Assignment Brief 2.4

Unit Name: Analysis at Work	**Unit Number:** Unit 2
Assignment Title: A Preservative for Mummies	**Assignment Number:** 2.4
Date Set:	**Due date**

Assessment Objective(s): AO3b

Brief:

Have you ever wondered how Egyptian mummies have lasted for thousands of years? When the person died, their organs were removed and the body treated with a number of naturally occurring preservatives before the body was wrapped. One of the preservatives used was an inorganic solid obtained from dried up lake beds.

You have been provided with an impure sample of this preservative, which has been called **Mummion** and you are required to analyse it.

The purification and qualitative analysis of mummion.

Task:

You are required to:

- Identify hazards and carry out a risk assessment
- Devise a simple plan
- Follow set procedures
- Record your observations
- Write a conclusion that interprets your results and states the chemical content of mummion
- Briefly evaluate your results.

Maximum marks possible for this task: 6

Resources:

Class notes on qualitative inorganic analysis and relevant paper and electronic based material.

A Preservative for Mummies
Unit 2: Analysis at Work (AO3b)

The purification and qualitative analysis of mummion.

PRACTICAL INSTRUCTIONS

1. Complete an appropriate risk assessment before starting your work.
   You should assume that you are carrying out the qualitative tests for anions and cations as described in this unit.
2. Mummion is a white solid that is soluble in water. Your sample is contaminated with sand and iron(III) oxide, both of which do not dissolve in water.
3. Weigh out around 5g of your impure sample of mummion. The mass need not be accurately known.
4. Add all your weighed sample to 100cm^3 of distilled water in a conical flask.
5. Stir to dissolve the mummion, leaving the sand and iron(III) oxide as insoluble solids.
6. Filter the mixture to remove the insoluble impurities.
7. Boil the filtrate, which is a colourless solution of mummion, in an evaporating basin until only about 15cm^3 remain. The solution may spit on boiling and you should take adequate precautions.
8. Allow the solution to cool, when white crystals of mummion remain in the basin.
9. Remove the crystals from the liquid by filtration and dry them on a filter paper in air.
10. Mummion is a mixture of **two** compounds. These two compounds have the same cation but two different anions.
11. Devise a simple plan showing the order in which you will test for the anions and cation present.
12. Analyse your crystals for the cation present using the tests that are in the specification and that you have practised in the laboratory.
13. Analyse your crystals for the anions present using the tests that are in the specification and that you have practised in the laboratory.
14. Record your plan, observations and conclusions in a suitable way.
15. Briefly evaluate your results.

Exemplar Material with Commentary
Unit 2: Analysis at Work (AO3b)

Candidate Portfolio Work	Commentary on Mark Allocation
Risk Assessment 1. As I not certain what mummion contains I will wear gloves and a laboratory coat when handling the material. 2. I will also wear eye protection during my work. This is very important during heating and when handling acids and alkalis. 3. When testing for the cation present I will use sodium hydroxide solution. This is very corrosive and I will wear plastic gloves and wash off any splashes with a large quantity of water. 4. I will also test for the cation using a flame test. I will ensure that my lab coat is done up and my hair is tied back. 5. When I test for anions I will be using the following solutions. *Silver nitrate* – this is irritant and I must avoid splashes on the skin. *Dilute acids and alkalis* – these are corrosive and I must take care and remove any splashes with plenty of water. *Barium chloride* – this is very toxic and I must take care no to get it on the skin and remove any splashes immediately using plenty of water.	Mark 1 awarded for a reasonably detailed risk assessment
My plan Hopefully I will obtain pure crystals of mummion when I have followed my teacher's plan. 1. I have been told that the cation is one of those mentioned in the specification for this unit. Since mummion is white I conclude that it cannot contain iron(II), iron(III) or copper because these give coloured compounds. 2. I will firstly try a flame test because this is the simplest. 3. Then I will add a little sodium hydroxide solution to my solution of mummion. 4. I will firstly test for the anions, chloride, bromide and iodide. I will do this by adding dilute nitric acid to my mummion solution and then adding a little silver nitrate solution.	Although the practical tasks are relatively simple, the task set required candidates to write a plan, and this has enabled the possibility of awarding higher level marks.

If I see a solid being formed its colour will tell me if I have a chloride, bromide or iodide.

5. I will next test for a sulphate because this is an easy test and does not require heating. I will add some dilute hydrochloric acid to my mummion solution so that the solution is acidic (test with litmus paper). Then I will add a little barium chloride solution and see if I get a white solid. If I do then I have found a sulphate in my mummion.
6. Next I will add some hydrochloric acid to my mummion solution and see if there is any fizzing. If there is fizzing I will pass the gas into lime water. If this turns cloudy then I have found a carbonate.

   I have noticed in tests 4 and 5 that I will be adding acid to my mummion solution. I need to see if I notice fizzing there too.
7. I hope that it is not a nitrate because this is a dangerous test. I will take some of my mummion crystals and add a little sodium hydroxide solution to them. I will warm them – I will then test for ammonia gas by seeing if damp red litmus paper is affected by any gas coming off. If it is then I have found ammonium in my mummion. Then I will try the same again but also adding a little aluminium powder to my mixture. If I get ammonia now it is a nitrate. If I found an ammonium group then this upsets my test and I will have to ask my teacher for advice.

My observations and conclusions

I carried out my plan and found that it worked. I was fortunate because I did not have to carry out every test because I found the cation and two anions early on in my experiments.

Flame test I cleaned my wire and wet it with a little water. Then I dipped it into a few mummion crystals. When I put it into a blue flame a brilliant yellow colour was seen. I looked in my notes and found that this colour was due to SODIUM.

Sodium hydroxide solution When I added a liitle sodium hydroxide solution to my mummion solution I did not see any change, no precipitate was formed. When I looked in my notes I found that this showed that I did not have calcium, zinc or aluminium. My teacher told me that all sodium compounds dissolve in water and this shows that I was right in my flame test.

Test for chloride, bromide and iodide When I added dilute nitric acid to my mummion solution I noticed some fizzing. I wondered if it was a carbonate. I carried on adding the acid until the solution turned blue litmus paper red. Then I added a few drops of silver

Mark 2 awarded for a report of the observations, processing and interpretation.

Marks 3 and 4 awarded because the report is quite detailed and the results accurately processed.

The work has been presented clearly and logically.

nitrate solution. I saw a white solid appear. When I looked in my notes I found that this was due to a CHLORIDE being present and the white solid was silver chloride. **Test for a carbonate** When I tested for a chloride I saw fizzing so I next tested for a carbonate. I added some hydrochloric acid to my mummion solution. Fizzing occurred and I passed the gas into lime water. This turned cloudy showing that I had found a CARBONATE. **Conclusion** Mummion contains the following ions : **SODIUM, CHLORIDE** and **CARBONATE** **Evaluation** The hardest part was doing my plan but my notes from analysis work done in class helped me. I think that I should have also test for sulphate, nitrate and ammonium to show that these were not present but I forgot ! My plan worked well and I was pleased with the result especially because I find these tests are confusing at times.	This is a **Mark Band 2** piece of work. It is felt that the use of the first person throughout limits the possibility of a higher score. It was felt that this assignment did not merit the full 6 marks as there is no evidence provided that the equipment has been used safely and to an appropriate level of accuracy although the candidate made an attempt to ensure acidification had occurred when testing for halide ions. In addition the candidate has not adequately linked the tests in a vocational way but this is not quite so easy in this basic qualitative analysis. Although the candidate has made an attempt at an evaluation, it is felt that this needs to be more detailed. As a consequence a total mark of **4** has been awarded.