



1871

Alum Extraction around the North Yorkshire Moors

Look at the clothes you are wearing. What colour are they? You may perhaps have said: blue, red or yellow. How do you think material is made into different colours?

You have probably said by now that to make material a particular colour it needs to be dyed. Dyeing is quite a scientific process and to make dye stay in the material it needs to be 'fixed'. The stuff that makes it fix is called a 'mordant' or a fixative. In the 1500's a major industry in Britain was producing woollen clothing. One of the mordants used was urine, in other words 'wee'! It was also discovered that the mineral alum was a more effective mordant. Alum is a mix of the crystalline salts of *Potassium aluminium sulphate* and *Ammonium aluminium sulphate*.

At that time the Roman Catholic Church was very powerful in Europe and was able to control the export of alum from Italy. By then Britain was Protestant, and the Catholic Church tried to make life difficult for Britain in several ways: one thing they did was to make it expensive to import alum. Late in the 1500's, Sir Thomas Chaloner, who owned an estate near Guisborough, visited alum extraction areas in Italy and realised that the plants growing there were similar to the ones on his own land. With the help of his cousin, Thomas Chaloner of Lambay, and alum workers from Germany and Italy, he was able to develop a process to extract alum from the shale deposits on his estate.

The process involved roasting the shale for 6 to 9 months to create the right kind of minerals. At that time the science of chemistry did not exist, so getting the timing and the temperature just right was quite an achievement. Thomas Chaloner of Lambay was awarded a government pension of 40 marks a year for his achievement, but at 70 years of age, he had to walk 250 miles from Guisborough to London to ask the government of King Charles I to continue to pay the pension. The Chaloner family had difficulty getting money from the King after he had forced them to lease the alum workings to him, because he no longer needed them.

To produce the alum other things were needed. These were coal for fuel, dried seaweed for potassium and urine for ammonium. Coal was brought in from Newcastle and urine was sent from London in barrels. People were paid for their wee - and then the barrels were sent back to London full of Yorkshire butter to

sell! Most of the resources to produce the alum and the finished alum itself were transported by sea and therefore the extraction works moved closer to the coast. Whitby's shipping industry and the port expanded considerably in the 17th Century because of the alum industry.

There were 17 alum works at the peak of the industry, with workings at Loftus, Ravenscar and Sandsend. However, by the 19th century simpler methods of manufacture had been developed and the woollen industry was no longer so important. The last working mine was at Sandsend, which ceased operations in 1871.



Remains of alum works at Sandsend

QUESTIONS

1. When you dye fabric, what is the name for the 'fixative'?
2. What is one of the fixatives that was used in the 1500's?
3. What is Alum?
4. Why was the Roman Catholic Church able to control the export of Alum to Britain?
5. Where did Sir Thomas Chaloner visit and realise that the plant life was similar to that of his Guisborough estate?

6. Who helped him develop a process to extract Alum from the shale deposits on his estate?

7. How long did the shale need to be roasted for to convert the sulphides into oxides and sulphates?

8. When the Chaloner family had difficulty getting money from the King Charles I, what sort of a man did this make the king?

9. Why was alum production moved closer to the coast?

10. How were the people of London paid for their 'wee', and what happened to the empty barrels?

11. How did the alum industry help Whitby?

12. When and where did the last alum workings cease operations?

Find out more:

- The Cleveland Way footpath offers a beautiful route for visiting ten sites of the old workings - <http://www.teeswildlife.org/what-we-do/past-projects/alum-alchemy-and-ammonites/places-to-visit/cleveland-way-alum-sites-guide/>
- 'Thomas Challoner and his Astonishing Alum Industry' by Adam Hart-Davis (1995), at <http://www.exnet.com/1995/12/18/science/science.html>