

Tips For Giving a Scientific Presentation

Good oral presentation skills are vital to a career in the chemical sciences as well as many other fields. What ever you do when you graduate from the University odds are that you will be required to make oral presentations as part of your job. In the industrial community such presentations offer a quick synopsis of proposals and progress reports. A lousy five minute presentation, can spoil weeks of work preparing written materials. Similarly, in academia, the ability to clearly convey scientific information in an oral presentation is critical to both teaching and research.

While there are no strict rules about how to give an effective presentation, there are some guiding principles. This hand-out will attempt to provide an overview of these principles in helping you prepare a better talk. These will be covered in greater detail in the pages that follow, but here is the main idea behind each.

1. **Know the audience.** This is vital to an effective presentation. If you were giving a talk about a particular experiment, it is critical to know how much the audience knows about the technique. You would not give the same presentation to a group of marketing representatives as you would to a group of scientific researchers. Your talk must be geared to inform. This leads up to our next guideline
2. **Clarity, clarity, clarity.** You are trying to convey information to the audience. What may seem perfectly obvious to you may be baffling to them. Presentation style and materials must be easy to understand and make a clear point. Concerning visual aids, what you can read perfectly clearly on a transparency may be too tiny to see when viewed from the back of the room.
3. **Practice makes perfect.** Nothing makes for a worse presentation than the actual presentation being the very first time you have ever gone through and given the talk. A good presentation should have a flow to it. It should move smoothly from one point to the next. You want the audience to be focussed on the materials and not your fumbling. A corollary to this rule is rehearsed is boring.
4. **People might be sleeping.** Have you ever been to a scientific talk? Boring! Well it certainly can be. All lectures, scientific or otherwise, have the possibility of being sleep inducing. Keep this in mind as you prepare your lecture. Try to avoid the pitfalls that can lead to a comatose audience.
5. **What do you mean it's not compatible?** In this day gadgetry and computer toys, overhead projectors are headed the way of the dinosaur. However, never has an overhead failed to project a transparency because it was version 6.03 and it can only use versions up to 5.01. If you use a

laptop and projection system be sure everything is compatible (software, hardware, cables, etc...). And bring a backup just in case.

Principle 1

KNOW YOUR AUDIENCE

Your talk needs to convey information to the audience. It is therefore imperative that you know who your audience is. Here are few examples. Lets say you were going to give a talk about the effectiveness of detergents at removing a particular compound from a liquid mixture. You are going to give this talk to two audiences. A group of research scientists and a group of second graders.

Clearly, things would not go well if you started the talk to the researchers with, “Who knows what soap is? Has anyone ever used soap? Soap makes us clean by picking up the dirt and allowing it be carried away by the water!...”

Equally the second graders would not appreciate “The effectiveness of the surfactant compound can be determined by the noted decrease in the measured surface tension of the model system...”

Here are few guiding principle to keep in mind

1. **Know the purpose of the talk.** By knowing why you are giving the talk you learn a lot about the audience. For example, if you were asked to teach a group of second graders about soap you would know they have little or no background. You'd need to cover a lot of basic material, give examples, etc... If you were going to give a talk for TA's and students for your CH 154 class, you would know the purpose of your talk was to see if you understood the material in a particular lab. Therefore, even though the audience might know all about the experiment, you should explain it to them. This demonstrates your mastery and may teach them a thing or two.

2. **Don't talk over their heads, don't make them want to smack you.** This cannot be emphasized enough. Don't patronize people to the point that they want to leap out of their seats and slap you across the face. There is a fine balance between giving people background material so that they will understand your talk and talking down to people (2nd graders included). On the other hand, don't assume that people understand and skip the introductory material. You'll need to decide at what level to cover things and strike a balance between complexity of the talk and clarity.

Principle 2

CLARITY, CLARITY, CLARITY

The issue of clarity has perhaps the largest number of practical tips to keep in mind. The following pages will show two examples of good and bad viewgraphs. If you can avoid common mistakes, people will be better able to understand your talk.

