biosciences  
FMC Corporation  
GeneDx, Inc  
Gen-Probe  
Genzyme Corporation, Framingham  
Genzyme Corporation, Waltham  
Hoffmann-LaRoche  
Hyalose, L.L.C.  
IBT Reference Laboratory  
Johnson and Johnson PRDUS  
LI-COR Biosciences  
MacroGenics, Inc  
Merck & Co, Inc, West Point  
Merck Research Laboratories, Rahway  
Monsanto, Davis  
Monsanto, St Louis  
Myriad Proteomics





Nalge Nunc International  
Neurogen Corporation  
Neurogenetics, Inc  
Palm Bay lab  
PanVera  
Pfizer Central Resaerch  
Pfizer Global R&D, Ann Arbor  
Pfizer Inc, Groton  
Pioneer Hi-Bred Int'l  
Procter & Gamble  
Protein Design Labs  
Sakata Seed  
Sigma-Aldrich  
SMDX  
Syntonix Pharmaceuticals  
Taro Pharmaceuticals  
Trinity Biotech USA  
UCB Research  
Wyeth Research, Cambridge  
Wyeth Research, Collegeville  
Wyeth Pharmaceuticals, Andover  
Wyeth, Columbia City

#### **Private Research Foundation**

Academy of Natural Sciences  
Bigelow Laboratory for Ocean Sciences  
Blood Center of Southeastern Wisconsin  
Coriell Institute for Medical Research  
Donald Danforth Plant Science Center  
Evanston Northwestern Healthcare  
Fox Chase Cancer Center  
Henry Ford Hospital  
Howard Hughes Medical Institute (HHMI)  
Institut Pasteur  
Institute for Systems Biology  
Jackson Laboratory  
Joslin Diabetes Center  
La Jolla Instiute for Allergy and Immunology/Gemini Science, Inc  
Lahey Clinic  
Mayo Clinic, Jacksonville  
Mayo Clinic, Rochester  
Memorial Sloan-Kettering Cancer Center  
Nemours Childrens Clinic  
Ochsner Clinic  
Population Council  
Queens Medical Center  
Roswell Park Cancer Institute  
Schepens Eye Research Institute  
Scripps Research Institute  
St Jude Children's Research Hospital





St Michael's Medical Center  
University of Texas MD Anderson Cancer Center  
Wistar Institute

**Government Agency**

Agricultural and Agri-Food Canada (AAFC)  
Centers for Disease Control and Prevention (CDC)  
ENRM VA Hospital  
Henry M Jackson Foundation  
INSERM  
Los Alamos National Laboratory  
Nat'l Center for Toxicology Research (NCTR)  
National Institutes of Health (NIH)  
NIH/Nat'l Heart, Lung & Blood Institute (NHLBI)  
NIH/Nat'l Institute for Occupational Safety and Health (NIOSH)  
NIH/Nat'l Institute of Allergy & Infectious Disease (NIAID)  
NIH/Nat'l Institute of Dental & Craniofacial Research (NIDCR)  
US Army Medical Research Institute of Infectious Disease (USAMRIID)  
US Environmental Protection Agency  
USDA/Agricultural Research Service  
USDA/Agricultural Research Service/Nat'l Center for Agricultural Utilization Research (NCAUR)  
Walter Reed Army Institute of Research (WRAIR)  
Wyle Laboratories/NASA Langley Research Center





