above, it is essential to test for X-rays, and to shield against them if they present a hazard to personnel.

J. F. STRACHAN
N. L. HARRIS

Research Laboratories,
The General Electric Co., Ltd.,
Wembley.
July 12.

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Existence of a Non-Electrostatic Stabilizing Factor in Hydrophobic Selenium Hydrosols

IT is well known that the stability factor of hydrophobic sols decreases, at first, exponentially with the ionic strength of the solution, and reaches, rather suddenly, its limiting value for a certain concentration C_1 of the coagulating electrolyte[1]. For concentrations lower than C_1 we have the so-called 'slow coagulation'; the interaction energy consists of long-range electrical repulsions, dependent on ionic strength, and of Van der Waals attractions. For concentrations higher than C_1, the electrical repulsions have practically disappeared[2] and we have 'rapid coagulation'.

The kinetics of rapid coagulation have been studied theoretically. Each particle is assumed to be surrounded by a sphere of attraction having a radius r. If the centre of a second particle penetrates into this sphere of attraction, the two coalesce irreversibly. Treating the problem as one of simple diffusion, von Smoluchowski[3] showed that the disappearance of primary particles must initially be a bimolecular process, characterized by a kinetic constant :

$$k_{1\cdot1} = \frac{4kT}{3\eta} \cdot \frac{r}{a}$$

where k is Boltzmann constant, T is the absolute temperature, η is the viscosity of the medium and a is the radius of the particles.

The ratio r/a must obviously have a value of at least 2, and Hamaker[4] has shown that it should be slightly larger. Experimental values between 2 and 3 have been found in a number of cases.

However, for selenium hydrosols, Kruyt and Van Arkel[5] found very small values ranging from 0·55 to 1·3. With sols prepared in a similar manner, we have confirmed their results, obtaining values between 0·58 and 1·06, as shown in Table 1. It therefore appears that for selenium sols, some repulsive force unconnected with the charge of the double layer must be taken into account.

We have found that the abnormal stability is due to an impurity, probably hydrazine hydrate, which is used as a reducing agent for preparing the sols.

Table 1. EXPERIMENTAL VALUES FOR THE RATIO r/a, WITH NON-DIALYSED SELENIUM HYDROSOLS

Sol concentration (No. of particles/cm.³)	Diameter of particles (mμ)	r/a
0·62 × 10⁹	188	1·06
0·96	168	0·84
3·14	142	0·58
1·57	142	0·62
0·78	142	0·77

Table 2. VARIATION OF THE RATIO r/a DURING PURIFICATION OF A SELENIUM HYDROSOL

Time of electrodialysis (hr.)	Conductivity of the sol (ohm⁻¹ cm.⁻¹)	r/a
0	133·0 × 10⁻⁶	1·5
22·5	118·0	1·8
29·75	95·5	2·1
46·0	57·0	2·3
71·0	8·8	2·2
78·5	8·0	(3·9)
118·5	6·5	2·1
167·0	4·2	2·2

The numerical data given in Table 2 show clearly that when the colloidal solutions are purified by prolonged electrodialysis, the ratio r/a increases regularly with the purity, as measured by specific conductivity.

In another series, r/a varied from 0·44 to 2·5 during purification.

It must be stressed that the purification has practically no influence on the stability factor in the region of slow coagulation, or on the limiting concentration C_1. Therefore, it does not affect the Stern potential.

A tentative explanation of this behaviour is that each micelle is covered by an adsorbed layer of hydrazine, and this strongly polar substance modifies the local structure of water in the immediate neighbourhood of the colloidal particle. The 'hydration' shell may cause a repulsive action of entropic origin—a steric hindrance.

L. DE BROUCKÈRE
A. WATILLON
F. VAN GRUNDERBEECK

Laboratoire de Chimie Analytique,
Université libre de Bruxelles.
March 24.

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Synthesis of 4-Methylumbelliferone β-D-Glucuronide, a Substrate for the Fluorimetric Assay of β-Glucuronidase

AT the present time there is considerable demand for a suitable synthetic substrate for the routine assay of β-glucuronidase. The most common assay method employs phenolphthalein glucuronide isolated from rabbit urine[1]. However, the preparation of 4-methylumbelliferone glucuronide from rabbit urine and its use in the fluorimetric assay of β-glucuronidase have been recently described[2]. This substrate promises certain advantages over phenolphthalein glucuronide, and it is easy to synthesize by the method previously employed for (−)-menthol[3] and phenol[4] β-D-glucuronides.

4-Methylumbelliferone β-D-glucoside hemihydrate[5] (1·5 gm.) in 60 ml. water was maintained at 90° C. and vigorously stirred. Oxygen was passed into the solution through a sintered glass disk, and freshly reduced platinum catalyst[3] (0·4 gm.) was added. The pH was kept between 7 and 9 throughout the oxidation by the addition of 0·5 N sodium bicarb-