

in its foul state had given very obvious indications of both sulphur and ammonia; but neither of these substances could be detected after its spontaneous depuration.

The source of these new saline bodies is referrible to the organic substances, chiefly of an animal nature, which are so copiously deposited in the Thames. The depurating process may be denominated a species of fermentation, in which the softer and more soluble animal compounds act as the ferment, and are themselves destroyed, while the salts that were attached to them are left behind. Hence, the more foul the water the more complete the depuration; and it is on this principle that the popular opinion of the peculiar fitness of Thames water for being used at sea may be explained; its extreme impurity inducing a sufficient degree of fermentation to effect the removal of all those substances which might induce any future renewal of that process.

*On the Composition of Chloride of Barium.* By Edward Turner, M.D. Professor of Chemistry in the University of London. Communicated by Dr. Dionysius Lardner, F.R.S. Read May 14, 1829. [*Phil. Trans.* 1829, p. 291.]

The frequent employment of chloride of barium in delicate chemical investigations, renders an exact knowledge of its composition peculiarly desirable; and this has become a more important object of inquiry since it has been made by Dr. Thomson the basis of his calculations of the chemical equivalents of sulphuric acid, and of thirteen metals and their protoxides. He has deduced from his experiments with the chloride of barium the number 36 as the equivalent of chlorine; 70 as that of barium; and 78 as that of baryta; whence the equivalent of the chloride of barium would be 106; and accordingly, on mixing this quantity of the chloride with 88 parts of sulphate of potash, each being previously dissolved in separate portions of distilled water, he finds a complete double decomposition has taken place; the resulting sulphate of baryta, reduced to dryness, weighing 118 parts, and the muriate of potash yielding 76 parts of chloride of potassium. Hence he infers that 40 is the equivalent number for sulphuric acid, and 48 that for potash. Berzelius, however, maintained that this experiment, as well as the deductions from it, are not exact. Dr. Thomson having, in consequence of Berzelius's objections, repeated his experiments, still asserts their accuracy. The author of the present paper investigated the subject with the greatest care, employing materials in a state of perfect purity, and obtained results which coincided with those of Berzelius. He details the precautions he took for ensuring the conditions of perfect purity in the substances with which his experiments were made, and to the neglect of which he traces some of the errors which he imputes to Dr. Thomson's analysis. But there exists also a more radical cause of error in the method employed by that chemist; for Dr. Turner finds that when solutions of muriate of baryta and of sulphate of potash

are mixed together, a small portion of the latter salt adheres tenaciously to the sulphate of baryta, which is precipitated, and escapes decomposition. By employing different processes the author avoids this source of fallacy; first, from the chloride of barium, previously dissolved in water, he throws down sulphate of baryta by adding sulphuric acid; and, secondly, he effects a precipitation from a similar solution of the chloride, by nitrate of silver, and infers the quantity of chloride from that of the fused horn-silver obtained, having previously determined, by a separate series of experiments, the exact composition of horn-silver. The conclusion he draws from his researches is, that 100 parts of chloride of barium correspond to 137·63 parts of the chloride of silver, which latter substance contains 34·016 parts of chlorine, and therefore leaves for the proportion of barium 65·984 parts. The real equivalent of barium, however, will depend upon that of chlorine, which is itself not yet satisfactorily determined.

*On a new Series of periodical Colours produced by the grooved Surfaces of Metallic and Transparent Bodies.* By David Brewster, LL.D. F.R.S. L. & E. Read May 21, 1829. [*Phil. Trans.* 1829, p. 301.]

The author, having received from Mr. Barton in the year 1822 some fine specimens of his Iris ornaments, undertook a series of experiments on the action of grooved surfaces upon light, of which he communicated an account to the Royal Society of Edinburgh in the following year. The investigation having since been taken up by Mr. Fraunhofer, the author had desisted from pursuing it until lately, when he learned that the phenomena which had principally occupied his attention had escaped the notice of this philosopher. The image of a candle seen by reflexion, from a flat and polished metallic surface, covered with equal and equidistant grooves, the plane of reflexion being parallel to the grooves, is accompanied with a row of prismatic images, arranged in a line perpendicular to the grooves. The colourless image of the candle is formed by the original portions of the metallic surface, which have been left between the grooves, while the prismatic images are formed by the sides of the grooves themselves. This is rendered evident to the eye by varying the proportion between these two parts of the surface. The general phenomena of the prismatic images, such as their distance from the ordinary image, and the dispersion of their colours, depend entirely on the number of grooves and intervals which occupy a given breadth; and the laws of these phenomena have been accurately determined by Mr. Fraunhofer. Dr. Brewster, by examining the appearances with more attention, observed in some specimens a remarkable defalcation of particular colours, varying with the angle of incidence, and sometimes affecting one of the images and not the others; in some cases even the image reflected from the original surface of the steel was slightly coloured, its tint having a