Synthesis of Aspirin

1. **Question 1:** What are the two main reactants used in the synthesis of aspirin? Provide their chemical names and formulas.

2. **Question 2:** Why is it important to add a small amount of concentrated sulfuric acid during the synthesis of aspirin?

3. **Question 3:** What is the function of acetic anhydride in the aspirin synthesis reaction? Explain in simple terms.

4. **Question 4:** Describe one way to purify aspirin once it has been synthesized in the lab.

5. **Question 5:** If a student obtained a lower yield of aspirin than expected during the synthesis, what could be a possible reason for this outcome? Provide two possible reasons.

Synthesis of Aspirin

1. **Answer 1:** The two main reactants used in the synthesis of aspirin are **salicylic acid** ($C_7H_6O_3$) and **acetic anhydride** ($C_4H_6O_3$).

2. **Answer 2:** Concentrated sulfuric acid is added during the aspirin synthesis to **catalyze the reaction** and increase the yield of aspirin.

3. **Answer 3:** Acetic anhydride acts as an **acetylating agent**, meaning it adds an acetyl group (CH_3CO) to the salicylic acid molecule, forming aspirin.

4. **Answer 4:** One way to purify aspirin is through **recrystallization**. This involves dissolving the impure aspirin in a solvent at high temperature, then allowing it to slowly cool and recrystallize.

5. **Answer 5:** Possible reasons for obtaining a lower yield of aspirin could include **incomplete reaction** due to insufficient mixing of reactants, or **loss of product** during filtration and purification steps.