## QUESTION 12.

### Question:

How long have you been using molecular biology techniques?: \_\_\_\_\_ years

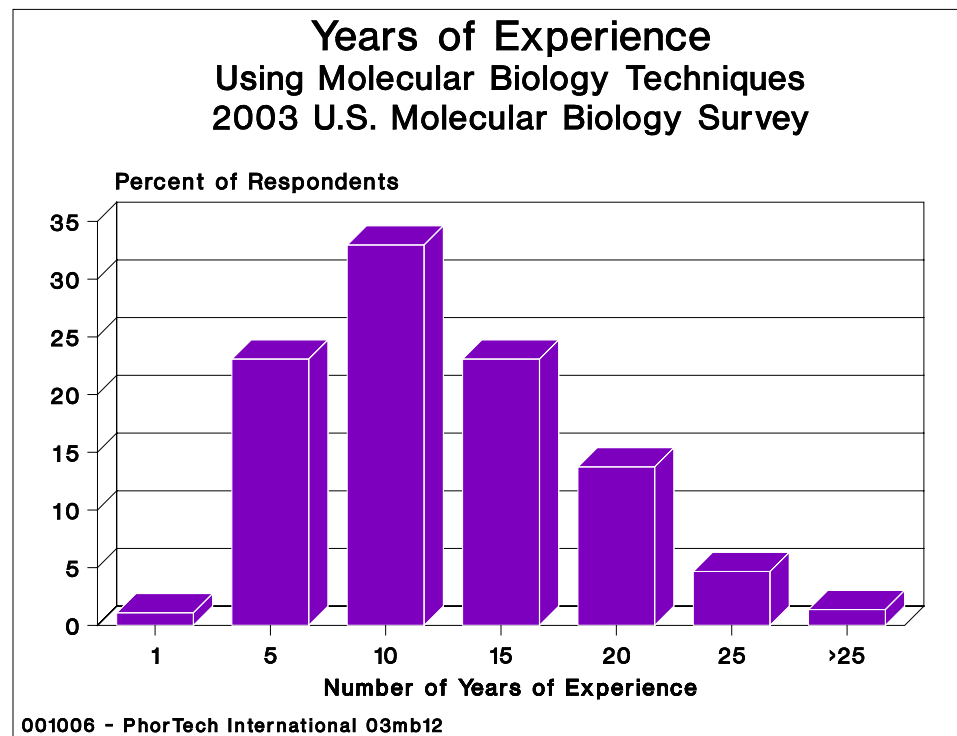
### Rationale:

This final demographic question examines the amount of experience contained in our respondent pool. We examine the level of experience for all molecular biology reagent users and separately, for respondents purchasing kits. We also examine the level of experience according for respondents from each type of organization.

### Results:

The 364 researchers currently utilizing nucleic acid isolation and purification techniques who also answered this question report a combined total of 3,984 years of experience. On average, then, these respondents have 10.9 years of experience although individually, responses ranged from one to 41 years. Despite this range the 10 year median and mode are very close to the mean value.

As might be expected, the distribution of these responses, shown below, forms a Gaussian curve centered on the 10 year mark.





Interestingly, the following table suggests that the small group of respondents purchasing individual reagents exclusively tend to have less experience than those purchasing at least some of their molecular biology reagents in kit format.

Years of Experience, Resps Grouped According to Format of Reagents Purchased

Format of Reagents	# Resps	Total	Mean	Median	Mode
Individual reagents only	35	337	9.6	7.5	2
Kit format	329	3,647	11.1	10	10
All Resps	364	3,984	10.9	10	10

### Analysis:

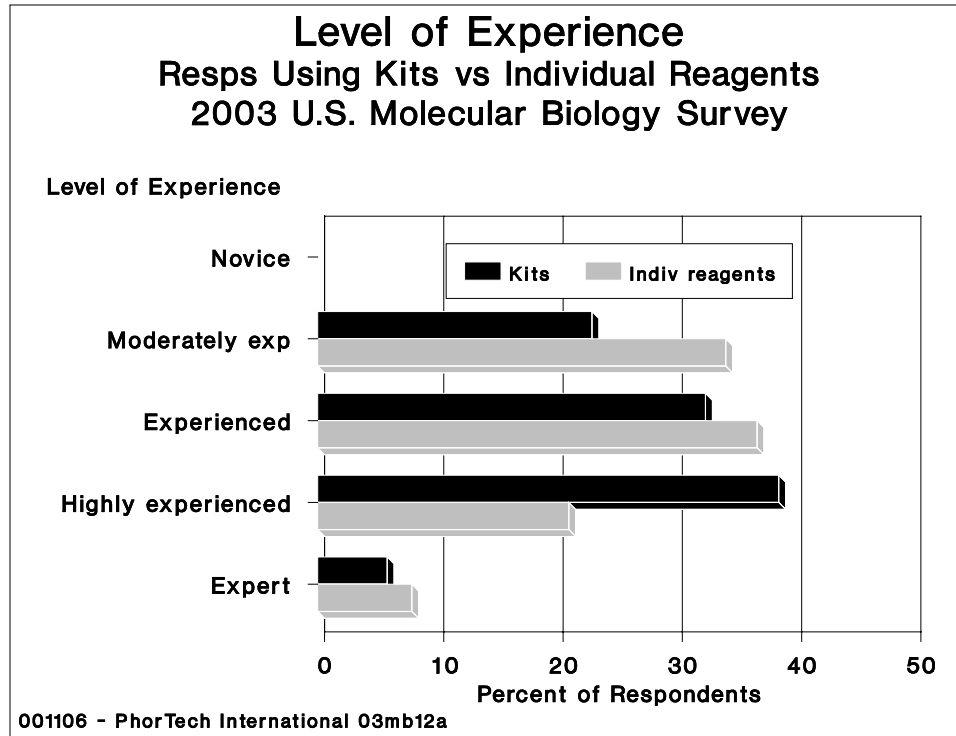
To further analyze this data, we can set arbitrary limits for the different levels of experience to simplify the analysis, as below.

