Thermodynamique

Coefficients calorimétriques définitions

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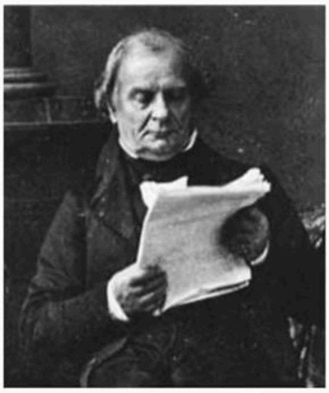
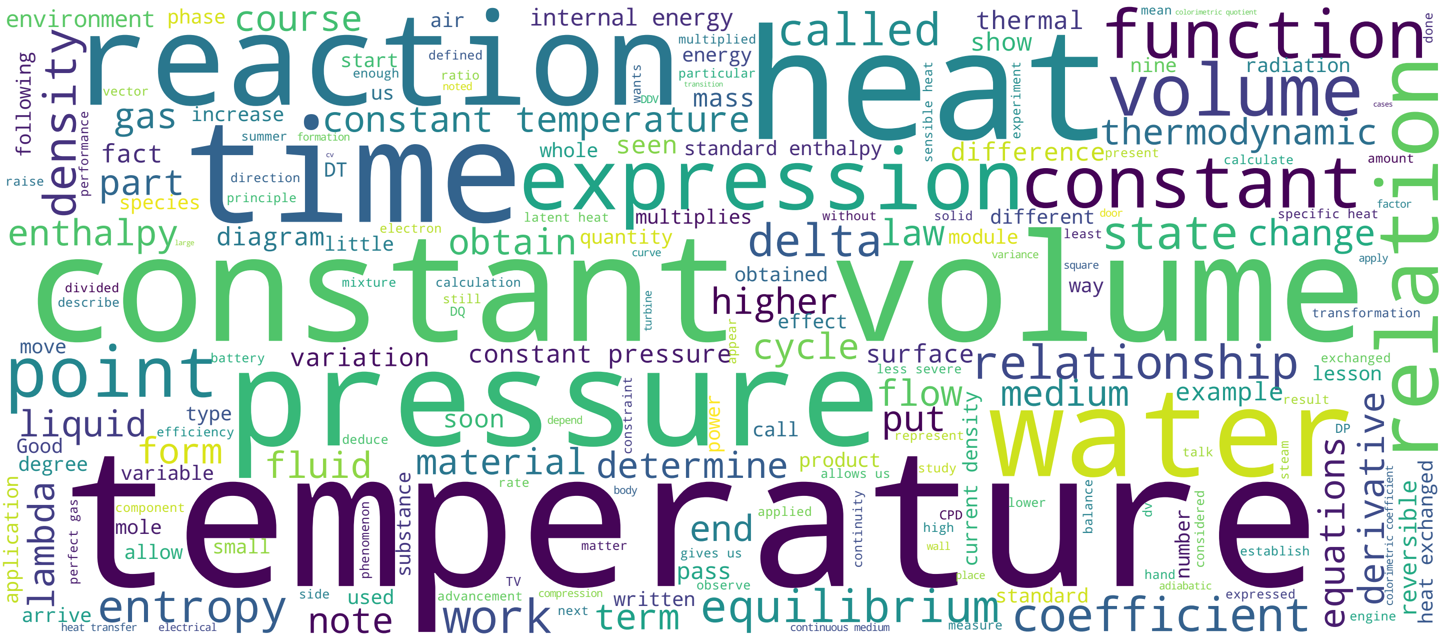
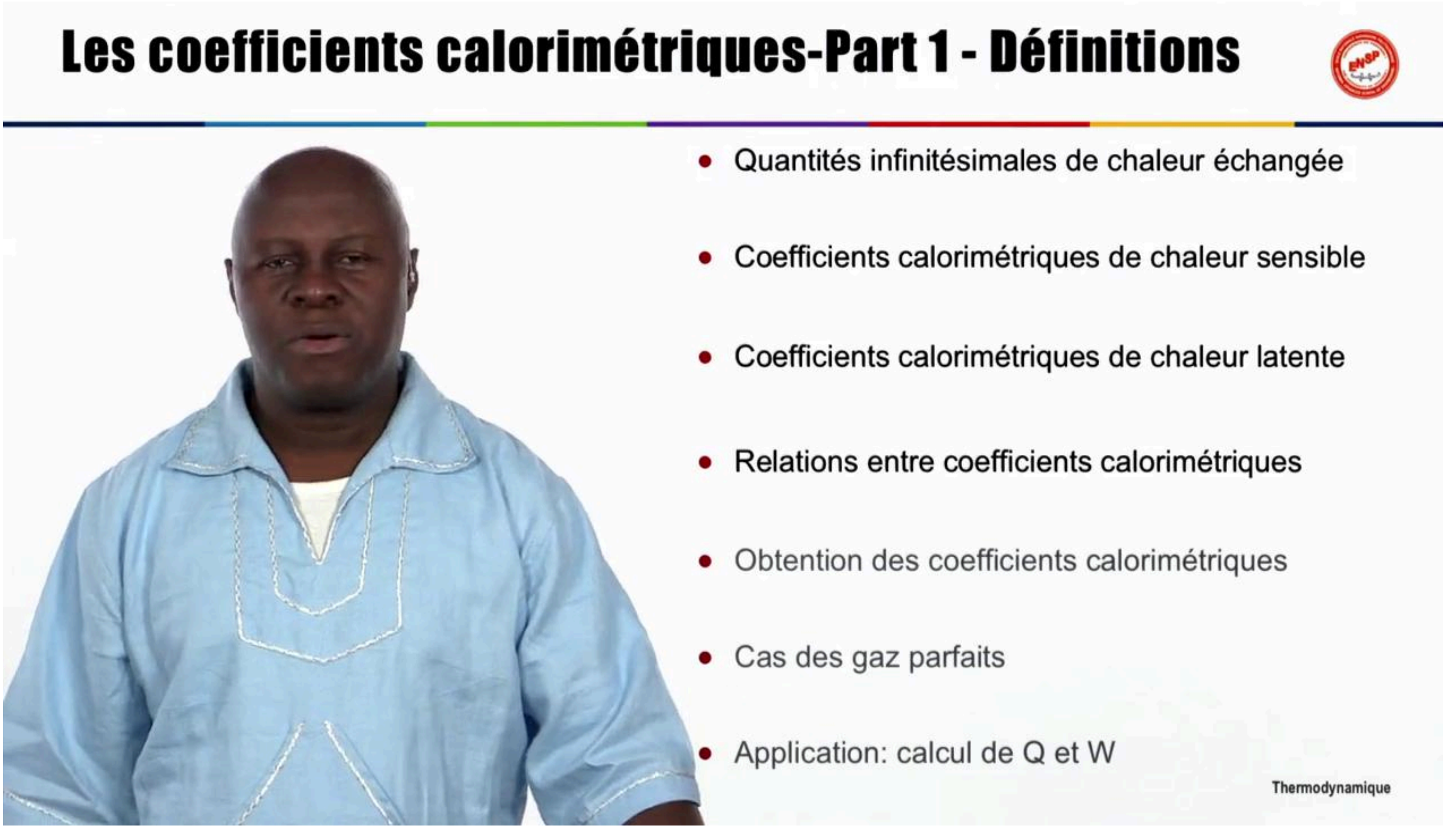


