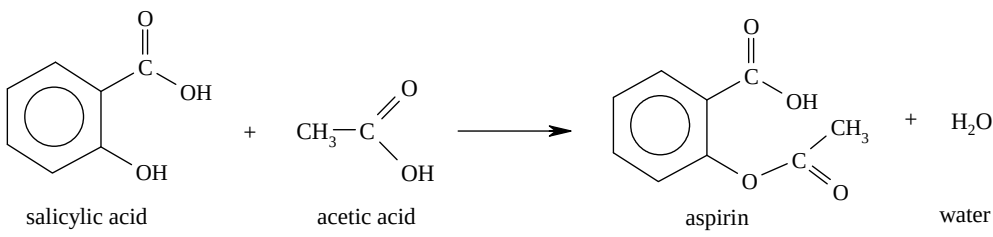
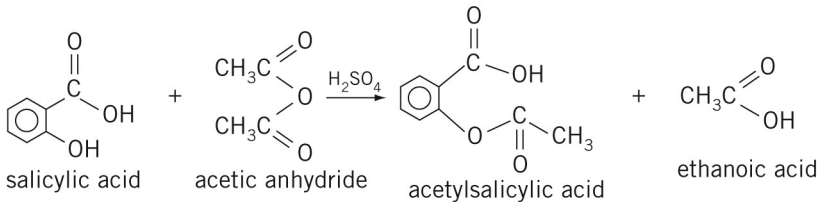
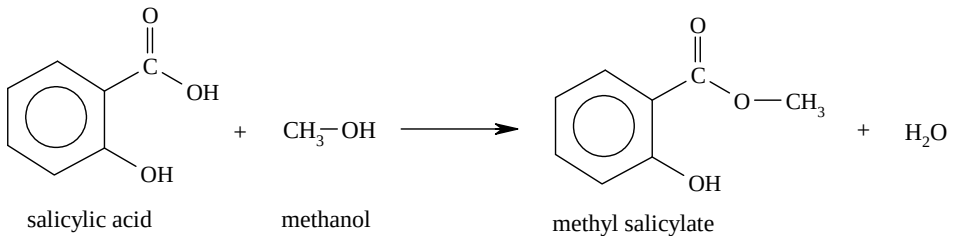


Preparation and analysis of aspirin

No.	Answer
1	Analgesic: pain reliever Antipyretic: reduces fever Anti-inflammatory: reduces production of prostaglandins that lead to inflammation
2	Used by the ancient Greeks and by native Americans, who chewed the leaves.
3	a Carboxylic acid b Hydroxy (or alcohol) c Ester
4	 <p>salicylic acid + acetic acid → aspirin + water</p>
5	 <p>salicylic acid + acetic anhydride $\xrightarrow{\text{H}_2\text{SO}_4}$ acetylsalicylic acid + ethanoic acid</p>
6	a It is a catalyst. b It is used in many ester-forming reactions.
7	a The binder holds the tablet together so that it is a single, solid tablet. b The binder must be harmless, stable and edible – starch is suitable for this.
8	<p>a $m(\text{acetylsalicylic acid}) = 0.325 \times 10^6 \text{ mg} = 325 \times 10^3 \text{ g}$</p> $n(\text{acetylsalicylic acid}) = \frac{m}{M} = \frac{325 \times 10^3}{180.154}$ <p>$n(\text{salicylic acid}) = n(\text{acetylsalicylic acid})$</p> $= n \times M = \frac{325 \times 10^3}{180.154} \times 138 = 249 \times 10^3 \text{ g} = 249 \text{ kg}$ <p>b The process is far from 100% efficient. Reaction is incomplete and isolation of the product is difficult because the solubility of the aspirin makes it hard to crystallise out from the reaction solution.</p>
9	Stomach bleeding may occur. In addition, the blood is thinned too much, making it unlikely to congeal and so interfering with the clotting process.

Preparation and analysis of aspirin

No.	Answer
10	<p>Methyl salicylate (oil of wintergreen) is produced.</p> <div><p>The diagram illustrates the chemical reaction for the synthesis of methyl salicylate. On the left, the reactants are salicylic acid and methanol. Salicylic acid is represented by a benzene ring with a carboxylic acid group (-COOH) and a hydroxyl group (-OH) in the ortho position. Below it is the label 'salicylic acid'. Methanol is represented by the chemical formula CH₃-OH, with the label 'methanol' below it. An arrow points to the right, indicating the reaction. On the right side of the arrow are the products: methyl salicylate and water. Methyl salicylate is represented by a benzene ring with a methyl ester group (-COOCH₃) and a hydroxyl group (-OH) in the ortho position. Below it is the label 'methyl salicylate'. Water is represented by the chemical formula H₂O.</p></div>