

All evidence you submit for professional registration must be endorsed by your supervisor/manager

**PLEASE READ GUIDANCE NOTES FOR APPLICANTS BEFORE FILLING IN THIS FORM**

Name: A. N. Example

**A: Application of knowledge and understanding: Identify and use relevant scientific understanding, methods and skills to complete tasks and address well defined problems**

Competencies	Guidance	Evidence Chosen
<p>A1: apply knowledge of underlying concepts and principles</p>	<p>This means that you can explain the major reasons for undertaking your tasks. You may be, for example:</p>	<p>Why: Most members of the laboratory use Enterotoxin B to perform research experiments. It is expensive to buy so it is my task to make it in house.</p>
	<p>a) working in a particular subject discipline in an applied area. You should be able to name the main components / elements involved in a task and why you are carrying it out.                      b) involved in carrying out a particular procedure; you should be able to explain why you are using that procedure and why it is relevant to the work undertaken.                      c) involved in using particular experimental model; you should be</p>	<p>What: I express the protein using a bacterial expression vector and purify the protein following expression.</p>

	<p>able to explain why you are using that model, how you are using it and what the results might mean.</p>	<p>How: I transform bacteria with the expression vector which contains the sequence for the protein. I then grow the bacteria in selective media and at the appropriate time harvest the culture, spin down the cells and take the media. I concentrate the protein by adding ammonium sulphate, I then re-dissolve the protein, dialyse out the ammonium sulphate and pass the solution through an affinity column. I test the purity and viability of the protein.</p>
<p>A2: review and select appropriate scientific techniques, procedures and methods to undertake tasks</p>	<p>This means that you can explain the basis underlying your scientific method and why it is appropriate. For example:</p> <p>a) you should be able to state the principles behind the activity that you are undertaking and any associated technology.</p> <p>b) you should be able to explain the reasons behind the choice of method used to carry out the activity and the criteria for basis of what you are looking for.</p>	<p>Why: As for A1</p>
		<p>What: Entoertoxin B is a protein normally expressed by E.Coli, for this reason the most suitable expression system is one using bacteria as they will be able to produce the protein in its native form</p>
		<p>How: Using a bacterial expression vector means that the bacteria are able to produce the protein. Using selective media means that only bacteria having the vector will express the protein. The method of purification via affinity column is extremely effective at purifying proteins as it usually very specific and can be done in one step.</p>

<p>A3: interpret and evaluate data and make sound judgements in relation to scientific concepts</p>	<p>This means you can recognise when your activity appears to have been successfully carried out, or not, and what your data means, relating it to the underlying principles. You should also be able to present the data in an appropriate manner in order to explain your results.</p>	<p>Why: As for A1</p>
	<p>a) You can state that the activity has worked well or not. If not, you should attempt to give reasons why the activity 'failed' and what you will do next time to address this. You should also be able to explain and graphically demonstrate results of the activity and compare results from a number of different activities.</p>	<p>What: in order to determine if the expression and purification of Enterotoxin B is successful I carry out a number of tests, biochemical tests. A colleague carries out a biological assay to determine activity.</p>
	<p>b) You should be able to state whether the activity was successful, the rationale behind this conclusion and what the data might mean. Assuming the activity is successful, you should also be able to explain the scientific basis as to why the results occurred.</p>	<p>How: These include running the samples of the culture supernatant from various points in the purification process on an SDS-PAGE gel. I also do an immunoblot to make sure it is the right protein and then another member of the group carries out a standard biological assay to determine if it is active.</p> <p>A successful purification will result in the correct bands on the gel and immunoblot showing up and the right MW, and if the biological assay worked (as compared with previous purification batches) then the experiment has been successful. Analysing samples from the various stages of purification allows me to determine where I lost the</p>

		protein if I end up with no protein.
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**B: Personal responsibility: Exercise personal responsibility in planning and implementing tasks according to prescribed protocols**