Emile Clapeyron, 1799-1864



Video

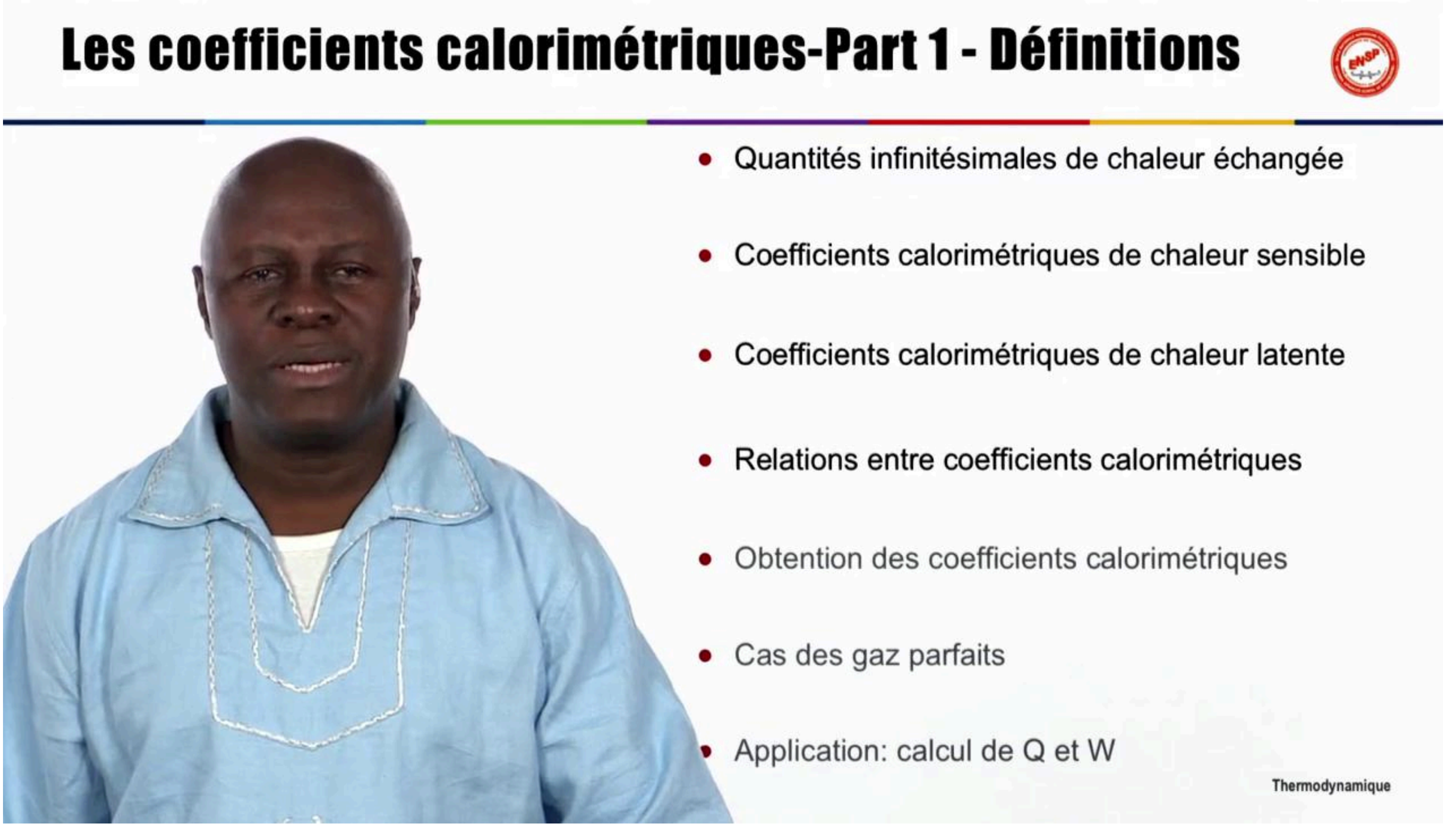


It is a great pleasure for me to contribute to the keyword siphon of thermodynamics coordinated by the Swiss Federal Institute of Technology in Lausanne, Switzerland. I am the ingenious doctor. Paul Salomon is a teacher at the School National Polytechnic School of Yaoundé in Cameroon. I have the honor to surprise you this time. On the themes. The colorimetric coefficients. Definition. In fact. The lesson on the race to the automatic extends throughout the game. Is the module the first one? At the end of this module. You will be able to. Determine or estimate the elementary quantities of heat exchange. This can. In the part of the undergrounds of this elementary entity of heat. Determine or define the velvety color quotient, particularly in installation. Let's make a difference between the coefficient colorimetric sensible heat and colorimetric heat quotient. The shade. Called in the definition of these two types of colorimetric cushions. You will then be able to. To establish the relationships that existed between these different mythical caloric quotients. This will be the end. Current models. Of course the modus vivendi of part two. She skated earlier. We will present.