1. **Speak up.** The most important point for clarity is to speak clearly. It is a nervous business to talk in front of people. As a result, people talk to the floor or mumble at the overhead. Speak clearly to the audience. Practice speaking slowly and loudly. Again, don't go too far. People will wonder why you are talking so strangely. But rest assured, if people can't hear and understand you they will get very little out of your talk.
2. **One point only.** Try to keep your transparencies to only a single point. Overheads with many issues are hard to read and overly busy. This will help you organize your talk and keep it moving smoothly. If you have 5 points to make on one viewgraph then you might forget and leave out one or two. Worse yet, in the ten minutes that the same transparency is up several people may doze off. You might want the viewgraph to have this main point on it in writing. That way the audience knows what you are going to explain and you have a visual cue as to what you were going to say.
3. **People have to read it.** Big letters. It may seem like the type is large enough, but beware. People may be far away. They may have lousy eye sight. As a guideline try to use at least 18 pt font.
4. **Graphs have labels.** Graphs should always have labels. People should be able to understand your talk with you giving it. They should be able to see the graph you are presenting and come to the same conclusion you are reinforcing by explaining it to them. If the data is void of labels they will never be able to understand it.
5. **Viewgraphs should be obvious.** People should look at your viewgraph and understand what point you are trying to convey. To accomplish this goal you might want to use titles, give the viewgraph a conclusion, highlight particular words, point out important areas in diagrams, etc. . .

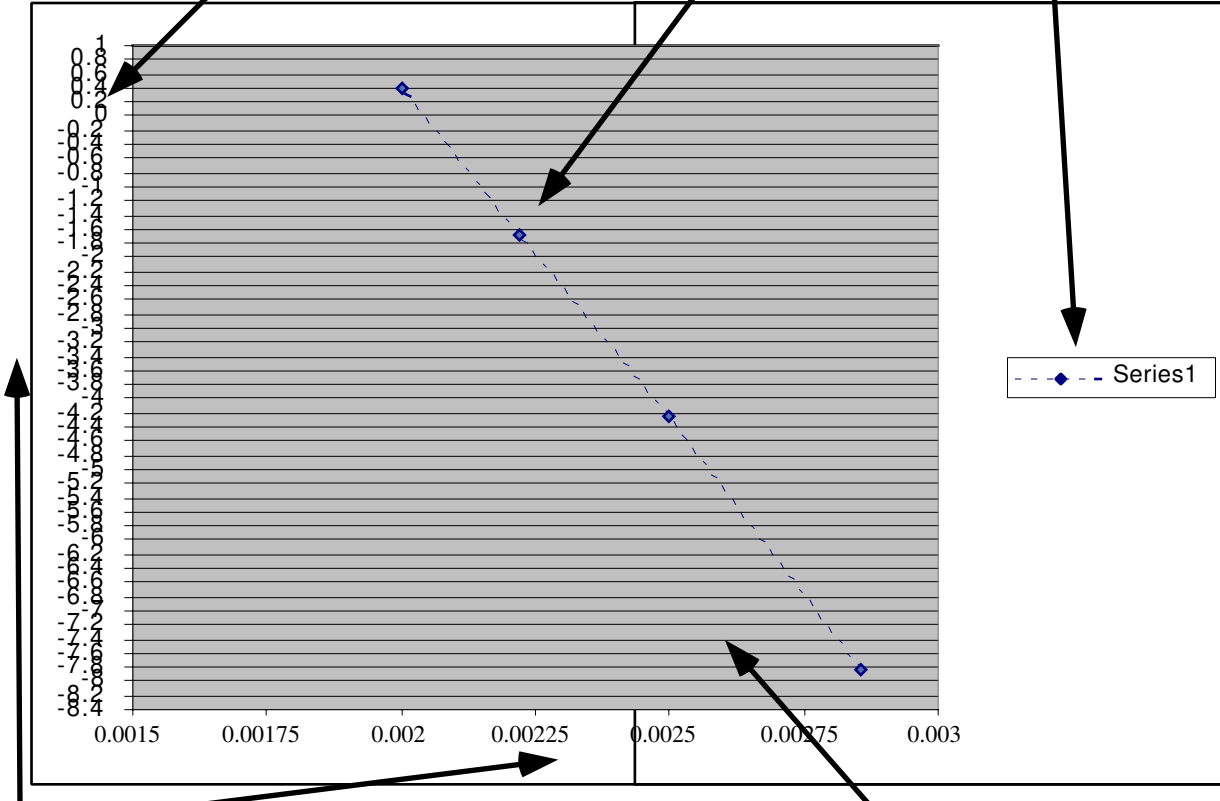
See examples that follow.

