becoming common, and is by no means a bad one, provided it be well done. We regret that we cannot say this much for the little work before us; for, although the matter is pretty well selected, and the plan of the work good, it is not unfrequently disfigured by obscurity, bad grammar, and plagiarism.* Such a passage as the following is downright nonsense :—

> It may not here be deemed quite out of place to caution amateurs and others, desirous of obtaining satisfactory results, against the purchase of their materials, &c., at establishments where the exorbitant prices charged, or the numerous adulterations practised, render the efforts of the most careful manipulator worse than useless, and in many cases even the obtaining of a picture a matter of chance, which must always end in failure and disappointment.

In what possible manner can high prices, however undesirable in an economic sense, render the efforts of the manipulator worse than useless?

THE ROYAL YACHT AT THE NORE. Photographed by F. Haes. London: McLean and Haes.

Mr. Haes has sent us a very pretty vignetted photograph of the Royal yacht, as she lay at the Nore, all her colours flying, with the Princess Alexandra on board. It is one of the best pictures taken on the occasion, which we have seen, although it lacks the action which gives interest to some of Mr. Blanchard's pictures of the same occasion.

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PHOTOGRAPHIC CHEMICALS:

Their Manufacture, Adulteration, and Analysis.

Sesquioxide of chromium is not only interesting on account of its being the tinctorial result of a very ingenious photographic process, in which bichromate of potash is reduced by the agency of light, but it is of value to photographers on account of its beautiful colour, which has caused it to be employed as a pigment. There are many ways of preparing this oxide, and as each process gives it in a slightly different physical condition, and therefore of a somewhat different tint, we will briefly describe some of the most approved methods.

Chromate of potash is dissolved in water to form a saturated solution; to this nitrate of suboxide of mercury is added until the precipitate ceases to fall. The liquid is then gently warmed and filtered.

The chromate of mercury is to be well washed and allowed to dry. It is then introduced into a glass retort and gentle heat applied. The hydroscopic water goes off at first and afterwards the salt begins to decompose. Mercury and oxygen gas are given off; the mercury condenses in the receiver, and sesquioxide of chromium is left behind, of a fine green colour. Another way to prepare this oxide is, to prepare a saturated solution of chromate or bichromate of potash and then to add a boiling solution of pentasulphide of potassium, to the boiling liquid, until no more oxide of chromium is precipitated. The reaction in this case is somewhat complicated: the sulphur is oxidized by half the oxygen contained in the chromic acid and is converted into sulphuric acid, which unites with the potash forming sulphate of potash, whilst the sesquioxide of chromium is precipitated. Some persons use pentasulphide of calcium for this process instead of pentasulphide of potassium, and maintain that it gives a brighter coloured oxide of chromium; in the latter case, however, it is liable to be contaminated with sulphate of lime. A third process, which is said to give a green of a peculiarly splendid colour, is the following:—Boil a solution of chromate of potash with sulphur until green oxide of chromium ceases to be precipitated; then filter and wash the chromic oxide till all soluble matter is removed; transfer to a dish or flask and boil in hydrochloric acid until it has dissolved with formation of a brilliant emerald green solution of sesqui-chloride of chromium. Evaporate this solution to dryness, and ignite in a shallow dish freely exposed to the air. Hydrochloric acid will be driven off, and a beautifully coloured sesquioxide will be left behind.

Lastly, we will give a method proposed by Guignet for preparing a chrome green of a very rich and pure colour. A mixture of three parts of boracic acid and one part of bichromate of potash is calcined at a temperature of about 300° C. An evolution of water and oxygen gas is observed, and there is formed a double borate of sesquioxide of chromium and potash. This salt, which is stable at the ordinary temperature, is decomposed by water giving biborate of potash and sesquioxide of chromium. The latter body in the nascent state combines with water and forms a hydrated sesquioxide of a remarkably fine colour. This is separated from the biborate of potash by decantation and washing, and the remaining chrome green is allowed to dry at the ordinary temperature. This pigment is being largely used amongst artists on account of its beauty and brilliancy. The colour is very solid, and it has the valuable property of looking equally beautiful by gas or candle light as it does by daylight—the green colour not changing to blue as is the case with many pigments. Sesquioxide of chromium may also be obtained in a very curious form by the decomposition of bichromate of ammonia. A quantity of crystallized chromic acid is dissolved in water and divided into two equal parts, one portion is then neutralised with ammonia, the other portion added, and the whole evaporated over oil of vitriol. When the solution becomes sufficiently strong, the bichromate of ammonia separates in the form of large cherry-red crystals, which are collected by decantation, drained on bibulous paper, and dried at a gentle heat. On exposing a small portion of this salt to the heat of a spirit lamp in a platinum dish, a very energetic action takes place, accompanied by strong incandescence, and green bulky masses of chromic oxide shoot out in every direction, exactly resembling ordinary dried green tea leaves.

Sesquioxide of chromium possesses another property which renders it of interest to photographers. After it has been ignited it may be considered as being practically unaffected by any chemical reagent. It is, on this account, of the greatest value for colouring paper pulp, from which bank-notes, or important legal documents, are to be made. The green tint of the paper renders them incapable of being copied photographically, whilst the unalterability of the sesquioxide of chromium prevents the paper from being bleached by chemical means before taking the photograph. There is only one objection to paper tinted in this manner. The oxide of chromium is so intensely hard that it rapidly wears away the pens employed for writing on paper tinted with it. We are informed that the best osm-iridium-pointed gold pens become spoilt after being used for a few days in writing signatures on notes made of this paper.

The next metal which demands our notice, by reason of its photographic capabilities, is uranium. This formerly was looked upon as extremely rare, but of late years it has been procured in more abundance, and its salts are now to be met with, at a moderate price, at most operative chemists. The common ore of uranium is the mineral pitchblende. The composition of this is most complicated, for besides the uranium it may contain no less than twenty other elementary bodies, all of which have to be separated by complicated chemical processes. It would be quite out of the question for our readers, unless they possess more extensive chemical knowledge and more complete laboratory arrangements than fall to the lot of photographers generally, to attempt to prepare uranium compounds from the ore direct. The salt usually met with in the shops is the nitrate of uranium, a compound of nitric acid with sesquioxide of uranium crystallized with six atoms of water, the formula being :—

$$U_2 O_3, NO_5 + 6Aq.$$

It is prepared by dissolving any oxide of uranium in diluted nitric acid, and evaporating the solution to the crystallizing

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* In both the works on photography, we notice in this number, our Year Book is laid under contribution, in some cases freely, without any acknowledgment.