Notes

Summary

0m 05s

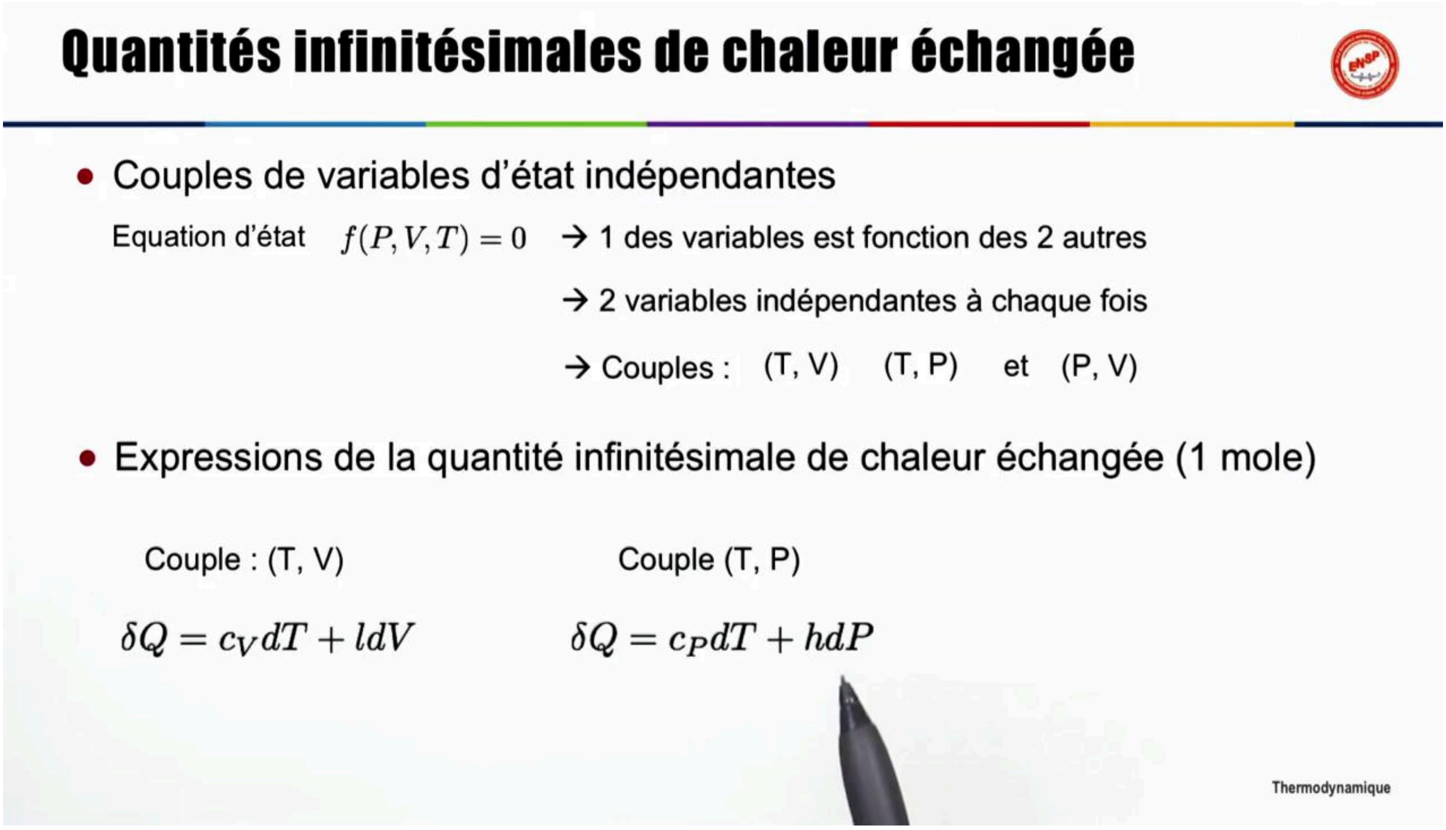


How are one obtained? Then, we will determine them for the particular case of perfect gases. It is the most famous case for its determination. So we'll have the third part. Which will be entirely dedicated to to the application of all that we have seen in colorimetry, especially the calculation that can exchange heat.

Notes

Summary

2m 01s

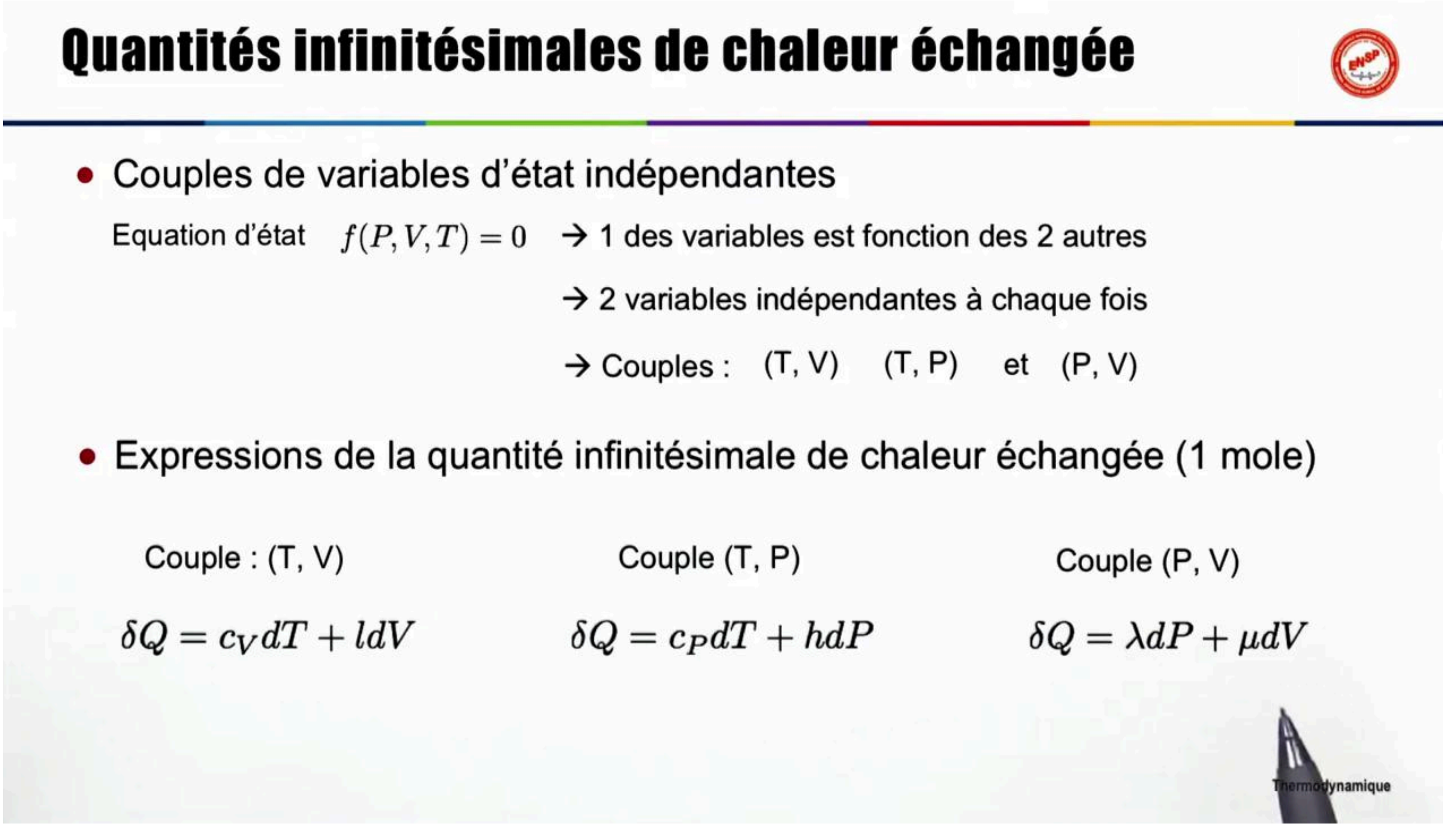


Let's talk about the infinitesimal amounts of heat exchanged. When we talk about infinitesimal quantity and quantity of matter. We will now address. An important concept. Independence of the State Mahlab two by two. We have seen that the valid state. Were linked together by the equation of state of the system. Who was in the form F of PVT equal to zero when we retained PVT as three valid steps. An easy thermodynamic shift of the swarms of this equation allows at any time to express one of the variables as a function of the other two. So we say. The variables are independent 2 by 2 at each time. Thus, we can choose as a couple of valid independent the couple temperature volume. The couple hits the pressure. But also the pressure volume couple used in a couple to give an estimate of the elementary quantity of heat exchanged. We will do it in the case of a mass equal to one mole of matter, the amount of heat exchanged when the torque of independent value is TV of the form, the elemental amount of Cu The higher the coefficient of T, the higher the coefficient of V. When the couple is valid independent, type, we have the quantity of elementary heat of change which is put in the form of a coefficient CPQ multiply dt, then a coefficient that multiplies d.

Notes

Summary

2m 30s



P. IP address, if we take into account the valid couple independent of PV. We have in the quinté of the elementary exchanged and the lambda formula d+ but dv. So for a basic quality of heat exchanged between the stimulus and the weight of the possible solutions to arrive at the automatic coefficient.

