

## A Comparison of the Coagulation Phenomena of Dialysed and Fresh Prepared Silver Iodide Sols

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The coagulation values of potassium-, barium-, and lanthanum nitrate were compared for dialysed sols of silver iodide and silver iodide sols *in statu nascendi*. It has been shown that the behaviour of dialysed sols against these coagulating ions is practically the same as the behaviour of the sols *in statu nascendi*.

Recently, employing the experimental technique of working with silver halide sols *in statu nascendi*, much information has been obtained giving the possibility of a better insight in the processes of coagulation<sup>1</sup>. Thus, it was observed that the concentration of the stabilizing ions plays an important role in regard to the stability of sols. We performed systematical experiments on the electrolyte coagulation using the mono-, di-, and trivalent cations, varying the concentration of the stabilizing ion and the concentration of the sol and obtained characteristic coagulation curves. A part of the results of these investigations has been published previously<sup>2</sup>.

However, it could be supposed that these results are specific for sols *in statu nascendi*, and that the dialysed sols would give quite a different picture. Therefore, it would be interesting to compare our results of coagulation experiments obtained with sols *in statu nascendi* with the coagulation values for the pure sols, where the impurities have been removed in the course of dialysis. Unfortunately, there are only few papers dealing systematically with the coagulation of dialysed sols in spite of the fact that most coagulation values were obtained on dialysed sols. For our purposes the data of Kruyt and Klompè<sup>3</sup> have been very useful.

### EXPERIMENTAL

We prepared our sols as described previously<sup>4</sup>. The silver nitrate solutions of constant concentrations (0.001N — 0.00002N) were mixed with the solution which contained equimolar amounts of potassium iodide and nitric acid, but always in a definite excess to silver nitrate. Neutral electrolytes were also added to the halide solutions. As the sols were negatively charged the nitrates of potassium, barium, and lanthanum were used.

The coagulation effects of potassium, barium, and lanthanum nitrate are shown on Fig. 1. We plot the negative logarithmic values of the excess of potassium iodide ( $\rho I$ ) versus coagulation values of the counter ions. The coagulation values were obtained by extrapolating the 10-minutes tyndallometric values to zero turbidity. All concentrations were computed for the whole volume of the reaction mixture.

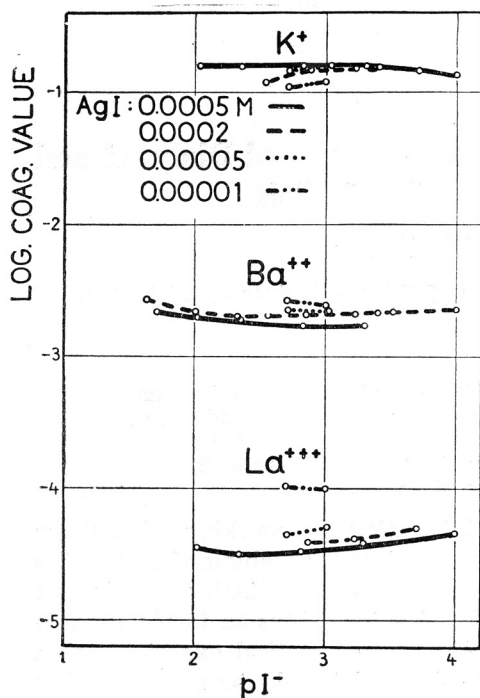


Fig. 1.

