

Aspirin

1. To synthesize aspirin

الهدفين التجريبية

2. To determine the purity of the synthesized aspirin or a commercial aspirin tablet

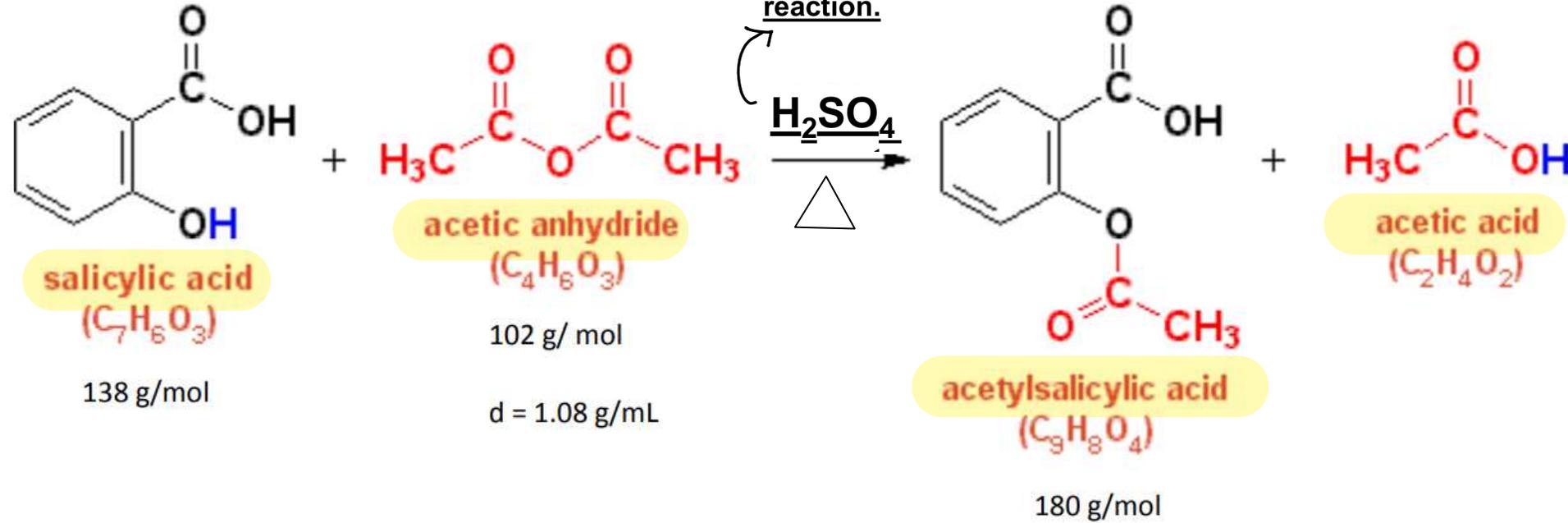
Aspirin is a leading commercial pain reliever, first synthesized in a pure and stable form by Felix Hoffman in 1897.

background

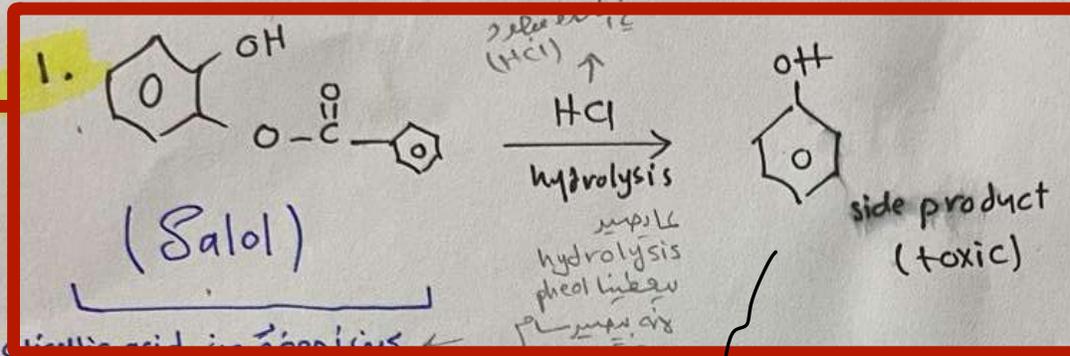
- Pure aspirin, chemically called *acetylsalicylic acid*, is both an organic ester and an organic acid. It appears as a white crystalline powder.
- Aspirin is one of the safest and most effective medicines and is widely used medication, thus is displayed on the WHO's List of Essential Medicines
- It is used widely as a painkiller such as headache (مسكن للألم, analgesic), as a fever-reducing drug (دواء خافض للحمى, antipyretic). It is most widely used in medication to treat pain, inflammation, and fever.
- When ingested, acetylsalicylic acid (ASA) remains intact in the acidic stomach, but in the basic medium of the upper intestinal tract, it forms the salicylate and acetate ions
- The analgesic action (عمل مسكن) of aspirin is due to the salicylate ion.