Notes

Summary

4m 28s

Coefficients calorimétriques de chaleur sensible

- Les coefficients calorimétriques

$$\left.\begin{aligned} \delta Q &= c_V dT + l dV \\ \delta Q &= c_P dT + h dP \\ \delta Q &= \lambda dP + \mu dV \end{aligned}\right| \longrightarrow \quad c_V,\ c_P,\ l,\ h,\ \lambda,\ et\ \mu$$

- Les coefficients calorimétriques de chaleur sensible

$$c_V = \frac{(\delta Q)_V}{dT} = \left.\frac{\partial U}{\partial T}\right)_V$$

Thermodynamique

Indeed, we will exploit the three expressions that we have seen earlier. Namely, as soon as the CVD was higher. As soon as the CPD was more HDP and DQ equal to the ADP blade. More dv. This law. The equations giving the amount of heat required. We can indeed define as colorimetric coefficient the six coefficients cv, cp, l, as lambda emus. Well among these six coefficients, we will now define or specify which will be considered as a calorie coefficient. The type of sensible heat, the calorimeter coefficient, the sensible heat are the colorimetric coefficient which links the exchanged heat to the variation of temperatures due to the effect of heat. Thus, it was the heat that was exchanged with the enemy within and which was accompanied by temperature variations. Thus, in this expression, we will have as coefficient chronometric heat sensitive to the cv coefficient. And not the mattress. Part of this equation that when the constant volume gives when dv is zero. To move forward with who is equal. Decided t on. Few in the country. Struggled to describe it. Constant volume divided by t. That we can do without the diluted form. Switch from clip to reach at constant volume. Cv. What is it?

Notes

Summary

4m 55s

Coefficients calorimétriques de chaleur sensible

- Les coefficients calorimétriques

$$\left.\begin{aligned}\delta Q &= c_V dT + l dV\\ \delta Q &= c_P dT + h dP\\ \delta Q &= \lambda dP + \mu dV\end{aligned}\right| \longrightarrow \quad c_V,\ c_P,\ l,\ h,\ \lambda,\ et\ \mu$$

- Les coefficients calorimétriques de chaleur sensible

$$c_V = \frac{(\delta Q)_V}{dT} = \left.\frac{\partial Q}{\partial T}\right)_V \quad \text{et} \quad c_P = \frac{(\delta Q)_P}{dT} = \left.\frac{\partial Q}{\partial T}\right)_P$$

Chaleur spécifique molaire à V = C^{te} — Chaleur spécifique molaire à P = C^{te}

Pose : $\frac{c_P}{c_V} = \gamma$

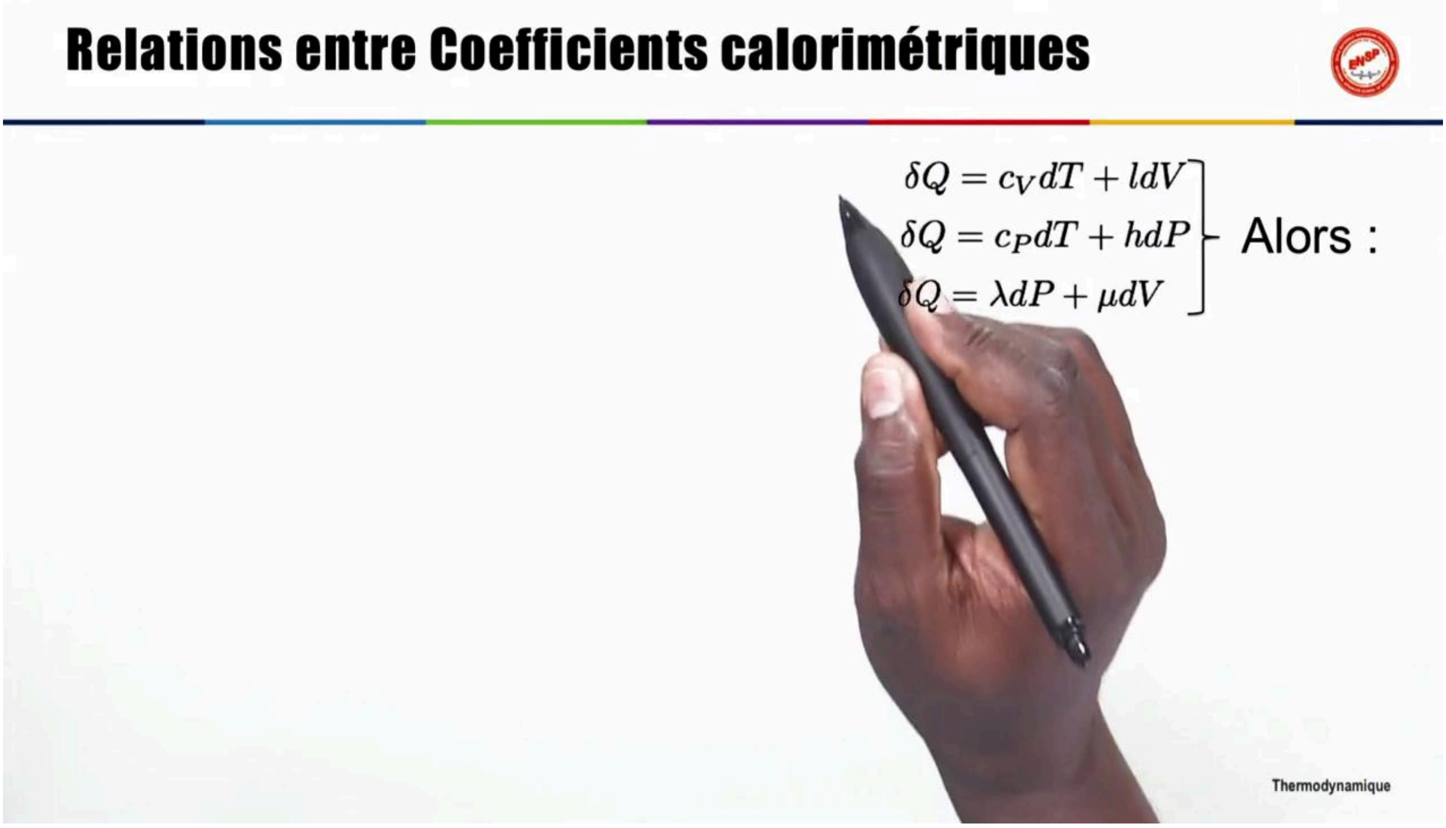
Thermodynamique

It's this business of sensitive heat. Is called that. The molar specific at constant volume. So we work on the basis of one mole of water, a molar quantity and this coefficient rose to the heat for in the name of heat molar sensitivity and obtain a constant volume. The second coefficient. So it is sensitive. And of course it's a CP. The observation of this equation shows us that when the constant pressure in the other is null, that is to say that on DD one is in CPD at the DQ. PMI LOSC indices pushed a consensus DD as an assumption formed as soon as DD after finding out what a CP was doing was called the molar specific heat at constant pressure. It is customary to only use the ratio CP on cv and that it is designated by the gamma coefficient. This is put to good use. After the cousins Carlos Limited and Chalosse.