Poor Viewgraph

Tiny Numbers, Too many labels

Hard to see data points

Useless legend



No Labels

*fit $y=9500*x+19.488$*

Needless lines

Mysterious Formula

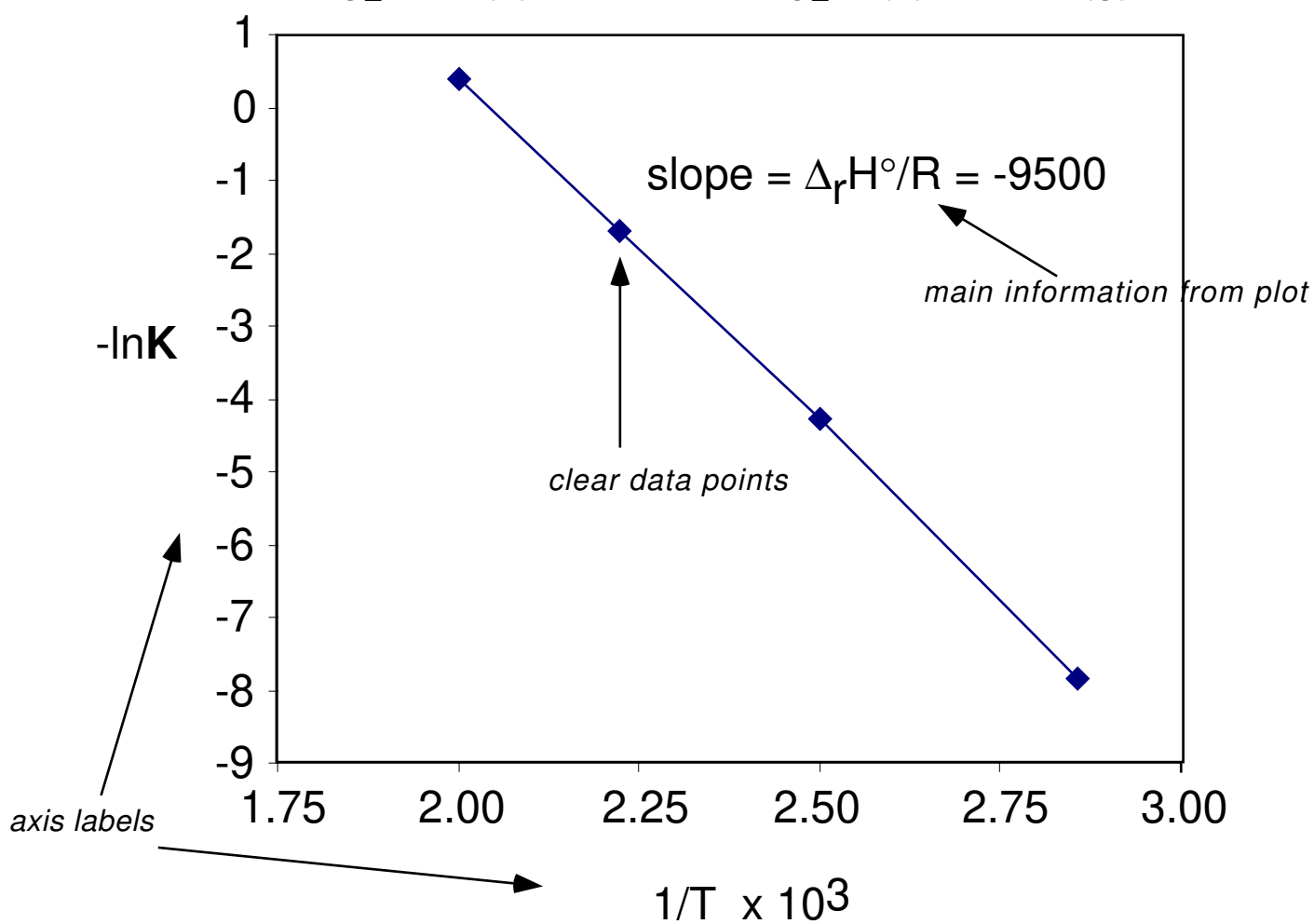
What is this a graph of?

