temperature at which sulphur powder when thrown in catches fire spontaneously. This temperature being maintained, a shovelful of sulphur is thrown in and allowed to burn off while the mass is being constantly agitated with iron rakers. Another dose of sul­phur is then added, and so on until a sample taken out is found to have come up to the highest attainable brilliancy and depth of blue. The product is then lixiviated with water, which removes a deal of sulphate of soda formed in the process ; it is then ground up very fine, and finally subjected to elutriation to produce a graduated series of ultramarines of different degrees of fineness. In some works the process of sulphuration is divided into two or more periods, after each of which the product is washed, dried, and ground before being returned to the muffle to produce a higher degree of homogeneity.

1. In the *carbonate of soda process* the soda is used solely, or at least principally, in the carbonate form. The following is one of many recipes :—kaolin (calculated as anhydrous matter) 100 ; car­bonate of soda 100 ; charcoal 12 ; sulphur 60. The mixture is heated in a reverberatory furnace to form in the first instance a white mass, which is so porous that it readily passes, by oxidation, into green and partly even into blue ultramarine. Green ultra- marine, saleable as such, cannot be produced in this manner. The half-blue product is finished by sulphuration pretty much as ex­plained above for the Nuremberg process. Well-made soda-ash ultramarine has a richer colour than the Nuremberg variety.
2. *Silica ultramarine* is soda-ash ultramarine in whose prepara­tion a quantity of finely divided silica, equal to 5 to 10 per cent. of the weight of the kaolin, has been added. It is distinguished by a reddish tinge, which is the more fully developed the greater the proportion of added silica. It is more highly proof against the action of alum solution than non-siliceous ultramarine is.

Since 1873 the Nuremberg works have been producing four varieties of magnificently violet ultramarine. The mode of manu­facture has not transpired. At the Paris Exhibition in 1867 a mag­nificent block of ultramarine exhibited by the Kaiserslautern works attracted attention. In its manufacture the roasting (blueing) pro­cess is said to have been continued for three weeks.

Artificial, like natural, ultramarine has a magnificently blue colour, which is not affected by light nor by contact with oil or lime as used in painting. Hydrochloric acid at once bleaches it with liberation of sulphuretted hydrogen gas and milk of sulphur. The natural pigment is proof against dilute acetic acid and solution of alum ; the artificial pigment is even alum-proof only in a higher or lower relative sense. Hence there is room for progress in one direction at least. The composition of the pigment is quite similar to that of lapis lazuli ; but the constitution of both is still a chem­ical enigma. It is remarkable that even a small addition of zinc- white (oxide of zinc) to the reddish varieties especially causes a considerable diminution in the intensity of the colour, while dilu­tion with artificial precipitated sulphate of lime (“ annalin ”) or sulphate of baryta (“ blanc fix ”) acts pretty much as one would expect. Ultramarine being very cheap (it sells at 7d. to 10d. per lb), it is largely used for wall painting, the printing of paper hangings and calico, &c., and also as a corrective for the yellowish tinge often present in things meant to be white, such as linen, paper, &c. Large quantities are used in the manufacture of paper, and especially for producing that kind of pale blue writing paper which is so popular in Great Britain. Only the very finest ultramarine can be used for paper tinging, because the least admixture of coarse particles becomes visible in the paper as dark spots or stains.

ULUGH BEG, Mirza Mohammed ben Shah Rok(1394-1449), astronomer, grandson of Timur *(q.v.),* suc­ceeded his father as prince of Samarkand in 1447, after having for years taken part in the government, and was murdered in 1449 by his eldest son. He occupied himself with astronomical pursuits, and erected an observatory at Samarkand, from which were issued tables of the sun, moon, and planets, with an interesting introduction, which throws much light on the trigonometry and astronomical methods then in use (*Prolégomènes des Tables Astronomi­ques d'Ouloug Beg,* ed. by Sédillot, Paris, 1847, and trans­lated by the same, 1853). The serious errors which he found in the Arabian star catalogues (which were simply copied from Ptolemy, adding the effect of precession to the longitudes) induced him to redetermine the positions of 992 fixed stars, to which he added 27 stars from Al Sûfi’s catalogue, which were too far south to be observed at Samarkand. This catalogue, the first original one since Ptolemy, was edited by Th. Hyde at Oxford in 1665 *(Tabulæ Longitudinis et Latitudinis Stellarum Fixarum ex Observatione Ulugbeighi),* and in 1843 by Baily in vol. xiii. of the *Memoirs* of the Royal Astronomical Society.