Notes

Summary

6m 30s

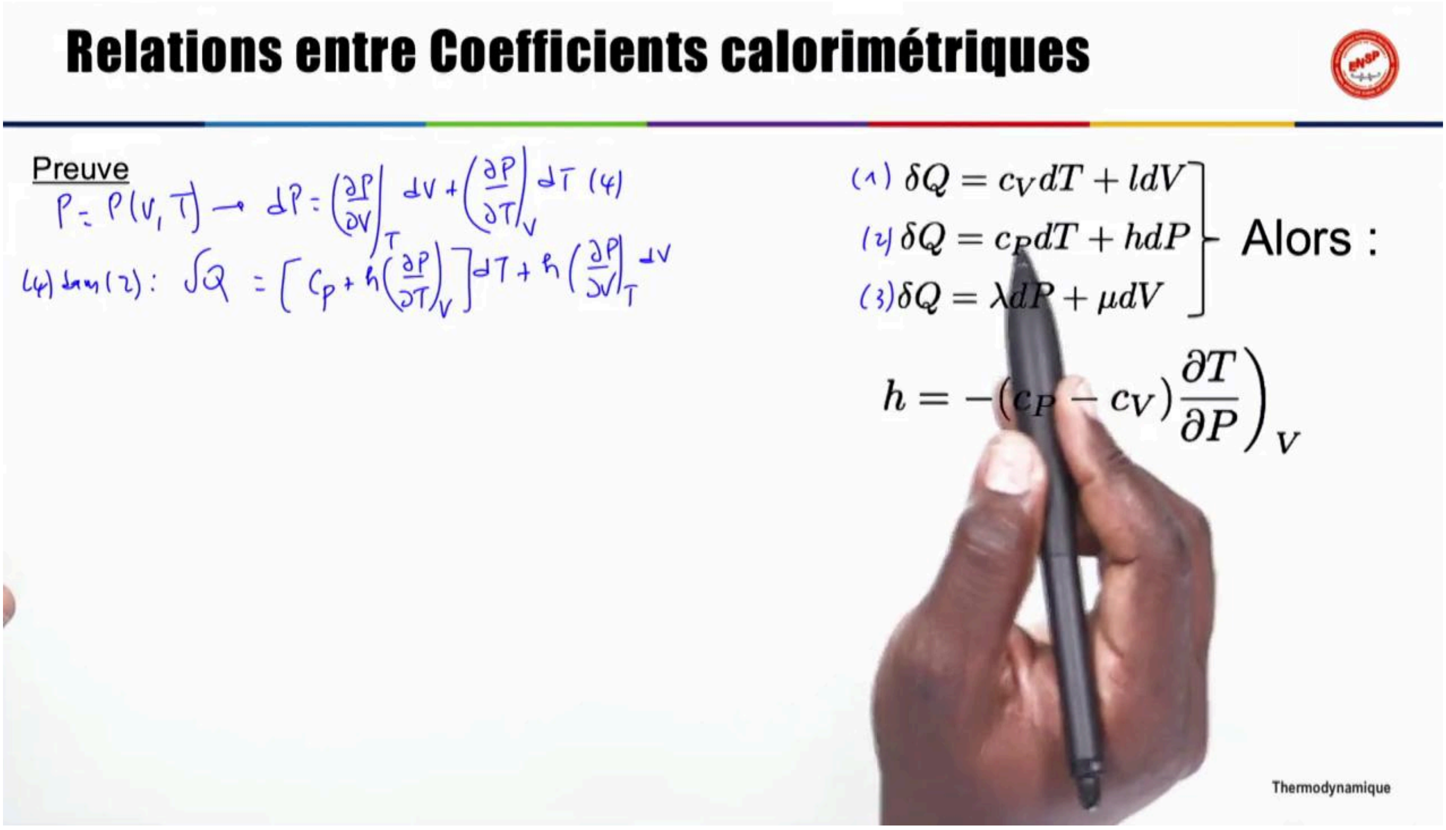


Then, of course, we go to the quotient because the trade of latent heat, the attention is always focused on the equations. Is this really a cottage exchange? Samuel but let go the trust and bcp. Who. Accompanies people from heat with to the end of the temperatures. Obviously the other coefficients that. But only of pressure and volume to accompany the scenes of heat. According to called the heat mileage cushion. Reach. And we have additional Moscovici. The factor is. Here. We also note that when the temperature constant it was at the dq dv of which it was there, the dq at constant temperature follows dv the second quotient and the quotient h. In this equation we obtain that when the temperature is constant at this state, the QD follows dp, i.e. the constant temperature DP. The third quotient is the lamda cousin. We also observe that when the constant volume lambda is equal to say that if dp the core is equal to intermediate volumes DP coefficients. Not the latent heat trade. It's a menu with constant cutting since now the different relationships that existed between Oceane Callot the mythical, always beating him on the three equations. As soon as the CVD was higher than I call me.

Notes

Summary

7m 42s



The equation. One. As soon as there is CPD, you have. DP that will be the fish of. As soon as it has the ADP blade higher than that, the equation all goes well. We show that with or from these equations, we no longer have the same h. The lock out was at the CP. For me it's V to go through constant volumes. Indeed. If we consider P as a function of volume and temperature, whose two independent variables VB, then we can write that the differential of P. And the derivative of P with respect to. Should pass by little compared to the volume of. At constant temperature. To raise and raise the temperature contribution. At constant summer volume. This equation you will call the PATH equation. That being one of them. Two. And it's there for. Well if we add equation four to equation two. Frame. In two. We are entitled to add dead ends to the equation. Two the cp dd. We'll put a factor in the soup. DD. Plus HDP, DP This absolute value there, it is twice DT, thus higher since the constant volume scope. The whole DT. Lacépède had become the only one to multiply. He was the Messiah. Therefore higher of P compared to V the constant temperature of V. Now this new equation, we will bring it closer to the rentals.

Notes

Summary

9m 31s

Relations entre Coefficients calorimétriques

Preuve

$P = P(V,T) \rightarrow dP = \left(\frac{\partial P}{\partial V}\right)_T dV + \left(\frac{\partial P}{\partial T}\right)_V dT \quad (4)$

(4) dans (2) : $\delta Q = \left[c_p + h\left(\frac{\partial P}{\partial T}\right)_V\right] dT + h\left(\frac{\partial P}{\partial V}\right)_T dV$

(1) : $\begin{cases} c_V = c_p + h\left(\frac{\partial P}{\partial T}\right)_V & (5) \\ l = h\left(\frac{\partial P}{\partial V}\right)_T & (6) \end{cases}$

(5) : $c_V - c_p = h\left(\frac{\partial P}{\partial T}\right)_V$

$\rightarrow h = (c_V - c_p) \times \frac{1}{\left(\frac{\partial P}{\partial T}\right)_V}$

