

$\Phi_{I_2} = 0.49$; after bubbling pure, oxygen-free nitrogen through the solution, $\Phi_{I_2} = 0.42$; on distilling and freezing out *in vacuo*, $\Phi_{I_2} = 0.38$. A more extensive distillation *in vacuo* was then undertaken: the solution was transferred by evaporation and condensation from one vessel to another at least six times. It was then found that although the amount of light absorbed was the same as before for the same concentration, the yield of iodine was practically negligible, $\Phi_{I_2} = 0$. As soon as the solution was opened to the air and oxygen allowed to dissolve, iodine began to form at the same rate as before.

We repeated the photolyses in hexane of such iodides as methyl, ethyl, *iso*-amyl, iodobenzene and *p*-iodotoluene in the presence of oxygen, where we found $\Phi_{I_2} \sim 0.5$, and after extensive removal of oxygen, $\Phi_{I_2} < 0.05$. If we accept the evidence derived from a study of the absorption spectra of such compounds that rupture of the C—I bond follows on the light absorption, we can only assume that negligible quantum yields are due to recombination of the radicals, *R*, with the iodine atoms. Does this recombination take place by the formerly accepted mechanism of Franck-Rabinowitsch⁴? If the dissolved oxygen reacts with the radical according to accepted ideas⁵, the radical and the iodine atom must remain uncombined and surrounded by a sheath of solvent molecules for a relatively long time to enable such reactions to take place. One of us (T. I.) pointed this out some years ago⁶ in a criticism of Bamford and Norrish's interpretation of ketone photolysis in hexane solution⁷.

If the recombination does not take place by a Franck-Rabinowitsch mechanism, we must assume that the reaction $R + R = RR$ is a very rare one compared with the reaction $R + I = RI$. When the oxygen concentration is sufficiently high, the reaction $R + O_2 = RO_2$, etc., becomes of importance. Oxygen has a fairly high solubility in hydrocarbons⁸, and its removal is evidently not easy. These considerations apply, *mutatis mutandis*, to the photolysis in solution of other kinds of substances involving radicals susceptible to oxidation. It does not necessarily follow that gaseous products will be formed, and that evidence of photochemical change will be discovered by micro-analysis of evolved gases. Minute amounts of oxidized and condensation products would have to be looked for. Iodine betrays its presence, even in small amounts, by its colour, and its analytical determination is relatively easy. That is why this phenomenon has been so readily detected in the case of the iodides. At higher temperatures the solubility of oxygen is less, and we find increasing reactivity of the radical with the hydrocarbon solvent, where the activation energy must be higher than that required for the oxidation. More experimental details and theoretical treatment of the results of these investigations will be published soon.

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¹ For example, Rollefson and Burton, "Photochemistry" (1942).

² Dickinson, *Chem. Rev.*, **17**, 416 (1935).

³ Discuss. Farad. Soc., No. 2, 228 (1947).

⁴ *Trans. Farad. Soc.*, **30**, 120 (1934).

⁵ Blaedel, Ogg and Leighton, *J. Amer. Chem. Soc.*, **64**, 2499 (1942).

⁶ *Nature*, **150**, 579 (1942).

⁷ *J. Chem. Soc.*, 1531, 1544 (1938).

⁸ Gniewasz and Walfisz, *Z. phys. Chem.*, **1**, 70 (1887).

Monoclinic Thorium Silicate

THE name 'huttonite' is proposed for a newly recognized monoclinic mineral of the composition $ThSiO_4$. It has been isolated in minute grains from beach sand of South Westland, New Zealand, by Prof. C. Osborne Hutton, of Stanford University. Its optical properties are: $\alpha = 1.898$, $\beta = 1.900$, $\gamma = 1.922$; dispersion $\rho < \gamma$, moderate; $2V = 25^\circ$ (measured); $Y \parallel b$, Z near c ; colourless to very pale cream. X-ray study by means of powder, rotation and Weissenberg patterns shows that huttonite is isostructural with monazite. Space group $C2_2^5 - P2_1/n$; $a_0 = 6.80$ A., $b_0 = 6.96$ A., $c_0 = 5.54$ A., $\beta = 104^\circ 55'$. The measured density is 7.1 ± 0.1 . The calculated density, corresponding to a cell content of $4(ThSiO_4)$, is 7.18.

A full description has been submitted to the *American Mineralogist*.

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The Sulphatase of 'Clarase': Inhibition, Inactivation and Purification

THE optimal conditions and specificity of the enzyme sulphatase of 'clarase' have been described in a previous communication¹. The method then used of measuring the activity of the enzyme by the gravimetric estimation of sulphate liberated from the substrate has now been abandoned, and a new colorimetric method adopted. In this the amount of phenol set free from the substrate (potassium phenylsulphate) in the course of enzymic hydrolysis is determined, as was done by King and Armstrong² for the determination of phosphatase.

Inhibition. The influence of various substances known to be enzyme inhibitors has been examined, as well as that of other compounds not necessarily regarded as such. Of all the substances tested, phenylhydrazine proved to be the most powerful inhibitor of the sulphatase of 'clarase'. Even at a concentration of 10^{-6} M, phenylhydrazine produces a 25 per cent inhibition, and when its concentration is raised to 10^{-5} M, the sulphatase activity ceases completely. Other inhibitors of the sulphatase, in order of decreasing inhibitory action, are named in the accompanying table.

ACTION OF INHIBITORS ON SULPHATASE OF 'CLARASE'

Inhibitor	Molar concentration	% Inhibition
Sodium cyanide	10^{-4}	100
Silver nitrate	10^{-3}	100
Semicarbazide	10^{-3}	77
Lead acetate	10^{-3}	44
Potassium hydrogen phosphate	10^{-3}	25

Other substances, such as barium chloride, ethyl alcohol and strontium nitrate, had no inhibitory effect even at a concentration of 10^{-3} M.

Inactivation. Sulphatase of 'clarase' is very sensitive to low pH. At pH 3 it is irreversibly inactivated after ten minutes, and after five minutes an 80 per cent inactivation of the enzyme occurs.

Purification. A partial purification of the sulphatase of 'clarase' has been achieved by means of fractional precipitation with ammonium sulphate.