Competencies	Guidance	Evidence Chosen
B1: work consistently and effectively with minimal supervision to appropriate standards and protocols	This means that you can demonstrate the ability to carry out work with minimal input from your supervisor. You should discuss the work with you supervisor but then carry out the work with no or little further input, until discussing the results with your supervisor. You should provide examples of work that was completed to the appropriate standards and time frame in this manner.	Why: AS for A1
		What: I monitor stocks of Enterotoxin B available to the group and take responsibility for making more as and when it is needed. If the experiment fails I need to determine why so I can ensure it does not happen in the future.
		How: . I discuss future possible needs for the protein with my supervisor at our weekly meetings and adjust my work accordingly. If for some reason the expression and purification fails I will identify at which step using the gels and then discuss with my supervisor what might have gone wrong and what I need to do to address the problem

<p>B2: manage and apply safe working practices</p>	<p>This means that you follow and can explain safe working practices applicable to your area of work. This can include (but is not limited to):</p> <ul style="list-style-type: none"> <li>▪ risk assessments associated with your work</li> <li>▪ relevant Health and Safety regulations, e.g. COSHH, Noise, Manual Handling</li> <li>▪ relevant Home Office Licenses</li> <li>▪ safety training courses you have successfully completed for your laboratory role</li> <li>▪ any monitoring of safety within your work, e.g. for radioactivity, chemical exposure</li> <li>▪ safety equipment and control measures necessary to work safely</li> </ul> <p>Within your work you may also be responsible for an aspect of 'safety monitoring or training' and (if relevant) a description of this should be included.</p>	<p>Why: There are two liquid nitrogen storage tanks that store frozen samples of cell culture cells that the group uses to carry out experiments. These need to be topped up so that they do not dry out causing the cells to thaw and die.</p>
		<p>What: Three times every week I and another technician go to the room where the tanks are kept and fill up the tanks with liquid nitrogen.</p>
		<p>How: I took a course in handling cryogenic gases and also was shown by our chief tech how to fill the tanks. I read the risk assessment provided for the procedure and all the associated COSHH form.</p> <p>I always carry this out in pairs, and ensure that we wear lab coats visas and cryogenic gloves. I make sure that the alarms in the rooms are on and not sounding.</p>

<p>B3: accept responsibility for the quality of work of self and others</p>	<p>This means that you accept responsibility for the quality of the work that you undertake and that of others – including if an activity does not work in the way that you expect. This can include:</p> <ul style="list-style-type: none"> <li>a) ensuring that an activity is carried out to the agreed standard or protocol (e.g. Good Laboratory Practice) and you provide evidence for this.</li> <li>b) realising when something might not have been carried out quite correctly and the impact it could have on the quality and reliability of data or other outcome.</li> <li>c) pointing out ‘good experimental data’ and ‘bad experimental data’ and the reasons why the bad data might have occurred</li> <li>d) being prepared to say ‘I’m not happy with this experimental data and I’d like to repeat the activity because of the following reasons’</li> </ul> <p>If you supervise other staff then you will need to give evidence of how you have worked with them to ensure their work is carried out to the appropriate standards.</p> <p>If you don’t supervise other staff then there may be instances where your actions can have helped their activities, e.g. you notice that a standard lab</p>	<p>Why: We have a number of centrifuges in the lab that I am responsible for looking after. I have responsibility for ensuring that PhD and project students use the centrifuges correctly so that are not damaged or used in a dangerous way.</p>
	<p>What: When we have new students in the lab as part of their induction I make sure they know how to use the centrifuges correctly and safely.</p>	
	<p>How: When new students start it is part of their induction to have a demonstration by me as to how to use the centrifuges correctly. I explain the reasons why this is important and get them to read the risk assessments associated with centrifuge use in the lab. If I notice anyone using the centrifuges incorrectly I approach them and show them how to do it correctly.</p>	