$h = (c_V - c_p) \times \left(\frac{\partial T}{\partial P}\right)_V$

$$\left.\begin{aligned} (1)\ \delta Q &= c_V dT + l dV \\ (2)\ \delta Q &= c_P dT + h dP \\ (3)\ \delta Q &= \lambda dP + \mu dV \end{aligned}\right\} \text{Alors :}$$

$$h = -(c_P - c_V)\left.\frac{\partial T}{\partial P}\right)_V$$

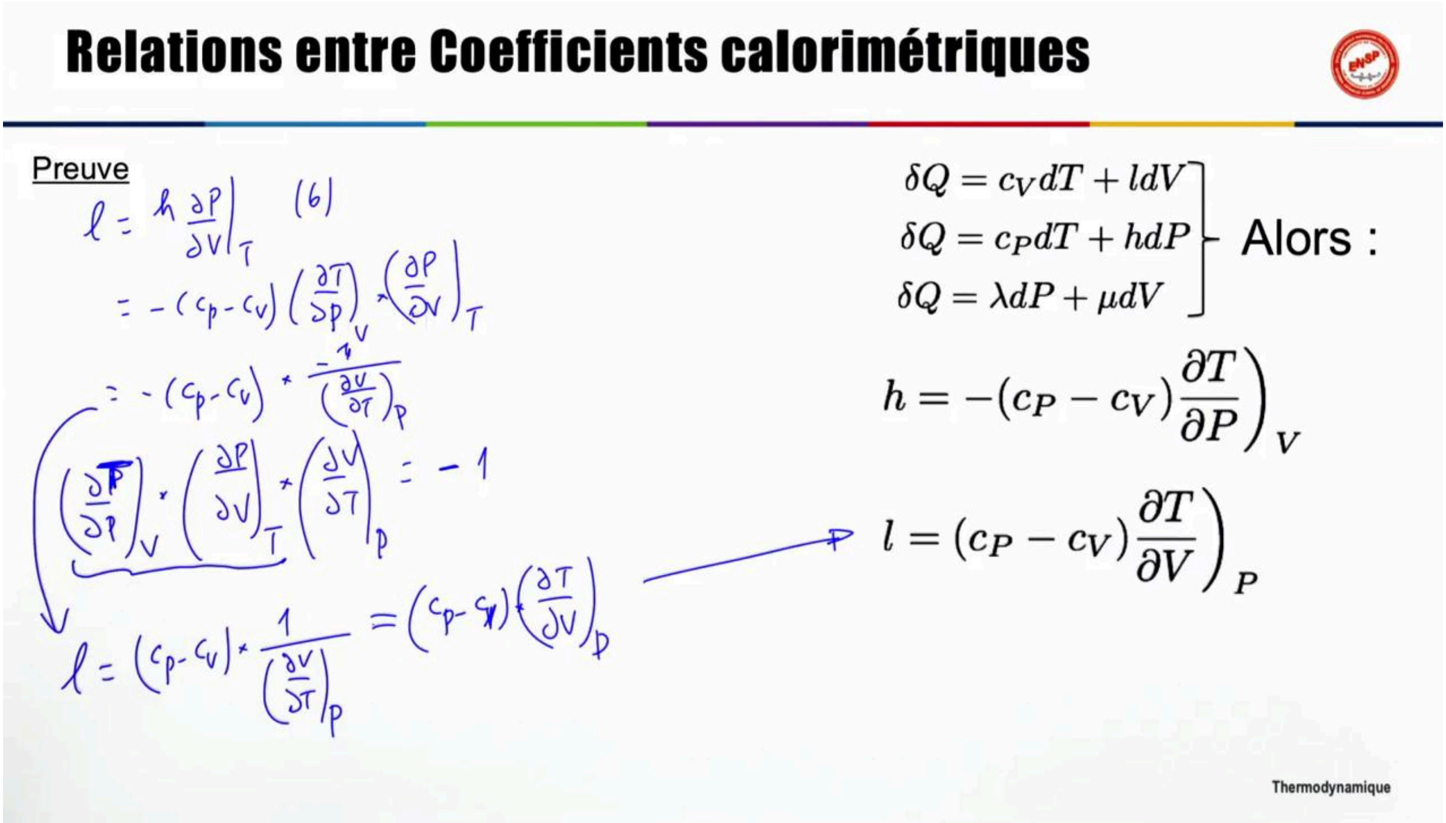
Thermodynamique

An identification therefore allows us to have. It was mega lascivious and the other one equal to it. So it is V equal to C+ s. High compared to constant volumes. And then there's the axe. He wants to p. Have you seen this equation, then called location five? And that's also the equation if. If we take in the equation five. It allows the Silver CP track to raise bays to the range at constant volume, i.e. equal to cv cp. Multiply su and exceed by at constant volumes and the possibility of exceeding it. It makes us write that the effect of these derivatives. To pass is to reverse the ballet. This is what TV Breizh gives us and that multiplies the wishes. Spending the summer typing a constant volume, a concern. And to get back to this equation, just reverse CP, CP and cv. We have the least. We have the property H which is equal to less CP less severe. The whole as Multiplier had to pass the hardness in relation to p constant volume. The second relationship between the coefficients has the automatic will use equality six to arrive at the following equality, namely.

Notes

Summary

11m 48s



It is equal to CP, less severe than multiplying was to pass from type A. The door had called its constant. Indeed. Equation six. The give is equal to as high as p in relation to v consonant plateau that are as well. With. The house session we have here. We love it. The lower it is, the lower it is. Summer elevation for a constant volume and as a diamond had developed in relation to V at constant temperature. This. So go give us less severe CP. And noticing here that we have the two valid ones that Athens every time. We appeal. The derivative property of P, derivative value of T with respect to P a constant volume. Sending peace greetings had a constant plateau. That's it, DDV was supposed to bring peace. The observation was there the least. Therefore, this allows to raise the volume of the product to a constant volume. The whole was not developed by Apple had reached perhaps equal to. Medium one. On. This derivative should be at constant pressure. It's nice, but of a real less, not less hilly, thicker, less cv and multiplied on places not high enough in relation to the simplest, constant temperature. And the 20 times ownership of the DDVs can give me the necessary keys. For me it is. That multiplies the inverted dv of a dvd to burn to more. Notes. Who is this second relationship? Good. The third relationship between the mute dog and the next one, namely the VAT.

Notes

Summary

13m 40s

Relations entre Coefficients calorimétriques

$$(3):\ \delta Q = \lambda\left[\left(\frac{\partial P}{\partial V}\right) dV + \left(\frac{\partial P}{\partial T}\right) dT\right] + \mu\, dV$$

$$= \left[\lambda\left(\frac{\partial P}{\partial V}\right) + \mu\right] dV + \lambda\left(\frac{\partial P}{\partial T}\right)_V dT \qquad (9)$$

$$c_V = \lambda\left(\frac{\partial P}{\partial T}\right)_V$$

$$\lambda = c_V \cdot \frac{1}{\left(\frac{\partial P}{\partial T}\right)_V}$$

$$\lambda = c_V\left(\frac{\partial T}{\partial P}\right)_V$$

$$\left.\begin{array}{l} (1)\ \delta Q = c_V dT + l dV \\ (2)\ \delta Q = c_P dT + h dP \\ (3)\ \delta Q = \lambda dP + \mu dV \end{array}\right\} \text{Alors :}$$