سبب استخدام الحمض

H₂SO₄ is added as a catalyst which speed up the reaction.



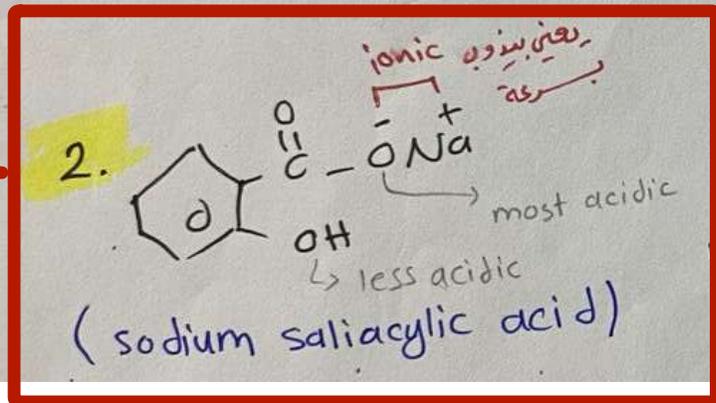
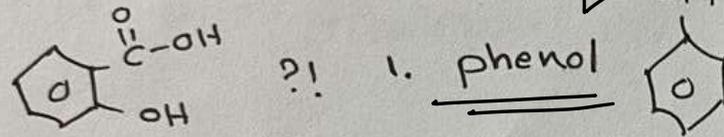
مهم تعرف انه للأسبرين مشتقات منها ...
واسمها



* مركبات مشتقة للأسبرين *

sodium salicylate
إسترات صوديوم
salicylic acid
صوديوم

salicylic acid in ionic form



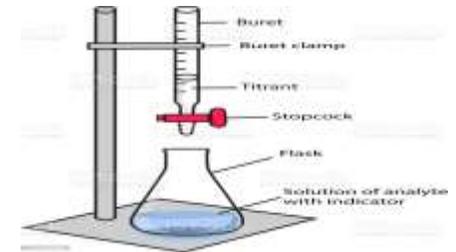
Crystalline aspirin is synthesized and then purified by recrystallization. The melting point and the percent purity of the aspirin are determined, the latter by titration with a standardized NaOH solution.

Determination by acid-base titration:

Direct titration with standard solution of NaOH to the endpoint of indicator

Phenolphthalein indicator : an acid-base indicator that is colorless at a pH less than 8.2 and pink at a pH greater than 10.

Apparatus for acid/base titration. The titrant in the buret is a standard solution of NaOH, while in the Erlenmeyer flask is the solution of aspirin sample with phenolphthalein indicator



Caution: NaOH is corrosive. Handle with care. In case of contact with skin, rinse the area with large amounts of water and notify your instructor. Wear goggles at all times in the chemistry laboratory.

1. نوزن 5g
Salicylic acid

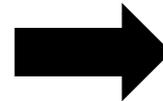
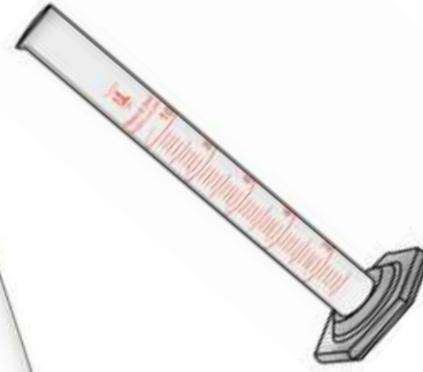
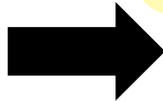


3. Add 5ml
acetic
anhydride

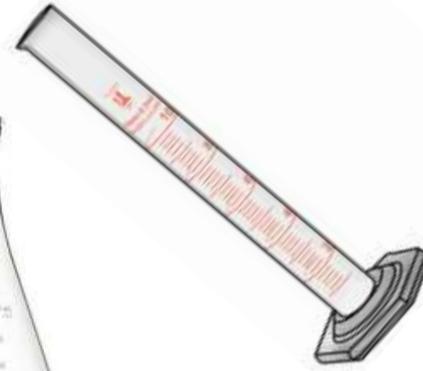
ضروري يكون
ال flask نظيف
وجاف تماما
لمنع تحطمه
بفعل الماء
وبالتالي
نخسر ال
Starting
material
قبل القيام
بالتجربة