ULVERSTON, a market-town in the north-west of Lan­cashire, England, is picturesquely situated near Morecambe Bay, on the borders of the Lake district, 9 miles north­east of Barrow-in-Furness, and 256 north-west of London. The town bears small evidence of its great antiquity. The principal streets branch from the market-place, and the houses built of stone are generally rough-cast and whitened. A rivulet flows through the town. The church of St Mary, founded in 1111, retains the south door of the original build­ing in the Transition style, but the greater portion of the structure is Perpendicular, of the time of Henry VIII. It consists of chancel, nave, aisles, south porch, and embattled western tower, and contains an altar-tomb with recum­bent figure of Walter Sandys of Conishead, dated 1588. After the destruction of Furness Abbey, Ulverston suc­ceeded Dalton as the most important town in Furness, but the rapid rise of Barrow within recent years has relegated it to quite a secondary place. Formerly it had a consider­able trade in linens, checks, and ginghams, but this has greatly fallen off. It possesses, however, large iron and steel works (North Lonsdale Iron and Steel Company), a large chemical work, an extensive paper manufactory, a bolt manufactory, breweries, tanyards, and wooden hoop manufactories. The population of the urban sanitary dis­trict (area 3120 acres) in 1871 was 7607, and in 1881 it was 10,008.

Early in the 12th century the lordship of Ulverston came into the possession of Stephen, earl of Boulogne, afterwards king of England, by whom it was presented to the monks of Furness Abbey as part of the endowment. In 1196 the *ville of* Ulverston was granted by the abbot of Furness to William de Lancaster, first baron of Kendal. In 1280 it obtained the charter of a market. The town became escheated to the abbot of Furness as chief lord in 1342, but this escheatment was suspended by Edward II. in favour of John de Coupland, who captured David II. of Scotland at the battle of Durham. After his death it reverted to the abbey. It is now in the possession of the family of Buccleuch.

ULWAR, an alternative form of Alwar (*q.v.).*

ULYSSES. See Odysseus.

UMAÑ, a district town of Russia, in the south of the government of Kieff, is now a small industrial and trading town, with 15,400 inhabitants, many of whom are Jews, who carry on an active trade in the export of corn, spirits, &c. It has a remarkable park (290 acres), planted in 1796 by the orders of Count Potocki, in connexion with which a gardening school is maintained.

Umañ was founded towards the beginning of the 17th century as a fort against the raids of the Tartars. The Cossacks of the Ukraine, who kept it, revolted against their Polish rulers about 1665, and had to sustain a fierce siege. In 1674 it was plundered and most of its inhabitants murdered by the Ukrainians and Turks, during the wars for the hetmanship. In 1712 its last inhabitants were transferred by Peter I. to the left bank of the Dnieper. But by the end of the 18th century, when it again became the property of the Potockis, it was repeopled and became one of the busiest trading towns of Little Russia. In 1768, when the Cossacks re­volted anew against their Polish serf proprietors, they took Umañ and murdered most of its inhabitants.

UMBALLA, au alternative form of Ambálá (*q.v.).*

UMBER. See Pigments.

UMBRELLA now means a portable protector from rain, while the name parasol is given to the generally smaller, lighter, and more fanciful article carried by ladies as a sun-shade. But primarily the umbrella (*ombrella,* Ital. dim. from Lat. *umbra,* shade) was a sun-shade alone,—its original home having been in hot brilliant climates. In Eastern countries from the earliest times the umbrella was one of the insignia of royalty and power. On the sculptured remains of ancient Nineveh and Egypt there are representations of kings and sometimes of lesser potentates going in procession with an umbrella carried over their heads ; and throughout Asia the umbrella had, and still has, something of the same significance. The Mahratta princes of India had among their titles “ lord of