$$h = -(c_P - c_V)\left.\frac{\partial T}{\partial P}\right)_V$$

$$l = (c_P - c_V)\left.\frac{\partial T}{\partial V}\right)_P$$

$$\lambda = c_V\left.\frac{\partial T}{\partial P}\right)_V$$

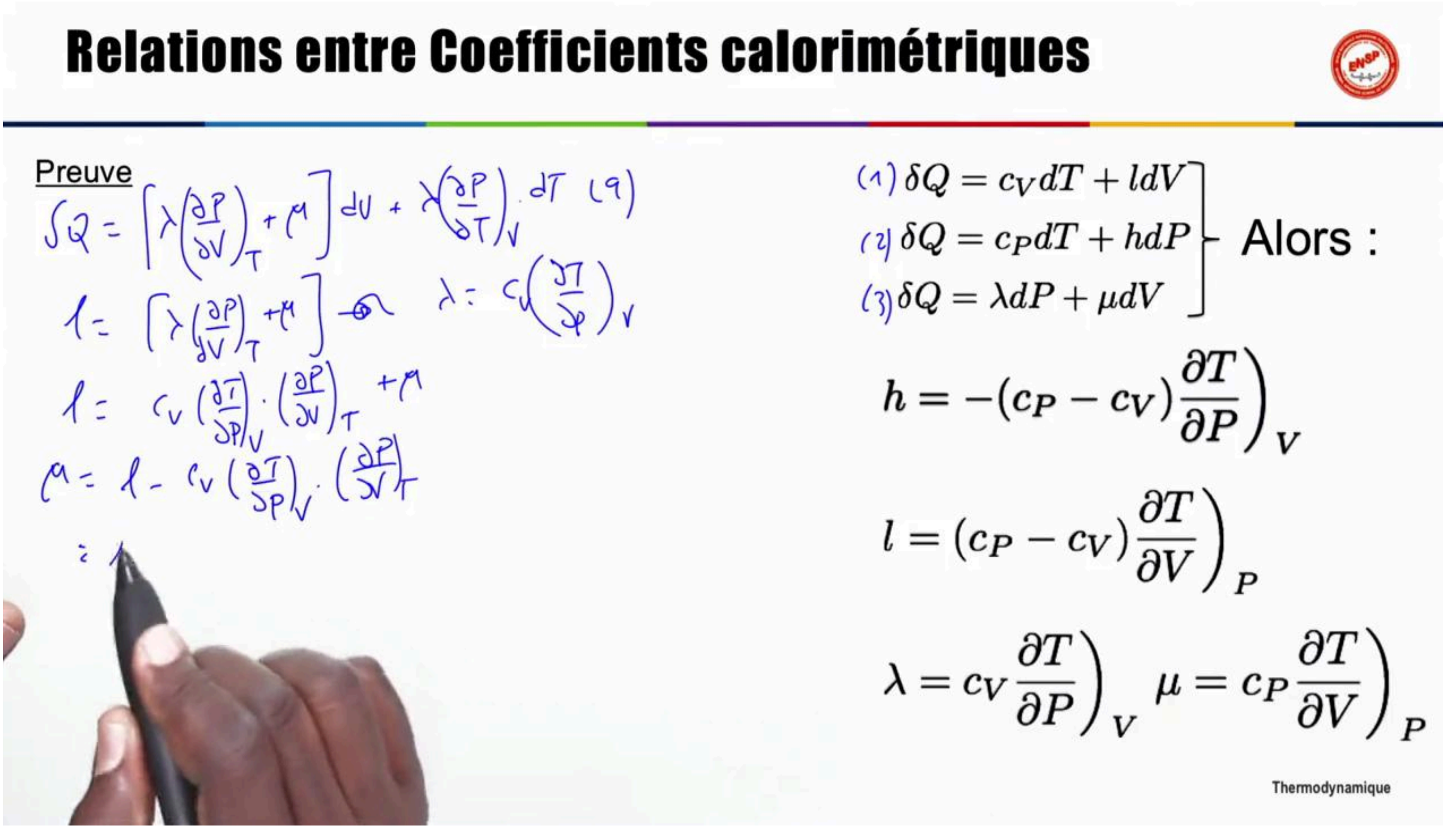
Thermodynamique

The QST is multiplying in relation to this. HP at constant volume. We will study and decide on equality. You who are here. Good. This allows us to create. And DQ is equal to man. He's the man from ADP. No more shedding. Bicycles. So lambda of French from. We will take the P. Confounding of long truth. There was not enough p to have of V and then wants to move from p to d dt in the ADP norm. And we have at the end of the summer dv. In these groupings, the falafels had to. The lamda dropout had to move from B over V plus MU. The whole dv then ctl lambda theme developed in relation to d? DT. In the fuller flow of the equations, it is the ? Equation nine. The comparison of equation nine. The equation. A magnifying glass allows to equalize the coefficient of the DT and its DDV. So they come cv. Within the equation. One is equal to lambda. Move from p to scope. A constant volume, very well gone from the lambda sessions and quite high. Divided by ten but not enough p. Provide a constant volume and the law of the inversion of the lips and the young people makes it possible to describe one enough high, multiplying vellets to call a constant volume. Which is this equation. Getting rid of me was not peace. Constant volume, the last equality. Regarding. The. Relation a mythical painting. It will exploit fish. New. And here's the push. To equation one. Like before, we can put some voice.

