Product formulation portfolio; evaluation pro-forma 4 (pfpe4)

Health & Medicine

Product Formulation Portfolio; Evaluation pro-forma 4 (PFPE4) Table4. New formula (including new ingredients/replacement ingredients) formula evaluation

Pyridine

New Formula: C7H6O3 (Salicylic acid) +C2OH3Cl (acetyl chloride) C9H8O4 (Aspirin) + HCl (hydrogen chloride)

Old Ingredient

New ingredient

Why replacing the old one (is it better? more natural? Less toxic?)

Chemical Characteristic

Role in the formulation

Acetic anhydride (CH3CO)2O)

Acetyl chloride(C2OH3Cl)

The old ingredient (Acetic anhydride) is replaced because it is a less vigorous acylating agent as compared to the new ingredient (Acetic chloride). Additionally, Acetyl chloride is cheap and readily available (2).

Acetyl chloride (C2OH3Cl) is a colourless to light yellow fuming liquid which violently reacts with water and lower alcohols to form acetic acid and hydrogen chloride (1). Lastly, the irritating liquid readily fumes in the air. Acts as a high quality acetylation agent due to its high reactivity and ability to produce irreversible reactions with weak acids such as salicylic acid.

85% Phosphoric acid

Pyridine

The old catalyst (85% Phosphoric acid) is replaced with a new catalyst (Pyridine) because Pyridine serves both as a catalyst for the acetylation

reaction as well as a base for neutralizing the resulting hydrochloric acid (4). HCL is normally formed as a by-product of the reaction between acetyl chloride and Salicylic acid.

Pyridine is a weakly basic catalyst that is miscible with water as well as most of the common organic solvents (3).

During the formulation of Aspirin, Pyridine plays an important role both as a catalyst for the acetylation reaction and as a base for neutralizing the resulting hydrochloric acid that is formed during reaction between acetyl chloride and Salicylic acid

Reference List

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3. Palleros, D. R. 2000. Experimental Organic Chemistry. New York: John Wiley & Sons.

4. Zumdahl, S. S. 2009. Chemical Principles 6th Ed. New York: Houghton Mifflin Company.