G620: Science at Work – Sample Assignment F

Unit Name: Science at Work	**Unit Number:** G620
Assignment Title: Aspirin: A Useful Drug	**Assignment:** G620 Sample Assignment F
Date Set:	**Due Date:**
Assessment Objective(s): AO3 & possible AO2(b)	

Vocational Brief:

More than 10 million kilograms of aspirin are manufactured in the US each year. Nowadays, aspirin is used not only as a painkiller but it is also effective in reducing the incidence of heart disease. Aspirin can be prepared in the laboratory by the esterification of salicylic acid with ethanoic anhydride. The aspirin that is manufactured must be of a very high purity.

Task:

The aim of this task is to prepare and determine the melting point of aspirin following a standard procedure.

In this task you are required to:

- identify hazards and carry out a risk assessment
- follow practical instructions
- record any observations and measurements
- process and evaluate results.

This task should be marked to a maximum of 21 and will need to be divided by two and the mark added to that of the second practical task.

Note:

In addition you can gain AO2(b) if you complete the:

- treatment of results.

Resources:

- Royal Society of Chemistry www.rsc.org.uk
- Aspirin information www.rsc.org/images/Aspirin_tcm18-189278.pdf
- Practical www.rsc.org/education/teachers/learnnet/practical/index3.htm
- Data www.chemsynthesis.com

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Practical Instructions

Preparation of a sample of aspirin and determination of melting point

Practical Instructions- AO3(a) & AO3(b)

Complete a risk assessment before starting the experiment.

1. Weigh accurately about 2.00 g of 2-hydroxybenzoic acid (salicylic acid) into a dry 50 cm^3 pear-shaped flask. Record all the weighings. The mass need not be exactly 2.00 g but the mass must be known to two decimal places.
2. Add 5 cm^3 ethanoic anhydride and 10 drops concentrated phosphoric acid.
3. Mix the reagents carefully by gently swirling the flask.
4. Attach a reflux condenser to the flask.
5. When the apparatus is assembled correctly, use a water bath to heat the flask for ten minutes.
6. Allow the pear-shaped flask to cool to room temperature.
7. Carefully remove the water bath and then very slowly and cautiously pour 5 cm^3 water down the condenser.

Caution: *the water may boil violently due to the reaction with excess ethanoic anhydride.*

8. When the reaction has finished, pour the contents of the flask into a beaker containing about 30 cm^3 cold water.
9. Cool the products in an ice bath.
10. Filter the mixture using vacuum filtration.
11. Recrystallise the crude aspirin using the minimum amount of boiling water.
12. Filter the solid using vacuum filtration.
13. Dry the solid.
14. Weigh the solid recording all masses measured.
15. Put a sample of the aspirin in a sample tube, labelling the tube appropriately.
16. Determine the melting point of the aspirin, recording all appropriate measurements.

Treatment of your results – AO2(b)

- Calculate the theoretical yield of aspirin for the mass of 2-hydroxybenzoic acid used.
- Calculate the percentage yield.
- Look up the melting point of aspirin and compare with the results for your solid.

Evaluation of your results - AO3(c)

Comment on:

- the method
- the results that you obtained for the percentage yield and the melting point.