Notes

Summary

16m 17s

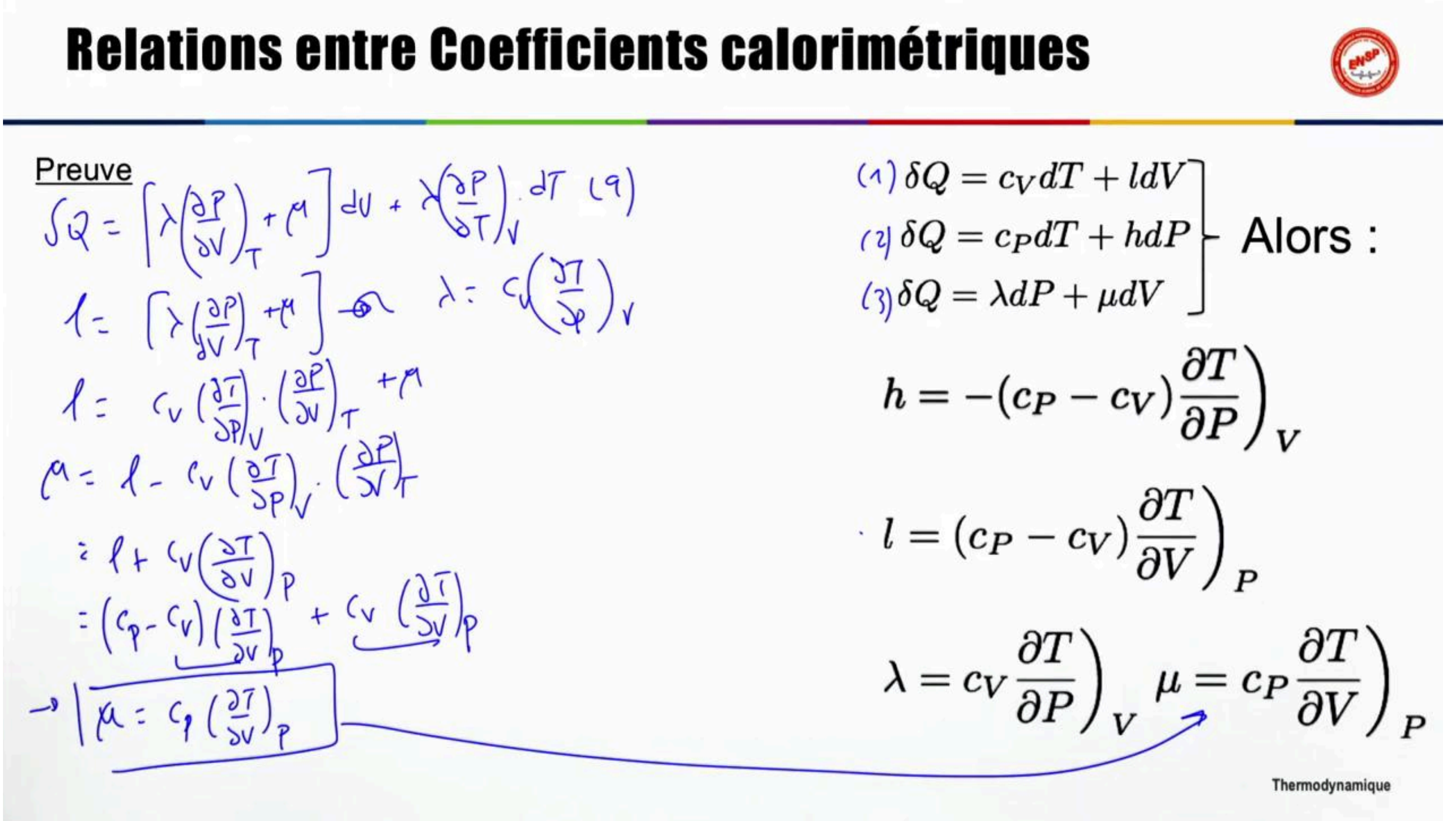


But is it up to the CPD to raise? Indeed, the equation of nine. We established earlier gave us. Disappointed in the form. Lamda and Undp. That's it for. With the constant temperature of the wall. The whole thing was supposed to be more. Lambda, it went from p to constant volumes. DT. It is to the equation nine when we take nine of their impressions to the equation, one that still has in front of us, in the identification of cause, among others. She. Equal to this, so it. Equal to lambda. It does not pay the constant temperature. More, but good. Gold by Paul V. Now we have just determined the formula cv. Had to spend the summer HP at constant volume. The use of an L. Equal to lambda, i.e. CR-V, should spend the summer compared to lambda volume. The whole thing that multiplies views. Move from B. You have. At Auto Plus constant temperature. The idea of the kind of which mu equal to it. Less severe, he wants to spend the summer on break after to have a constant pass of the pipes to the frying pan with constant temperature. Good if we take into account. Due to the fact that. The derivative gives the property that multiplies the derivatives. Alternative is to the Monza and in the tea that.

Notes

Summary

18m 56s

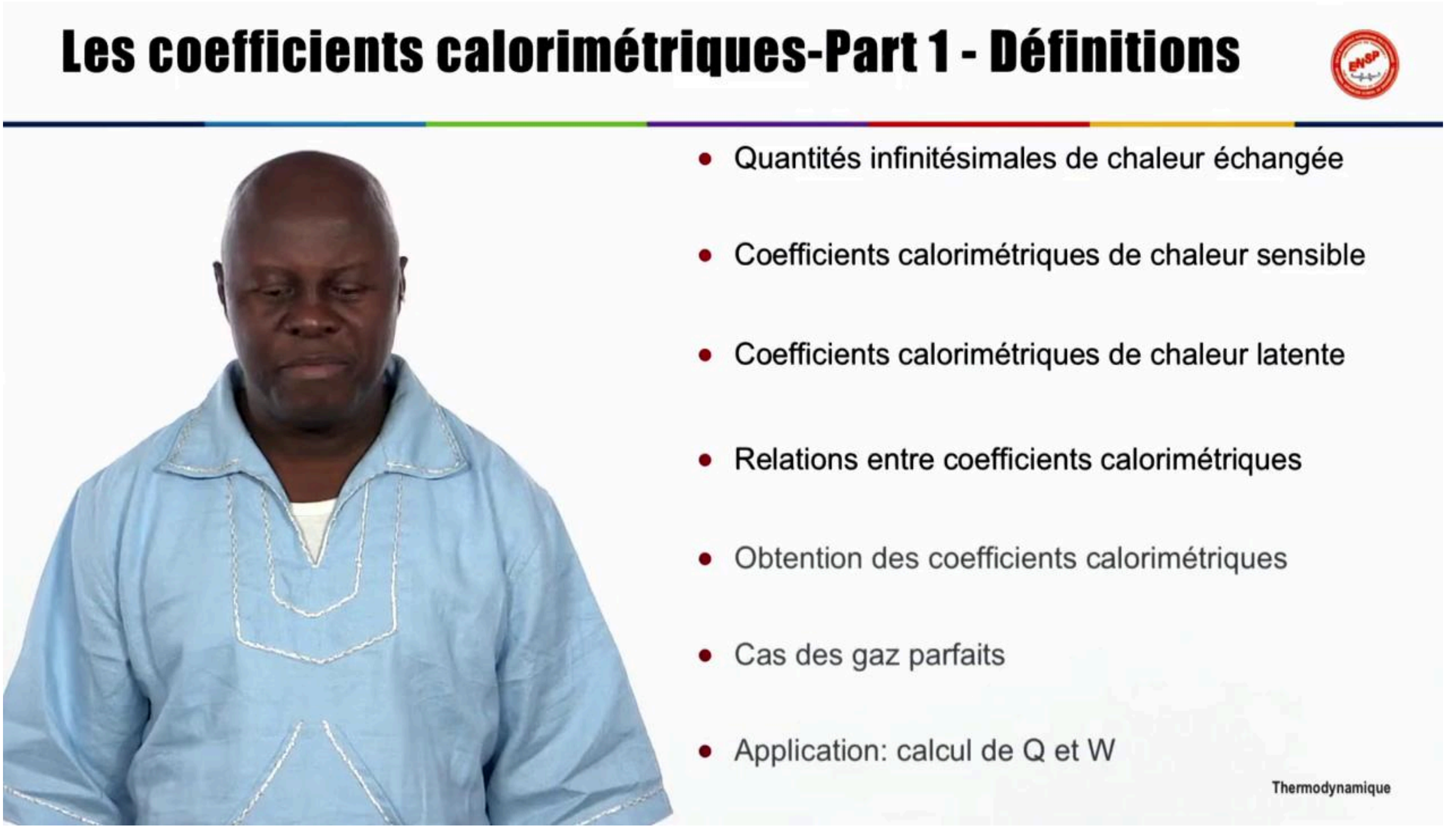


CCTV. The TV no longer TV. The TMC with less will give us. Partial wishes dictated by report had to constant pressure therefore, but. Having given this. And it is still there in front of us. We have. It's thick, it's high. All as multiplied. He wants to go through the door with a simple statement, she added. Raised had to go through the summer by the door with more constraints. These two terms do not cancel each other out. MU equals asp. Do you want to change dt with respect to V to a constant? So it is well this last equality. So these are the relationships.

Notes

Summary

21m 18s



That you can get a colorimetric quotient well at the end of this lesson. We recall. After defining infinitesimal quantities, exchange, we could deduce the colorimetric quotient of sensible heat, but also the chromatic quotient of latent heat. These definitions. And above all, the expressions tinged with elemental warmth to change a little are universal allowed us to establish the difference. Relationship between the colorimetric quotient. Good. We will return to the third part on five to the automatic to make applications, including in the calculation of heat and work, and change the following lesson. The most interesting, it is the way in which these are obtained and allow us to make an application of the different relations demonstrated here to the perfect gas. It is.

Notes

Summary

22m 20s