	<p>reagent/consumable/component has run out and you order some more straight away.</p>	
<p>B4: take responsibility for completing tasks and procedures as well as using judgement within defined parameters</p>	<p>This means that you accept responsibility for completing the task/procedure to the required time line and are proactive if the time line might not be met. This might be due (but not limited) to:</p> <ul style="list-style-type: none"> <li>▪ failure of an experiment</li> <li>▪ failure of a critical piece of equipment</li> <li>▪ a critical reagent running out</li> <li>▪ staff absence making it impossible to complete on time</li> </ul> <p>In these situations you will need to demonstrate that you are proactively judging how and when you communicate this 'negative news'. In addition you should also indicate how you overcame the problems and impact on the agreed time lines.</p>	<p>Why: Our group makes use of CO2 incubators to grow cell culture cells. One of the incubators became infected with fungus and so people had to stop using it.</p> <hr/> <p>What: What: I had to let everyone in the group know as well as other users with incubators in the same room. I had to find alternative space for the cell culture dishes.</p> <hr/> <p>How: I asked a neighbouring group if they had any space in their incubators and fortunately they did. I went round and told the group that the incubator was infected and that they needed to ensure their cultures were not infected before moving them to the neighbouring groups incubator. I put a sign on the incubator saying not to use it. I then disinfected the incubator before anyone used it again.</p>

## C: Interpersonal skills: Demonstrate effective communication and interpersonal skills

Competencies	Guidance	Evidence Chosen
C1: demonstrate effective and appropriate communication skills	<p>This means that you can demonstrate effective and appropriate communication using oral, written and electronic means. This may include (but is not limited) to:</p> <ul style="list-style-type: none"> <li>▪ discussing and agreeing objectives with your supervisor</li> <li>▪ discussing and agreeing objectives in team meetings</li> <li>▪ giving presentations of your work or other aspects of lab work (e.g. safety updates, method updates) to your supervisor and colleagues</li> <li>▪ preparing written reports on your work</li> </ul>	Why: I need to make sure the group has enough Enterotoxin B in order to carry out their research experiments.
		What: I need to determine how much protein needs to be purified
		How: I meet with my supervisor every week to discuss how much protein I need to purify that week to meet the needs of the group. He will indicate how active the group is going to be and if we need any more made than usual. Occasionally we make protein for other groups and I need to factor this in to my work plans for the week.
C2: demonstrate interpersonal and behavioural skills	<p>This means that you can demonstrate skills that enhance your ability to interact with colleagues in the work setting. In these situations it may be appropriate to discuss these with your supervisor, as an external perspective is often very useful in this regard.</p>	Why: I need to interact with new students in the lab to ensure they use the centrifuges appropriately.
		What: As part of their induction I have responsibility for ensuring they know how to use the centrifuges safely and correctly
		How: during their induction I demonstrate how to use the centrifuges and explain the reasons why it is important to use them in this way. I also give them the risk assessments to read associated

		with the use of the centrifuges.
C3: demonstrate an ability to work effectively with others	This means 'team work' and can be in a large team or on a 1:1 basis. Here you will need to give examples of how you have worked effectively, what was the outcome and what was your role at the time.	Why: It is necessary to work in pairs for safety reasons when filling the liquid nitrogen tanks
		What: I need to work with another technician every week to fill the liquid nitrogen dewars so that the cells stored do not thaw and die.
		How: I talk to the technician (or another lab member if she is not available) about the best time for them to go and carry out the activity. We then go together to the storage room, and between us we make sure that the tank is filled safely and that the cells are adequately covered.