Years Experience	Level
<1	Novice
1-5	Moderately Experienced
5.5-10	Experienced
10.5-20	Highly Experienced
>20	Expert

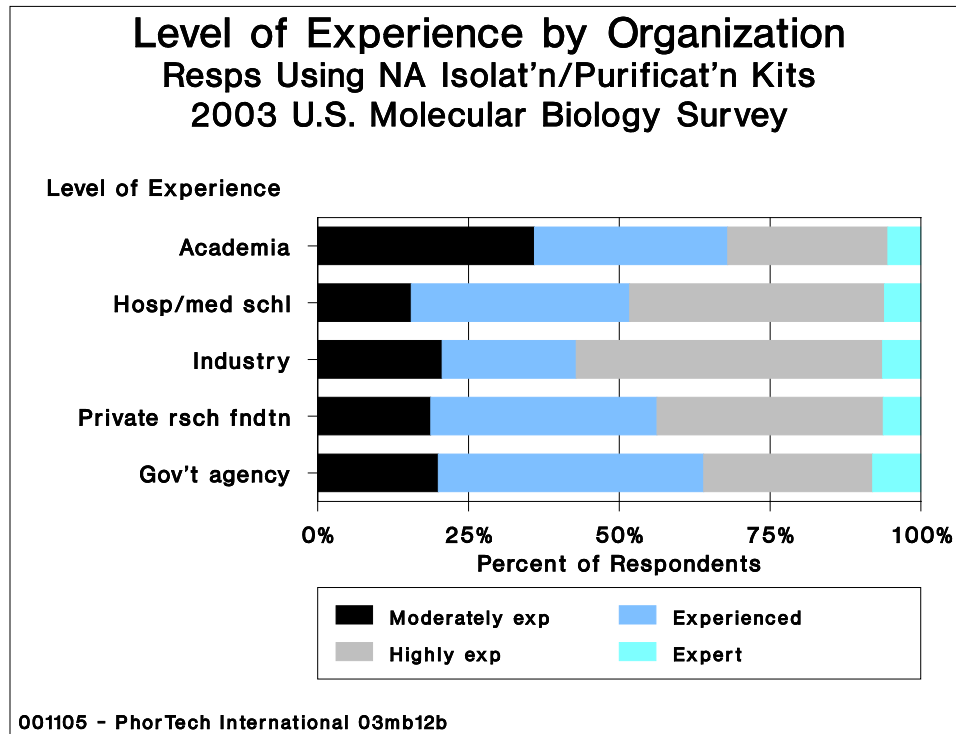
In the horizontal bar chart shown at the top of the next page, we reanalyze the data after placing each respondent into the appropriate category.

Consistent with the statistics presented above, the researchers purchasing kits for some or all of their molecular biology reagent needs generally appear to have a higher level of experience. Although there is a slightly lower percentage of 'experts' amongst those purchasing kits, fully 44.5% of kit users are considered to be 'highly experienced' or 'expert' compared to 29% of respondents purchasing individual reagents. Indeed, as noted in previous reports, both new and seasoned researchers have adopted reagents in kit format for the isolation and purification of nucleic acids.





We complete this analysis with the following bar graph depicting the level of experience amongst researchers from each type of organization.



With near 30% considered to be moderately experienced, academics appear to be slightly less experienced than respondents from other types of





organizations. On the other hand, more than 50% of industrial researchers have a minimum of 10 years of work isolating or purifying nucleic acids, making this group the most experienced. Although there are small variations in the pattern derived from researchers working in hospitals or medical schools, or private research foundations is very similar. Looking at the proportion identified as 'highly experienced' or 'expert', government researchers tend to have worked in this area for a shorter period of time.

In the following table, we present the type of organization and mean number of years those researchers have been involved with this technique. We see here that, despite variations, all groups of respondents are well qualified to provide meaningful responses to the questions on this survey.

**Mean Years of Experience with NA Isolation/Purification, by Type of Organization**

Organization	# Resps Using Kits	Mean Yrs of Experience
Industry	53	12.5
Hospital/med school	106	11.7
Gov't agency	25	11.3
Private research fndtn	32	10.9
Academia	113	9.9
Total	329	11.1

In conclusion, these researchers have a considerable amount of experience and are therefore capable of providing valuable insight regarding their work with nucleic acid isolation and purification reagents.