Improved Viewgraph

Heading

Reaction Enthalpy of
Silver Carbonate Decomposition

Determined from van't Hoff Plot

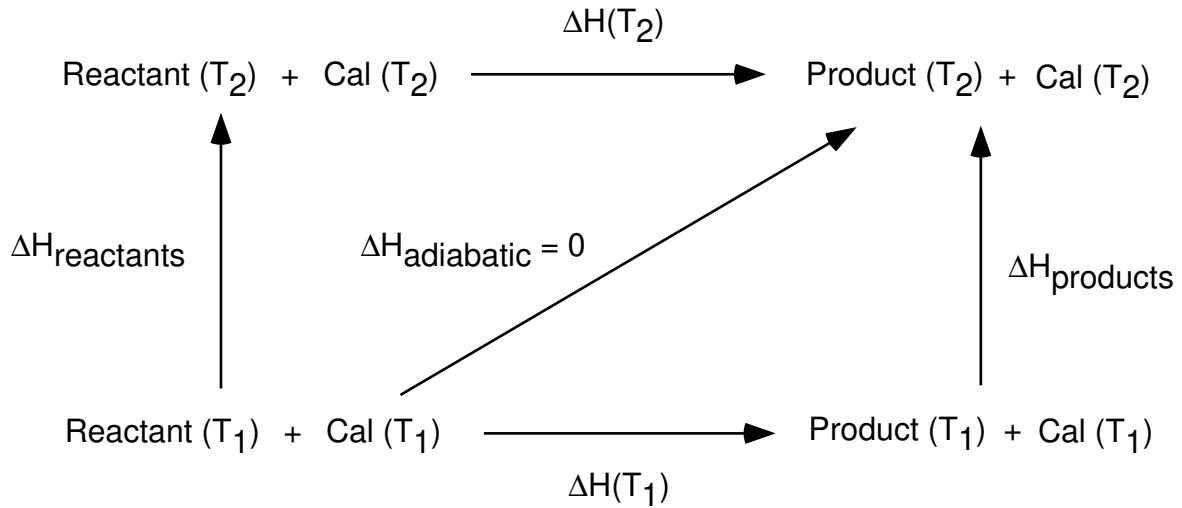


Reaction is endothermic $\Delta_r H^\circ = 75 \text{ kJ mol}^{-1}$

Conclusion showing point of viewgraph

UNCLEAR *(way too much info)*

you want the enthalpy of the reaction. T changing! Use calorimeter



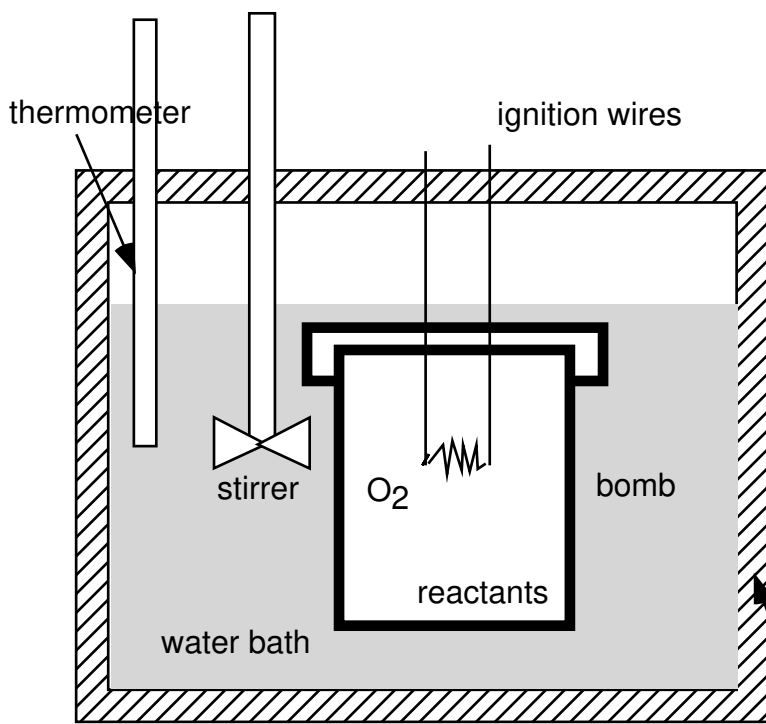
$$\Delta H_A = \Delta H(T_1) + \Delta H_{\text{products}} = 0$$

