

New observations on the part played by pressure in chemical phenomena

M. Berthelot

To cite this article: M. Berthelot (1879) New observations on the part played by pressure in chemical phenomena, *Philosophical Magazine Series 5*, 7:40, 70-71, DOI: [10.1080/14786447908639558](https://doi.org/10.1080/14786447908639558)

To link to this article: <http://dx.doi.org/10.1080/14786447908639558>



Published online: 13 May 2009.



Submit your article to this journal [↗](#)



Article views: 2



View related articles [↗](#)

apparatus is discharged, every thing returns to the initial state: the liquid which had descended in the tube of the inner vessel rises again; and that which had risen in the tube of the outer case re-descends. We must therefore conclude that the internal capacity and the external volume increase during the charge of a Leyden jar.

To leave no doubt on the subject, I will review the objections which can be made to this conclusion.

(1) The effect cannot be attributed to a rise of temperature, since the discharge causes it to disappear immediately instead of increasing it.

(2) Electric pressure might be suggested as the cause; but that would be the same on both faces of the dielectric, and then it would produce a diminution of volume instead of the increase observed.

(3) It might also be said that the liquid does not perfectly wet the glass before the electrization, and that afterwards, in consequence of attraction, more intimate contact is produced, giving rise to an apparent contraction of the liquid. But then the same phenomenon ought to be produced for the exterior liquid—which does not take place.

(4) Again, different properties of the positive and negative armatures might be mentioned. But if the communications of the apparatus with the electrical machine be reversed, the direction of the phenomenon does not change.

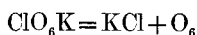
In short, it is established that, in a Leyden jar, the insulator undergoes, through the electrization, a dilatation which can neither be accounted for by a rise of temperature nor by an electric pressure. We therefore find ourselves in the presence of a new phenomenon; as to the interpretation that may be given of it, although several present themselves to the mind, it would be premature to discuss them.

M. Jamin, in presenting the above Note to the Academy, was anxious to acknowledge that, ten years since, M. Govi had made, and published in the *Actes de l'Académie de Turin*, the first part of the experiments of M. Duter. M. Govi observed that the internal volume seems to increase during the charging of a Leyden jar; and he attributed this effect to a contraction of the liquid which it contains; but he did not institute any experiment to show that the external volume is augmented. This is what M. Duter has done; and it has led him to a conclusion contrary to that of M. Govi—namely, that the effect observed is simply due to a dilatation of the dielectric case.—*Comptes Rendus de l'Académie des Sciences*, Nov. 23, 1878, tome lxxvii. pp. 828–830.

NEW OBSERVATIONS ON THE PART PLAYED BY PRESSURE IN
CHEMICAL PHENOMENA. BY M. BERTHELOT.

Permit me to call attention to a circumstance in the remarkable experiments of M. Pictet on the liquefaction of oxygen and hydrogen. Perhaps it will not be uninteresting to remark that the

decomposition of chlorate of potassium into oxygen and chloride of potassium, an exothermic reaction, and not limited by its inverse, is not arrested by a pressure of 320 atmospheres. In fact, from my measurements, the reaction



would liberate at the ordinary temperature $+11.0$. At about 400° , the chlorate being fused and the chloride solid, the amount liberated could not but be augmented.

It is the same with the decomposition of formate by hydrate of potass, the hydrogen continuing to be liberated even under a pressure of more than 600 atmospheres. Here, again, is an exothermic reaction not limited by its inverse. In fact the transformation of the system $\text{C}_2\text{HKO}_4 + \text{KHO}_2$ into $\text{C}_2\text{O}_5\text{K}_2 + \text{H}_2$ would liberate at the ordinary temperature

$$277.8 - 259.4 = 18.4 \text{ calories.}$$

At about 400° – 500° , all the substances being supposed to be fused, the heat disengaged would not be much modified; for the heats of fusion of the known salts but little exceed $+4$ calories, and the initial system comprises 2 fused molecules, the final system containing only 1.

Thus the exothermic reactions persist, whatever may be the amount of the pressure. It is nevertheless probable that the velocity of such a reaction is changed, and perhaps also the temperature at which it is effected; but the reaction itself does not cease to take place. This is a fresh proof in support of the opinions enunciated by the author of the present note, on a question so important to mechanical chemistry—opinions contested at first, but which derive fresh support from every new observation*.—*Annales de Chimie et de Physique*, October 1878, tome xv. p. 149.

ON AN AUTOMATIC CURRENT-REGULATOR. BY M. HOSPITALIER.

The apparatus which we have the honour to present to the Academy is composed of a resistance-coil wound in one layer only, the wire of which has been denuded along a generatrix of the spiral over a width of about 1 centimetre. A lever, somewhat convex, and forming a divider, is applied to the denuded part of the wire. This divider is attached at one of its extremities to an armature placed before an electro-magnet, in which the current circulates which is to be regulated. An antagonizing spring supports the lever at its other extremity. The circuit is formed by the resistance-coil, the lever, and the electromagnet. The apparatus being regulated for a determined intensity, the divider introduces into the circuit a certain number of turns of the coil. If the current increases in intensity, the electromagnet attracts its armature more strongly, the divider shifts its fulcrum and introduces into the circuit a greater number

* See *Chimie organique fondée sur la Synthèse*, t. ii. p. 349 (1860); *Annales de Chimie et de Physique*, 3^e sér. t. lxxvi. pp. 41 & 59, t. lxxviii. p. 239, and especially 4^e série, t. xviii. p. 95, and 5^e série, t. xii. p. 310, &c.