Date received: _____
Date trained: _____

APPLICATION FOR NMR TRAINING (Varian instruments)

NAME_____ ADVISOR_____

DATE _____ EMAIL_____

CAMPUS PHONE _____ BUDGET NO. _____

TIMES AVAILABLE _____

Circle one: undergraduate graduate post-doc visiting scholar

This quiz is not required for autosampler training. *However, all users must be trained on the autosamplers **before** being trained on the hands-on instruments.* Users must demonstrate that they can use the autosamplers before hands-on training.

Most answers are readily found in the instruction manuals available on our website, **http://nmr.chem.umn.edu**, but some may require more effort. Use any resources you require, but it behooves you to do the work on your own. The goal is for you to become a self-sufficient user of the NMRs.

Training sessions in groups of 4-5 will be scheduled after satisfactory completion of this quiz. Please return completed quizzes to Letitia Yao in 196B Kolthoff or Box D-6.

1a. Have you ever used an NMR spectrometer by yourself before? Circle one: Y N

1b. What kind? List the specific model if known, e.g., Varian Inova or Bruker Avance II:
Varian_____ Bruker_____ JEOL_____ Other _____

1c. At what institution(s) did you use these instruments? _____

2. What is your 6-letter code and what is it used for? (If you don't have a 6-letter code, you haven't been trained on the autosamplers; do this first!)

3. What is the minimum length for NMR tubes on the VAC-200 and VAC-300 autosamplers?

4. What is the optimum solvent height for NMR samples?

5. On a 500 MHz instrument, how many hertz = one ppm for a proton spectrum?
For a carbon spectrum? (HINT: they are not the same.)

6. You have collected 4 scans on a particular sample and would like to double the signal-to-noise that you are getting. How many scans should you collect?

7. Define the following:

NMR

FID

PFG

8. What type of information do these experiments typically provide?

DEPT

COSY

NOE

HETCOR

HMQC

HSQC

HMBC

9. Why should you run an HMQC or HSQC instead of a HETCOR or a 1D carbon spectrum?

10. What nuclei can you run on a routine basis on each of the following instruments?
VI-500:

VI-300:

VAC-300 and VAC-200:

11. What is the temperature range of the probe on the VI-500? on the VI-300?

12. What is the purpose of the lock? To find the lock, what parameter are you adjusting?

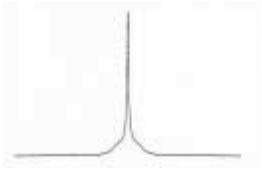
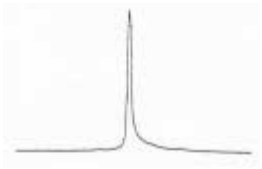
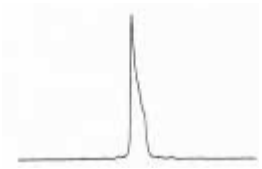
13. What nucleus do we normally use for "locking"? Why?

14. If you can't find the lock or the lock signal is very erratic, i.e., bouncing up and down, what are some common things to check?

15. What is the difference between lock power and lock gain?

16. What is the purpose of shimming? How can you tell if you are shimming well?

17. The 3 spectra below all have at least one shim incorrectly set. Which shim(s) should be adjusted for each spectrum to achieve a good lineshape?

18. If the lock level goes off scale while shimming, what should you do?

19. Define the following parameters and describe what they do:

at

sw

nt

d1

pw

bs

20. How do you join experiment 3?

21. How do you move parameters between experiments 1 and 3?

22. What two-letter command do you type to start the acquisition and process the fid when finished?

23. What three-letter command do you type to process your spectrum?

24. How do you get to the interactive display mode?

25. Describe how to expand a particular region of the spectrum.

26. Which mouse button controls the height of the peaks or integrations?

27. Describe how to *manually* phase a spectrum (not "aph").

28. Describe how to properly reference a spectrum.

29. Describe two ways to set integral reset points in your spectrum.

30. What is the difference between the commands dpir and dpirn?

31. Which plotter should you select for landscape plots?

32. List the string of commands you would use to print your spectrum with a ppm scale, integral values, peak frequencies, partial parameters, and send it to the plotter [not the "plot" macro].

33. How do you change the spectral width?

34. In what condition will you leave the spectrometer when you are finished with your experiment? Why?

35. What should you do if you break an NMR sample *outside* a magnet?

36. What should you do if you break an NMR sample *inside* a magnet?

37. In a 2D experiment, what is the difference between the parameters "nt" and "ni"?

38. You acquire a quick 16-scan ^{1}H spectrum with sufficient signal-to-noise, but your integral values don't make sense. What acquisition parameter(s) can you adjust to acquire data that give you better integrals?

39. How long did it take you to complete this quiz?