

*The First and Second Law of Thermodynamics*, Michael Flanders & Donald Swann, from the album *At The Drop of Another Hat*.

One of the great problems in the world today is (1)\_\_\_\_\_ this problem of not being able to talk to scientists, because we don't understand science. They can't talk to us because they don't understand anything else, poor (2)\_\_\_\_\_. This problem, I think it was C.P. Snow first (3)\_\_\_\_\_ it - Sir Charles Snow in private life - in his books *Science and Government* and so on. (4)\_\_\_\_\_ you, I haven't read it. I'm waiting for the (5)\_\_\_\_\_ to come.

He says, quite rightly, he says it's no good (6)\_\_\_\_\_ up to a scientist and saying to him as you would to anybody else, you know, "Good morning, how are you, lend me a (7)\_\_\_\_\_ " and so on, I mean he'll just (8)\_\_\_\_\_ at you or make a rude (9)\_\_\_\_\_ or something. No, you have to speak to him in language that he'll understand. I mean you go up to him and say something like, "Ah, H<sub>2</sub>SO<sub>4</sub> Professor! Don't synthesize anything I wouldn't synthesize. Oh, and the reciprocal of (10)\_\_\_\_\_ to your good wife." Now, this he will understand.

Snow says that nobody can consider themselves educated who doesn't know at least the basic language of science. I mean things like Sir Edward Boyle's Law, for example - the greater the (11)\_\_\_\_\_ pressure, the greater the volume of hot air. The simple . . . or . . . the Second Law of Thermodynamics, this is very important. I was (12)\_\_\_\_\_ shocked the other day to discover that my partner not (13)\_\_\_\_\_ doesn't know the Second Law, he doesn't (14)\_\_\_\_\_ know the First Law of Thermodynamics!

Going back to first (15)\_\_\_\_\_, very briefly: thermodynamics, of course, is (16)\_\_\_\_\_ from two Greek words, *thermos*, meaning hot - if you don't drop it - and *dynamics*, meaning dynamic, work; and thermodynamics is simply the science of heat and work, and the relationships between the two as (17)\_\_\_\_\_ down in the Laws of Thermodynamics, which (18)\_\_\_\_\_ be expressed in the following simple terms - (19)\_\_\_\_\_ me, Donald.

The First law of Thermodynamics.

Heat is work and work is heat

Heat is work and work is heat

Very Good.

The Second law of thermodynamics.

Heat cannot of (20)\_\_\_\_\_ pass from one body to a hotter body

Heat cannot of (20)\_\_\_\_\_ pass from one body to a hotter body

Heat won't pass from a cooler to a hotter

Heat won't pass from a cooler to a hotter

You can try it (21)\_\_\_\_\_ but you'd far better not-a

You can try it (21)\_\_\_\_\_ but you'd far better not-a

'Cos the cold in the cooler will get hotter as a rule-a

'Cos the cold in the cooler will get hotter as a rule-a

'Cos the hotter body's heat will (22)\_\_\_\_\_ to the cooler  
'Cos the hotter body's heat will (22)\_\_\_\_\_ to the cooler  
Heat is work and work is heat and work is heat and heat is work  
Heat will pass by (23)\_\_\_\_\_ and  
Heat will pass by (23)\_\_\_\_\_ and  
Heat will pass by (24)\_\_\_\_\_ and  
Heat will pass by (24)\_\_\_\_\_ and  
Heat will pass by (25)\_\_\_\_\_  
Heat will pass by (25)\_\_\_\_\_  
And that's a (26)\_\_\_\_\_ law

Heat is work and work's a (27)\_\_\_\_\_

And all the heat in the universe

Is gonna cool down,

'Cos it can't increase

Then there'll be no more work

And there'll be perfect peace

Really?

Yeah, that's (28)\_\_\_\_\_ , Man.

And all because of the second law of thermodynamics which (29)\_\_\_\_\_ down:

That you can't (22)\_\_\_\_\_ heat from a cooler to a hotter

Try it (21)\_\_\_\_\_ but you'd far better not-a

'Cos the cold in the cooler will get hotter as a rule-a

'Cos the hotter body's heat will (22)\_\_\_\_\_ to the cooler

Oh, you can't (22)\_\_\_\_\_ heat from a cooler to a hotter

Try it (21)\_\_\_\_\_ but you'll only look a fool-a

'Cos the cold in the cooler will get hotter as a rule-a

And that's a (26)\_\_\_\_\_ law

Oh, I'm hot

Hot? That's because you've been working!

Oh, Beatles, nothing!

That's the first and second laws of thermodynamics.