

5 February 1962

READING 3

DENSITY OF HYDROGENS OF THE THIRD SCALE

SECTION 1

Chemical analysis can be made very exact from one point of view. One can prove that the body of the average newborn baby contains something like 500g of Protein, 30g of Calcium, 14g of Phosphorus and 0.4g of Iron. But this somehow does not tell one what one wants to know about a baby; and why one's own baby is so markedly more wonderful than anybody else's! Or that the composition of an average normal British diet is usually as follows: 'Protein 100g; Fat 100g; Carbohydrate 400g'. But more has been learnt about the biological qualities of a given food by seeing whether it will support life and growth when added to a diet adequate in other respects – in that way the vitamins were discovered and the causes of many diseases and their cures have been found.

Recently there has been a great opening up of methods in physics, which since the discovery of Isotopes finds measurable differences in matters chemically identical, for instance: gas hydrogen is always chemically the same; but physically there are three kinds of hydrogen present according to the number of neutrons present in the nucleus, the three isotopes – Hydrogen, Deuterium and Tritium having 1, 2 and 3 neutrons respectively, and therefore differing in their atomic weight. 'Heavy water' made from Deuterium is *physically* different from ordinary water, though both have the chemical formula H_2O . These discoveries have opened up a whole new science, one application of which is the use of radioactive tracers to study the metabolism of various elements in the human body.

For example, every day we are investigating the state of the thyroid gland in this way. Ordinary iodine of the Periodic Table has an atomic weight of 126.9, because it is a mixture of ordinary 127 and small quantities of various isotopes chemically indistinguishable. It is a routine procedure now to administer minute (tracer) doses of radioactive Iodine-131 (^{131}I) to the patient in the form of non-poisonous iodine; a Geiger counter placed on the neck over the gland records its hourly uptake. ^{131}I has a half-life of eight days. The thyroid gland is the only organ in the body that can selectively absorb inorganic iodine from the bloodstream. A normal thyroid collects 80 times the expected amount of ^{131}I that would be physically diffused, and an over-active gland in Graves Disease up to 300 times.

Similarly a tracer dose of radioactive iron (^{59}Fe – half-life 47 days) given to a dog by the mouth, begins to appear in the circulating blood corpuscles within two hours, proving that it has reached the bone marrow and it has been used there in the manufacture of fresh haemoglobin.

All this goes to show that we are more in a position nowadays to understand that there are invisible differences in matter which cannot be found by straightforward chemical analysis. It is those even more important invisible differences in matter for which there is at present no ordinary language and for which the System provides us with its special notation.

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SECTION 2. ALCHEMY

The difference between chemistry and true alchemy is really an extension of the study of such invisible differences into kinds of materiality which cannot be weighed and measured. The following quotation from *Tertium Organum* illustrates this conception:

Suddenly as A. spoke the author had an incredibly vivid sensation of the difference between factory chimneys and prison walls. He felt the difference between the very bricks themselves and it seemed to him that A. felt it too. ... When asked about this later, A. said that he had always felt this difference and was convinced of its reality. ‘Only positivism believes that a stone is a stone and nothing more,’ he said, ‘but any uneducated woman or child knows quite well that a stone from the wall of a church and the stone from the wall of a prison are different things. ...’

The mast of a ship, a gallows and a cross may be made of the same kind of wood, but in reality they are different objects made of different material... We see a vast difference between the qualities of two equal amounts of energy expended by two men, one of whom let us suppose is on his way to his daily quiet work, and another is on his way to denounce a fellow-creature at the police station, while the men of science see none. ...

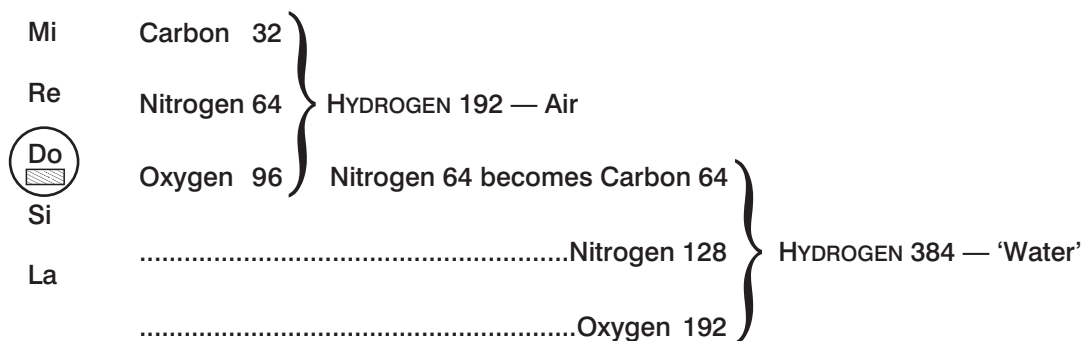
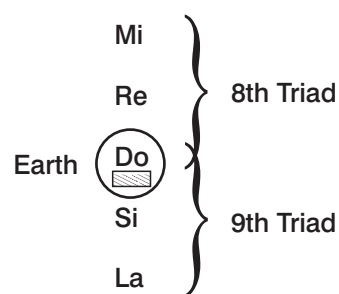
Actually all art consists of understanding and representing these elusive differences. For an artist the phenomenal world is merely his material... An artist must see that which others do not see, and he must possess the gift of making others see what they do not see by themselves. ...

