
Qualitative analysis

What's in it for us?

Some minerals, such as limestone and rock salt, have important uses in our everyday lives, as well as being used in the chemical industry. Many other minerals, known as ores, are processed to extract metals from them.

Minerals are mined. Some of the rock dug out does not contain enough ore to make it worth processing. It just gets piled up as waste heaps, disfiguring the landscape. However, scientific techniques and technology have improved over the years. It is now becoming possible to extract metals from some old mine waste heaps that contain only small amounts of useful minerals. It won't avoid the need for mining, but it may reduce it. It would also help to tidy up the environment.

However, we still need to decide whether it would be economic to process any particular waste heap. We need to know what's in it. Similarly, prospectors looking for new sources of minerals to mine also need to know what's in the rocks around them.

This is where qualitative chemical analysis comes in. Simple chemical tests can be performed with a mobile kit of common reagents and basic apparatus. The tests can indicate whether the rocks contain anything worthwhile. Unless they do, it's not worth sending samples back to the company for more detailed analysis. Simple chemistry can save a lot of wasted time, effort and money.

Prospectors need to be able to identify a wide range of minerals and ores. Some contain a simple compound, made up of one metal ion and one non-metal ion. For example, galena contains lead and sulfide ions. More often, minerals contain a mixture of several ions. For example, malachite contains copper, carbonate and hydroxide ions.

The Standard Procedure below is limited to detecting and identifying six metal cations and three non-metal anions, though these may be in various combinations. You should already be familiar with the techniques involved, such as the limewater test for carbon dioxide. In particular, before carrying out Part 2, you need to know how to do flame tests.

SP 0006:2005 Chemical tests for identifying cations and anions in minerals

Part 1: Tests for anions

Part 2: Flame tests

Part 3: Tests for cations