$$\Delta H_A = \Delta H(T_2) + \Delta H_{\text{reactants}} = 0$$

$$\Delta H(T_1) = -\Delta H_{\text{products}} = -[C_p^{\text{products}} + C_p^{\text{cal}}](T_2 - T_1)$$

$$\Delta H_{\text{reaction}} = \Delta U_{\text{reaction}} + RT \sum \nu_g$$

Enthalpy is a state function
therefore changes are path
independent



calorimeter

at constant V no PV work

measures change in U
not H

Need calorimeter constant

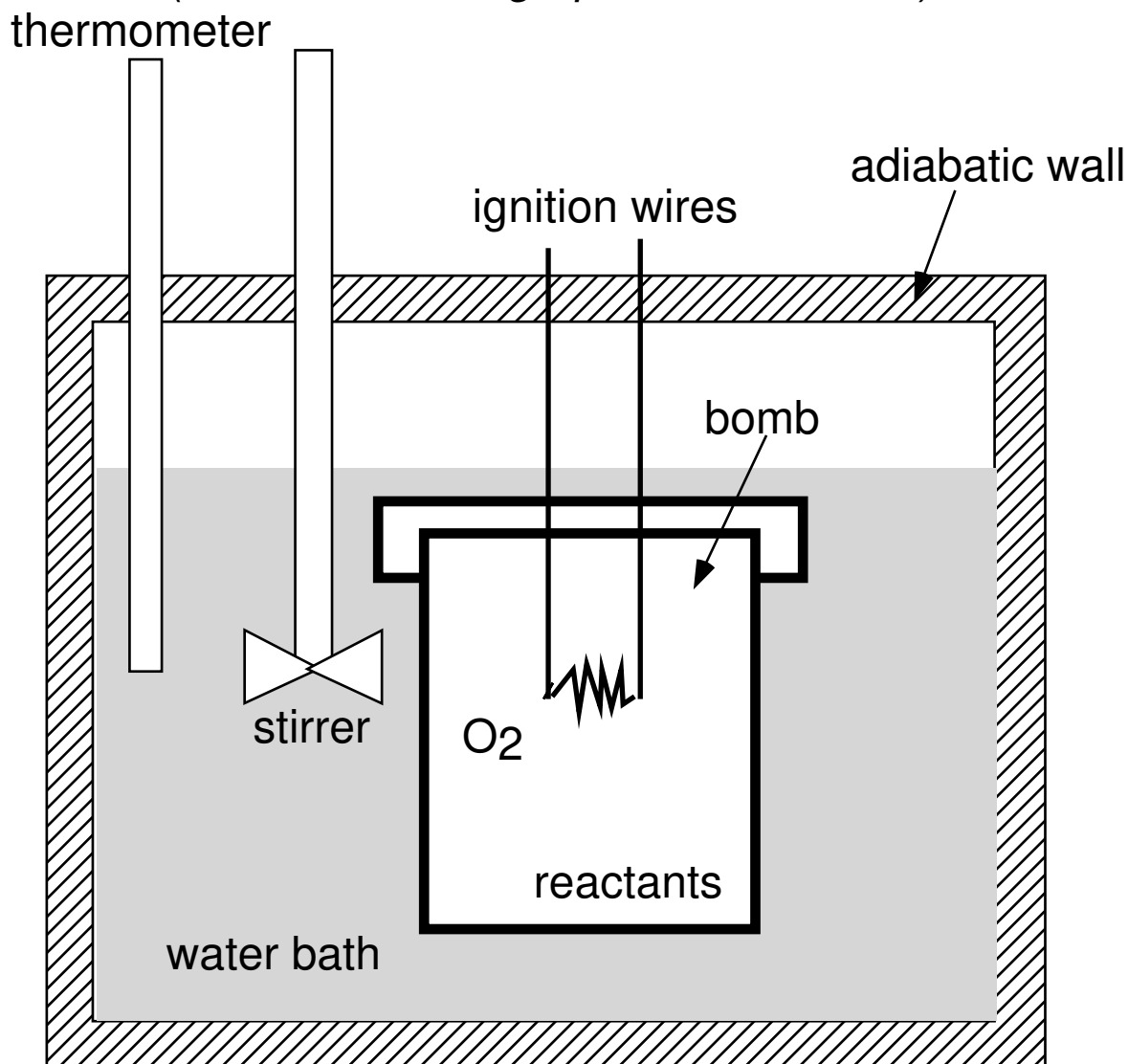
Calibrate with known
substance

usually benzoic acid

find heats of formation

CLEAR

(need more viewgraphs for other info)



Reactants are burned with excess oxygen gas

Reaction takes place in a sealed bomb immersed in a water bath

Whole apparatus is in an insulated box

Temperature rise in water
must be due to the heat of reaction

Principle 3

PRACTICE MAKES PERFECT

Practice, Practice, Practice!!!

While this statement usually refers to endless practice, in this case three times is about right.

NOTHING IMPROVES A PRESENTATION MORE THAN ONE PRACTICE TALK!!

This is perhaps the most important guiding principle. If you practice your presentation just once, your talk will be infinitely smoother. This does not mean looking over your transparencies or running through the powerpoint slides and going “yeah, then that stuff, then the next slide, then the experiment part, a couple of diagrams, data, conclusions” **Actually stand up and give the talk**, either to a practice audience or yourself. Giving a presentation can be a nervous business. Practice can help alleviate that fear. You don't want to get lost while giving your presentation. Knowing what is coming up next helps immensely.

Here are a few helpful pointers.

1. **Memorize the first few lines of the talk.** Starting out is the hardest part of the talk. Once you get going and into a flow things are easier. But that first little bit is nerve racking. One thing you can do is memorize the first few lines you are going to say. **DON'T MEMORIZE THE ENTIRE TALK.** Just the first few lines. “Hello, I'm Larry Hardison. The title of my presentation is, The Quantification of Propylene Glycol in Soft Drinks. Many people are oblivious to the contents of the foods that they eat on a daily basis. One example, is the additives commonly found in soft drinks.” Wing it from here.