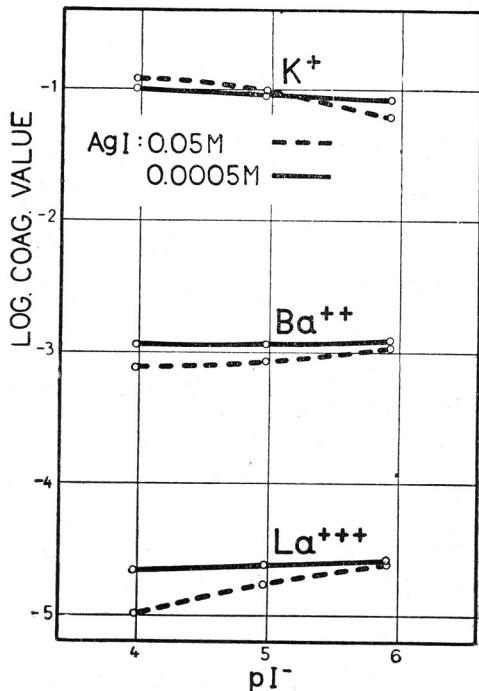


Fig. 2.

Fig. 1. Coagulation values of potassium-, barium-, and lanthanum nitrate for silver iodide sols *in statu nascendi* in presence of various concentrations iodide-ions.

Fig. 2. Coagulation values of potassium-, barium-, and lanthanum nitrate for dialysed sols of silver iodide in presence of various concentration of iodide-ions.

#### DISCUSSION

Kruyt and Klompè<sup>3</sup> examined also the stability of the negatively charged silver iodide sols as a function of the sol concentration and the concentration of the stabilizing ion. Their sols were prepared in the usual way and coagulated by silver nitrate. The coagulated sols were reprecipitated by addition of certain amounts of potassium iodide. By such treatment it was possible to avoid the change in the activity of iodide ions in the sol media, which may occur in the presence of the amionic particles. By further addition of potassium iodide sols of different pI-values were obtained (3.97, 4.96, and 5.58). The sols of various concentrations were prepared by dilution of a single concentrated sol; the pI-value remaining in each series the same. The coagulation values for K-, Ba-, and La nitrate were determined 18 hours after the addition of the neutral electrolyte. Their final coagulation values (taken from the Table 18 of the cited paper) are presented in the Fig. 2 in the same manner as our results on Fig. 1.

If the Fig. 1 and 2 are compared, it follows clearly that the results in both cases are practically the same. Not only the shape of the curve is the same, with the characteristic deviation in the region of low charge density

of the sols, but Fig. 2 may be considered as a continuation of Fig. 1. The differences in the coagulation values (which are low in the case of potassium and higher for barium and lanthanum) come as a consequence of different criteria in their determination. The values of Kruyt and Klompè are lower since they determined them 18 hours after the addition of neutral electrolytes and our values are taken from 10-minutes tyndallograms. The differences are not too big, because after 10 minutes the coagulation rate of silver iodide sols is rather low.

This agreement of Kruyt and Klompè's results with our experiments may serve as a further proof that in our investigations of the coagulation processes on silver halide sols *in statu nascendi*, we dealt with pure coagulation phenomena which were not essentially influenced by the presence of smaller or greater amounts of foreign ions. It is, therefore, possible to compare our results obtained on sols *in statu nascendi* with the results of other authors obtained on dialysed sols.

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## IZVOD

**Usporedni pregled koagulacije dijaliziranih solova srebrnog jodida i solova  
*in statu nascendi***

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Posljednjih je godina tehnikom rada *in statu nascendi* sa solovima srebrnih halogenida prikupljeno mnogo podataka o procesu koagulacije, pa je veoma zanimljivo, da se usporedi vladanje kod koagulacije solova *in statu nascendi* sa vladanjem dijaliziranih solova. Za tu svrhu osobito su prikladni podatci Kruya i Klompè<sup>3</sup>

o koagulacionim vrijednostima kalija, barija i lantana za dijalizirane solove srebrnog jodida različitih koncentracija i uz različite suviške jod-iona kao stabilizacionog iona. Uspoređivanjem tih podataka — prikazanih grafički tako, da su nanosene koagulacione vrijednosti u ovisnosti o količini slobodnog jod-iona — s podacima, što su ih autori dobili koagulacijom solova srebrnog jodida *in statu nascendi* kalijem, barijem i lantanom, jasno se vidi, da se i jedni i drugi solovi u ovom slučaju vladaju u biti jednako.

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