Introduction* - Aspirin is Over 100 Years Old!

Aspirin is one of the most successful nonprescription drugs ever made. Americans swallow more than 50 million aspirin tablets a day, mostly for the pain-relieving (analgesic) effects of the drug. Aspirin also wards off heart disease and thrombosis (blood clots), and it has even been suggested as a possible treatment for certain cancers and for senile dementia.

Hippocrates (460-370 BC), the ancient Greek physician, recommended an infusion of willow bark to ease the pain of childbirth. It was not until the 19th century that an Italian chemist Raffaele Piria, isolated salicylic acid, the active compound in the bark. Soon thereafter, it was found that the acid could be extracted from a wild flower, *Spiraea ulmaria*. It is from the name of this plant that the name “aspirin” (a + spiraea) is derived.

Hippocrates’s willow bark extract, salicylic acid, is an analgesic, but it is also very irritating to the stomach lining. It was therefore an important advance when chemists at Bayer Chemicals in Germany found, in 1987, that a derivative of salicylic acid, acetylsalicylic acid, was also a useful drug and had fewer side effects. This is the compound we now call “aspirin.”

Acetylsalicylic acid slowly reverts to salicylic acid, and acetic acid in the presence of moisture; therefore, if you smell the characteristic odor of acetic acid in an old bottle of aspirin, the tablets are too old and should be discarded.

Aspirin (acetylsalicylic acid) is a component of various over-the-counter medicines, such as Anacin, Ecotrin, Excedrin, and Alka-Seltzer. The latter is a combination of aspirin with citric acid and sodium bicarbonate. Sodium bicarbonate is a base and reacts with the acid to produce the sodium salt of acetylsalicylic acid, a form of aspirin that is water-soluble and quicker acting.

Video Reference:
Aspirin – Periodic Table of Videos or try the youtube link http://www.youtube.com/watch?v=amTAuK25P6c&feature=player_embedded

Laboratory Exercise:

Using the following references
- An Efficient Microscale Procedure for the Synthesis of Aspirin by Sangeeta Pandita and Samta Goyal
- A Synthesis of Aspirin by John Olmsted III
- A General Chemistry Laboratory Theme: Spectroscopic Analysis of Aspirin by Houston Byrd and Stephen E. O’Donnell

design a synthesis strategy for aspirin and 3 ways to characterize your product. You may also use other resources for your experimental design and analysis if needed.

For your final report, make sure to include,
1. The exact procedure that you performed with any modifications to your original experimental design
2. Chemical reaction and mechanism for the synthesis
3. The 3 ways your product was characterized
4. Percent yield of the product.
5. Site any other resources that you used for your synthesis and characterization.

Grading Scale:
Complete Lab Report (see syllabus) – 70 points
Proving with your characterization tests that you produced aspirin – 15 points
Percent yield from your synthesis – 100% to 75% - 15 points
74% to 50% - 10 points
49% to 25% - 5 points
Less than 24% - 0 points