2. **Actually practice. Stand up and say the words out loud.** Practice improves the flow of the talk. There will be less “um's” in the talk if you practice. Everyone is watching, everyone is listening, what was I going to say?!! People have a natural tendency when speaking in public to pause and say “um” when they forget what they were going to say for just an instant. By running through the talk you will develop a natural flow. You will come up with phrasings and ways to describe things that you will use when you give your presentation. Most importantly you will discover things that you don't actually understand. You want to find out that you don't know why the cryostat is attached to a vacuum pump when you are practicing rather than during the presentation. Explaining something to someone else is the best way to determine if you really understand it. Don't fool yourself into thinking you can explain it. Try it. If you don't understand, you have time to figure it out before the talk. Even things you know well might be difficult to explain. Practicing helps you to find the words.

3. **Don't over rehearse or memorize the talk.** There is not just a point of diminishing returns in practicing too much, things can actually start to get worse. The first practice things will improve at least 10 fold. The second will make things twice as good. The third will add a bit of polish. The fourth won't do you much good unless you have changed things drastically. From there it can easily be going backwards. You don't want to memorize the talk. There are two reasons for this. One, if you memorize the talk and someone interrupts you with a question it can be disastrous. Two, overly rehearsed talks are boring. See guideline 4 "People might be sleeping."

Principle 4

PEOPLE MIGHT BE SLEEPING

You find yourself in a comfy chair one late afternoon. The room is dark and quiet aside from the monotone banter coming from someone up ahead of you. The lone voice is babbling on about the nanoscale rheology of a poly-something-or-other. You had several big slices of pizza for lunch. Mmmm pizza. So peaceful. The room begins to fade. Wham! You shake yourself awake and wonder if anyone saw you drooling on yourself. Worse yet were you snoring?