2. Put it here



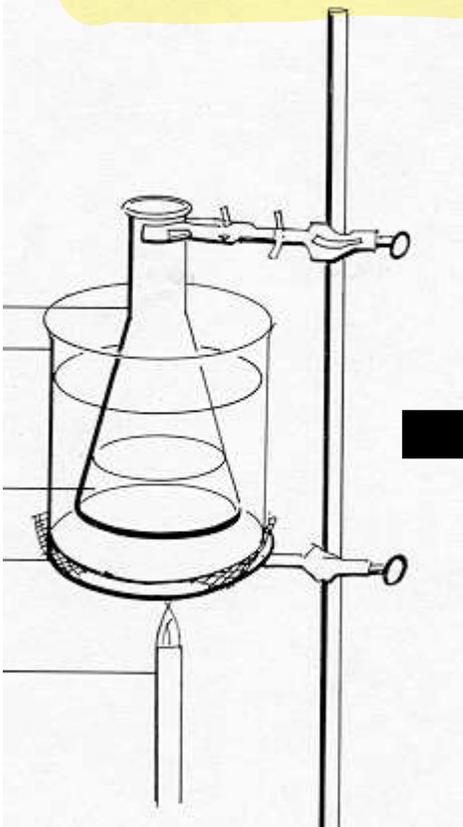
4. Add 4 ml of acetic acid



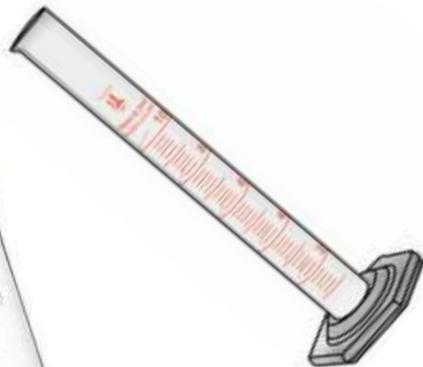
5. Add 10 drops of sulfuric acid

Catalyst

**6. By using water bath, heat it 10 min to
Dissolve all salicylic acid**



**7. Remove the flask from
water bath, and add 40 ml
hot water to the reaction
flask**



**8. Heating for 5 min
(gentle flame) blue flame**



**9. Cooling at room
temperature**



10. Cooling in ice bath



11. You will get aspirin



12. Suction filtration or vacuum filtration



13. Dry and weight it

(Caution: H_2SO_4 causes severe skin burns)

*(**Caution:** Acetic anhydride is a severe eye irritant—avoid skin and eye contact.),*

Experiment 8. Prelaboratory Assignment.

Do it

- 1.***** Experimental Procedure, Part A. 1. In the experiment, 2.00 g of salicylic acid (molar mass = 138.1 g/mol) reacts with an excess amount of acetic anhydride
- Calculate the theoretical yield of acetylsalicylic acid (molar mass = 180.2 g/mol) for this synthesis.

Question. *Identifther medical applications of aspirin. Select one or more:*

- Fever-reducer*
- Pain killer*
- Anticoagulant*
- Anti - histamine*
- Anti - inflammability*

Experiment 7 Report Sheet

Preparation Of Aspirin

مهم جدا حل اسئلة على هذه التجربة
بسبب ال Limiting reactant

Name : Section :

2 idea in the same time

Preparation of Aspirin (Reaction Equation) :

1. Volume of acetic anhydride (ml)

5 ml

2. Density of acetic anhydride (g/ml)

1.08 g/ml بتكون معلومة

3. Mass of acetic anhydride (g)

بما انه سائل وبدنا كتلته على قانون الكثافة

$$D = \frac{m}{V} \Rightarrow m = D \times V = 1.08 \text{ g} (5 \text{ ml}) = 5.4$$

4. Mass of Salicylic acid (g)

يلبي وزناها هالميزان بداية التفاعل

5g

5. Mole of acetic anhydride

$$\# \text{ mole} = \frac{\text{mass}}{M.m} \Rightarrow \frac{5.4}{102.09} = 0.053 \text{ mol}$$

6. Mole of Salicylic acid (mol)

$$\# \text{ mole} = \frac{5}{138.12} = 0.036 \text{ mol}$$

الأقل عدد مولات هي ال
Limiting reactant → The L.R

7. Limiting Reactant is

لأن

Salicylic acid

8. Moles of Aspirin (mol) (Theoretical) → 1:1

$$= \# \text{ mol L.R} = \# \text{ salicylic acid} = 0.036 \text{ mol}$$

9. Mass of Aspirin (Theoretical yield) (g)

$$\text{mass} = \# \text{ mol} (M.m) = 0.036 * 180.158 = 6.49 \text{ g}$$

10. Mass of filter paper (g)

قبل m_1

11. Mass of filter paper and Aspirin (g)

بعد m_2

$$m_2 - m_1 = 5.85 \text{ g}$$

12. Mass of Aspirin (g) (Actual Yield)

5.85g

13. Percentage yield of Aspirin (%)

14. Melting point of Aspirin:

نعم القانون * هدف التجربة.

* Show Calculations :

$$\% \text{ Aspirin} = \frac{\text{Actual mass}}{\text{Theoretical mass}} \times 100 \%$$

$$= \frac{5.85}{6.49} \times 100\% = 90.1 \%$$