(Chapter 14)

To continue the study of this new language, we must remind ourselves that matter differs according to whether in a given triad it is the conductor of the Positive or Active force (then called Carbon), of the Negative or reactive force (called Oxygen) or of the invisible Neutralizing force (called Nitrogen); or simply taken as matter of a certain density without force (called Hydrogen). For example, take these two triads from the table you were shown last week:

In relation to the Earth, the 8th Triad represents its atmosphere (‘Air’), and the 9th Triad its Hydrosphere (‘Water’). The atmosphere contains Carbon, Nitrogen and Oxygen in the ordinary sense of the words, and the relative proportion of these three will define the air breathed by different forms of organic life on earth. Putting in the four elements, the figures will show their ‘densities’ at this level.

In relation to *Man* we know that it is Oxygen which, as raw material, unites with haemoglobin in the lungs and is carried round to all the tissues by the arteries. At high altitudes where the oxygen tension is low, the effects of ‘air hunger’ are acutely



felt. We know also that the breathing centres in the brain-stem are extremely sensitive to Carbon in the form of carbon dioxide, and any increase in the percentage of CO₂ in the inspired air will excite these centres to set up deeper and faster breathing. But the Nitrogen, though it occupies about 4/5ths of the volume of inspired air, is not absorbed; only a little of it is dissolved at normal atmospheric pressures in the body fluids; it serves simply to dilute the other two elements so that the right volumes and pressures can be maintained. The Hydrogen-ion concentration is also important for respiration; and the term 'Hydrogen 192' can be thought of as proportional to the number of atoms or ions concentrated in a given volume of the material – hence its 'density' in the System sense. Note that there is an octave relationship between the 'density of air' and the 'density of water', there being of course many steps between them and grades in the humidity and impurities of the air breathed. But if air is too dry and too hot, its density – as a whole – will be less than H192, approaching H96 or 'incandescent gas'.

It takes a little time to learn to use this notation and we must proceed slowly from the obvious to the more obscure. The general law can be expressed in the following formulas:

$$n \begin{matrix} \text{C} & \text{N} & \text{O} \\ (1 + 2 + 3) \end{matrix} = 6n, \quad n \text{ representing powers of 2.}$$

Let $n = 0$, $2^0 = 1$ and we have the first triad at the top of the table.

Let $n = 1$, $2^1 = 2$ and we have the second triad $\text{C}_2 + \text{N}_4 + \text{O}_6 = \text{H12}$, and so on.

One point requires particular notice. The *order of action* of the forces in a given triad must not be confused with the proportionate densities of the four elements, which is always maintained. In this particular kind of triad where we proceed in successive octaves downwards from fine to coarse, the order of action of the forces is: 1st Carbon, 2nd Oxygen, 3rd Nitrogen. So it is Nitrogen with the intermediate density that becomes the Carbon of the succeeding triad. In other kinds of triads, there are different orders of action; and clearly there are six possibilities. The difference between different materials is partly one of 'density', and partly one of function. Thus in the quotation from *Tertium Organum* quoted above, 'wood' must have a density round about 'Hydrogen 1536'; and 'stone', with other minerals, a little lower; solid metal being 'Hydrogen 3072'. So what about the difference between 'the mast of a ship, a gallows and a cross' or that between 'stone from the wall of a church or of a prison'? The difference will be partly one of *density* (of relative proportion of the elements) and partly of *function*, that is, a different order of combination of the forces, a *different kind of triad*.

(Pause for discussion)

We can now look again at last week's Figure 3 (61/2) giving the densities of the Hydrogens, which omits for simplicity's sake those of the various Carbon, Oxygen and Nitrogen composing them: (see overleaf).

Looking at this Table, let us begin to try and place different levels of materiality in the Universe, always remembering that on this Third Scale they are taken directly in relation to *Man*. Where, for instance, do we put the three foods – the food we eat, the air we breathe and the average sensory impressions we receive?

Where does thought come on this table? Where sensation? Where emotion? And where ecstasy?





		Density of Hydrogens of the Third Scale	
Absolute	Do	}	1
	Si		
	La		
	Sol		
	Fa		
			
Sun	Mi	}	3
	Re		
	Do		
	Si		
	La		
	Sol		
Earth	Fa	}	6
			
	Mi		
	Re		
	Do		
	Si		
Moon	La	}	12
	Sol		
	Fa		
			
	Mi		
	Re		
Moon	Do	}	24
	Si		
	La		
	Sol		
	Fa		
			
Moon	Mi	}	48
	Re		
	Do		
	Si		
	La		
	Sol		
Moon	Fa	}	96
	Mi		
	Re		
	Do		
	Si		
Moon	La	}	192
	Sol		
	Fa		
	Mi		
	Re		
Moon	Do	}	384
	Si		
	La		
	Sol		
	Fa		
Moon	Mi	}	768
	Re		
	Do		
	Si		
	La		
	Sol		
Moon	Fa	}	1536
	Mi		
	Re		
	Do		
	Si		
Moon	La	}	3072
	Sol		
	Fa		
	Mi		
	Re		

Table of Hydrogens

At an early meeting a newcomer asked Mr. Ouspensky what the System had to say about the Holy Ghost in Christian terminology? His reply was: ‘You won’t understand, but as you have asked me the answer is “Hydrogen 6 of the Third Scale”’.

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