The key to success in keeping the audience awake is to build on our two previous principles. If your talk is clear and your presentation smooth you will keep the audience engaged. In addition to this there are several things you can do to improve things.

1. **Talk to the audience.** If you mumble to yourself no one will pay attention. You might actually ask the audience questions, or tell them they can interrupt and ask you things. The more involve the audience is in your presentation the more they will pay attention to what you are trying to tell them.
2. **Keep it interesting.** If you have practical examples, interesting tidbits, humorous asides, etc... people will be less likely to drift off to sleep. There is nothing like everyone suddenly chuckling to roust a few dozers.
3. **Be up beat.** If you are bored, the audience will be bored guaranteed. An upbeat speaking style is more likely to keep the audiences attention than a monotone drone. Beware of the used car sales man pitfall. Your job is to inform not entertain. So don't lay it on too thick.
4. **Visually interesting.** Use Color. It might sound stupid, but it doesn't hurt to give people something to look at. Black and white can be a bit dull.

5. **Keep the audience listening.** Last but not least is the principle that “This is a scientific talk, not a murder mystery.” Don’t hold back all your data/conclusions to the end hoping to drop it like a bomb and surprise everyone. While it might seem like a good idea to “wow them” at the end of the talk. This fails miserably if they are all asleep. Tell people what you did up front and they will have a better chance of following you through your talk. If they know where you’re going they are more likely to come along for the ride.

Principle 5

WHAT DO YOU MEAN IT’S NOT COMPATIBLE?

Larry and Janice each spent many long hours at their computers working on two presentations that they were giving. The people hosting the talks told them that they would have a laptop and projector setup and that all they would need to do is bring a Zip disk with the presentation. The first three presenters gave nice presentations using overhead transparencies. Larry was pleased that he would blow everyone away with his multimedia extravaganza using the computer and LCD projector. When his turn arrived he walked to the front with his presentation on his 250 MB Zip disk. Much to his horror the Zip on the laptop was a 100 MB Zip. What were these people living in the stone age? After much ranting and raving he said he had planned for such an emergency and he had brought his 250 MB drive with him. He went back to get his stuff and after much rummaging he brought back the drive. What, no USB port on this laptop? More ancient technology! No problem someone upstairs had a computer with a 100 MB internal drive and a USB port. They decided to proceed with another talk while Larry dealt with the transfer to a 100 MB Zip. After ten minutes Larry triumphantly returned with the disk in hand. They loaded it into the laptop and he double clicked on the presentation. A nasty error message came up. Larry had used Powerpoint 2000, and the laptop has Powerpoint 98! Much cursing. Again Larry heads upstairs to search the building for someone with Office 2000 so he can save his presentation in the older format. While he is gone Janice gives her talk. She has a 100 MB Zip disk and her presentation is in Powerpoint 98. Beautiful graphics, a bit of animation, clear presentation. Wonderful all around. Larry finally returns to hear the thunderous ovations for Janice’s lecture. He has the disk with the presentation. Unfortunately, there were several error messages about converting his copious animation to the older format. His 20 MB movie intro may be lost. He plows ahead. He starts the presentation. The intro movie starts to load and then crashes. He reboots the computer. Nothing. The laptop now has serious problems that no one has time to deal with. Janice asks if he has backup transparencies. No, he only has the one disk. Larry’s presentation is cancelled. After the last lecture Larry turns to Janice and asks “How did you have all the right formats? You had the right disk, the right program. You’ve even got a Mac and the PC laptop didn’t trip you up!” Janice replies that she simply asked what the equipment would be. She saved the presentation in a format that would work and used a PC formatted 100 MB Zip disk.

She also noted that she had brought transparencies as a back up in case there had been some catastrophic failure.

Rules to live by:

1. Bring your own equipment and **make sure it works**.

Since rule 1 is usually not possible, rule 2.

2. If you use anything from anyone else (projector, laptop, etc. . .) **make sure it is compatible**. This includes problems with OS, cables, software versions, etc. . .

Lastly,

3. If you are truly paranoid, **bring transparencies as a backup**.