**D: Professional practice: Apply appropriate theoretical and practical methods according to protocol**

Competencies	Guidance	Evidence Chosen
D1: recognise problems and apply appropriate scientific methods to identify causes and achieve solutions	This means that you are able to understand why an activity might have 'failed' and to identify how you might alter your methodology to address the problem. This means you will demonstrate your understanding of the underlying principles of the activity and how you are able to modify it to allow it to be 'successful'. NB this does not mean altering methodology that is sound when an unexpected result is achieved,	Why: One week the yield from the purification of Enterotoxin B was unusually low and we needed to know why so it wouldn't happen again.
		What: I looked at the analysis of the protein to determine at what stage we lost the protein to try and identify the 'failure' step.

	<p>only when the proper controls indicate the method is not working correctly.</p>	<p>How: I ran graphs and immunoblots of samples at the various stages of the purification process and found that the affinity column had failed to bind the protein. I investigated and found that one of the buffers was at the wrong pH which would explain the lack of binding. I made the buffer up again and this solved the problem.</p>
<p>D2: identify, organise and use resources effectively to complete tasks</p>	<p>This means that you can give examples of work undertaken and why the method/procedure used was chosen as the best (or most relevant) to use. This might include (but is not limited to):</p> <ul style="list-style-type: none"> <li>a) review of method – why is this one the best compared to others that are available</li> <li>b) cost effectiveness</li> <li>c) time taken</li> <li>d) IT considerations</li> </ul>	<p>Why: We use Ethidium Bromide gels for DNA analysis in the group – this is highly toxic and dangerous chemical. A rep from a company had explained to me that there were alternatives available that were not toxic, and I was tasked with investigating whether this was a viable option.</p> <p>What: I tested the product effectiveness vs ethidium bromide. I also evaluated the cost of each system</p> <p>How: I ran a variety of different gels with different concentrations of the product and DNA and different DNA sizes and compared the results for the new product and ethidium bromide. I also looked at the cost and although the new product was more expensive it did not have the associated costs of disposal of ethidium bromide. AS the results were comparable the group switched to using the new product.</p>
<p>D3: participate in continuous performance improvement</p>	<p>This means that you are aware of progress in your area and seek to discuss with your supervisor the strategy for improving the efficiency of your work in the laboratory. This can include new and improved methods, new ways to increase throughput, ways to increase cost-</p>	<p>Why: As for D2</p> <p>What: Having had a discussion with the rep about the new and safer product I went to talk to my supervisor about the possibility of using it instead of ethidium bromide.</p>

	effectiveness, etc.	How: My supervisor suggested that I test the product to see if it worked as well and asked me to compare the costs of using both products. I did this and as a result of using the new product not only are we working more safely but at a reduced cost as well.
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**E: Professional standards: Demonstrate a personal commitment to professional standards**

Competencies	Guidance	Evidence Chosen
E1: comply with relevant codes of conduct and practice	This means that you can give examples of how you: a) comply with the code of professional conduct of the Institute of Science & Technology b) manage work within all relevant legislative, regulatory and local requirements, frameworks such as Health and Safety Legislation, Home Office Regulations, Good Laboratory Practice (GLP), local Codes of Practice, etc.	Why: To be a member of the IST means you have to agree to comply with their code of conduct.
		What: For example I ensure I ' <b>perform my duties and work activities in such a way as to safeguard the health and safety of myself, their colleagues and members of the public.</b>
		How: Ensuring that new students are able to use the lab centrifuges safely and correctly.

<p>E2: maintain and enhance competence in own area of practice within structured and managed environment</p>	<p>This means that you undertake activities to enhance your competence in your own area of practice i.e. Professional and Personal Development (PPD). Your PPD report may be used as evidence for this section and details of what you need to achieve in terms of PPD are outlined in the PPD section of the IST's website.</p> <p>For your first application for Professional Registration you need to submit a plan of what you expect to undertake in the next 12 months.</p> <p>Note that PPD has to be submitted on an annual basis to maintain your entry on the Professional Register.</p>	<p>Why: To ensure that I am constantly up dating my skills to keep pace with the changing technologies</p>
		<p>What: I undertake many CPD activities as out lined in my PPD report form</p>
		<p>How: See PPD report form</p>