In the past we have synthesized the title compound, \([\text{Cr(CH}_3\text{CO}_2)_2\cdot\text{H}_2\text{O}]_2\), by the method described in Jolly, *The Synthesis and Characterization of Inorganic Compounds*, p 442. This method suffers from several defects. First, the \textit{in situ} reduction of chromium(III) to chromium(II) is not always complete and is difficult to carry out if any oxygen is present in the flask. It is not always clear how much acid is necessary to complete this reaction. Second, the use of hydrogen gas pressure to force the chromium(II) solution over into the flask containing the sodium acetate does not work if the system is not completely airtight; any leaks result in loss of pressure and failure of the transfer.

The assignment is to propose a synthesis of this compound that could reasonably be carried out here at Centre. That is, e.g., do not suggest a glove box, because we don’t have one. Your best course is probably to be creative in designing a method using conventional glassware. Consult me if you have questions as to the availability of certain equipment. Tanks of nitrogen gas are available and may be included in your method. The basic steps involve reducing chromium(III) to chromium(II), which is highly air-sensitive, mixing the chromium(II) solution with a slurry of sodium acetate, and isolating the resulting solid product, which is also air-sensitive (but not as much as the Cr^{2+} solution).

Techniques for handling air-sensitive compounds are dealt with extensively in Shriver’s book *The Manipulation of Air-Sensitive Compounds*. There are several published methods for this compound in the various volumes of *Inorganic Syntheses*. There may also be methods in some of the other inorganic lab texts in the library that we have not used as sources for this course. Since we do not have multiple copies of these books, it is expected that you will use them in the library so that they are available to all.

Write out your suggested procedure (you may use the amounts suggested in Jolly) and include diagrams of your apparatus. Slight variations on Jolly’s procedure will earn a poor grade. Grading will take into account evidence of your having researched and thought about various techniques of air-sensitive synthesis, the feasibility of your method within our facilities, and the likelihood of its success in terms of preventing oxidation of the air-sensitive species. \textit{This is not a group project.}