WHAT IS GYPSUM?

Pure gypsum is a white rock but sometimes impurities colour it grey, brown or pink. Its scientific name is calcium sulphate dihydrate and its chemical formula is CaSO42H2O. This means that, for every molecule of gypsum, there are two molecules of water. This is a most important fact in the gypsum story. If a piece of gypsum is ground to powder and heated, it will lose about three quarters of its water. If this powder is then mixed with water, the paste or slurry will set rock hard. The chemically-combined water, previously removed, has re-combined and the material has reverted to the original composition of the rock.

The powder is called hemi-hydrate gypsum plaster. You will know it as plaster of Paris and you may have used it for modelling or for taking casts of animal paw prints, tyre treads or footprints in soft ground. Why is it called 'plaster of Paris'? Well, the city of Paris was built over ground which contained gypsum and this has been mined and quarried, particularly in the district of Montmartre.

Gypsum is found in every continent of the world. We have mentioned France, but gypsum is also mined and quarried throughout Europe. India and Pakistan have gypsum and so have Africa, Australia, China, Japan and South America. In 1964 Jamaica issued a stamp picturing its gypsum industry. There are gypsum mines across North America, and Utah possesses large deserts of powdery gypsum rock.

Gypsum is now also obtained as a by-product of reducing the emissions levels of coal-fired power stations. Flue-Gas Desulpherisation (FGD) systems are a major source of pure gypsum in countries that use clean coal burning technologies (i.e., Europe, but little in Canada and the US).

GYPSUM IN BRITAIN

Where did it all come from? 160 to 200 million years ago dinosaurs lived over the marshy swamplands of Britain and the climate was hot and arid. During this time the huge inland seas dried up and left large layers of gypsum. Gypsum is an evaporite mineral like salt and comes from such drying up of large bodies of water, or from the evaporation of sea water in mud flats at the edge of the sea.

In later times the gypsum was covered by sand or mud and buried beneath the land surface while dinosaurs and other large reptiles walked on top of it.

During the millions of years following, when the British Isles were being formed, the gypsum deposits were folded and bent whilst the land surfaces rose and fell, and the earth's crust moved. Very large earth movements led to the rocks being faulted with the gypsum being displayed and distorted. This explains why it is possible to quarry gypsum in one place whilst nearby it is necessary to mine at depths of over 180m to win it.

If the gypsum was displayed deeply, then the water associated with the gypsum would be driven off by pressure and temperature leaving anhydrite (also an important ingredient in the manufacture of modern cement).

When the ice age came the land surface was eroded or ground down to bring the anhydrite nearer the surface where it encountered water and rehydrated to gypsum. These areas now form the gypsum deposits we mine, or quarry.

GYPSUM USAGE THROUGH THE AGES

Gypsum has been known in Britain for centuries and is one of the oldest building materials in the world. It's first use was, comparatively speaking, quite recent…..around 6000BC. the oldest use of gypsum yet discovered was in Anatolia about that time and later, in 3700 BC, it was used on the interiors of the great pyramids in Egypt. On the smooth white surfaces their artists painted magnificent frescoes - pictures of chariots, soldiers, kings, gods, animals and birds.

The ancient civilisations also used the type of gypsum we call alabaster. The great winged bulls of Assyria, which we can see in the British Museum, are made of this stone. The Greeks coined the word albatross from the Egyptian town of Albastron, where small vessels or pots were made from gypsum.

It was the Greeks also who gave gypsum it's name using two works meaning 'earth' and 'to cook' (-'Gypsos'). They used a special form of transparent gypsum for windows, particularly for temples dedicated to the moon goddess Selene, and this, traditionally, is why they called it selenite or 'moon-stone'.

The Romans knew of gypsum and used it during their occupation of Britain, as we can see from bodies preserved in gypsum plaster at York. The Anglo-Saxons and Normans forgot about it and gypsum was not heard of again until plaster of Paris was brought from France in the thirteenth century.

When the walls and ceilings of houses were made of reeds or wattles, gaps were filled with daub and the earliest British houses were of wattle and daub. At first mud of clay was used, but then builders found they could make a hard, white surface from the lime plaster and the trade of plastering was born. The 'Guild of Plaisterers' was given a charter in 1501 and by that time plaster could be made of lime or gypsum. Gypsum plaster became more popular because it dried faster and did not crack. Today very little lime plaster is used.

The Plaisterers were also called Pargettors. Pargetting meant decorating the outside of a house with rough plaster and you can see what this looked like by visiting an Elizabethan manor house. The greatest use for plaster, however, was inside, and from the sixteenth century onwards plasterers developed marvellous skills in creating decorative plaster or stucco. Walls and ceilings were covered with flowers, leaves, fruit - and even musical instruments - all in plaster. Some of the finest stucco was created by Italian plasterers in the Georgian houses of Dublin.

The plaster for this decorative work had to be of the finest quality and one plasterer used eggs and cream as well as horsehair in his mixture!

Because it is dry, strong, easy to handle and inexpensive, plasterboard is being used in buildings all over the country. Yet before 1890 no one had heard of the word.

It was 1890. In the works of the New York Coal Tar Chemical Company, Augustine Sackett and Fred L. Kane were looking at the death of an invention.

On a large wheel they had hoped to make a board from straw paper and pitch for lining walls and ceilings. But the pitch soaked through the paper, ruining all decoration applied to it.

But then Kane suggested using manilla paper instead of straw paper and plaster of Paris instead of pitch. They poured in the thin plaster, turning the big wheel five or six times, left the board to harden, and found they had stiff, strong, new material - plasterboard.

At first, builders and decorators did not like this new product but after ten years hard work the idea was accepted. More factories were built and by 1909, Augustine Sackett was producing nearly 47 million square metres of plasterboard a year.

WORLD GYPSUM

(source of data: US Geological Survey Mineral Commodity summaries)

- Worldwide gypsum production in 2000 is reported as being 106 million tons (2001 estimated 110 m tons), although production in developing countries are not reported. 90 countries produced gypsum, of which 6 accounted for 57% of Worldwide production. Over 110 million metric tons of synthetic gypsum is generated worldwide (Roskill information Services Ltd. 2000).
- The USA leads the World in gypsum production, in 2000 accounting for 18.5% of reported global output. An average new American home contains more that 7.31 metric tons of gypsum or, in other terms, more than 571 square metres of gypsum wallboard (Mineral information Institute 2001).
- World production of gypsum wallboard (plasterboard) in 2000 was at least 5.6 billion square meters produced in more than 250 plasterboard plants, of which about 50% are located in the USA.
- As a low value, high bulk product drawn from widely distributed deposits, 80% of gypsum is used in the country where it is mined. The World's largest known deposit of gypsum is found on the west coast of Australia.