Compound	Heat of combination	Difference	Heat of solution	Difference
[K,Cl]	105610	—	−4440	—
[H,Cl,Aq]	39315	66295	—	—
[K,Br]	95310	—	−5080	+640
[H,Br,Aq]	28380	66930	—	—
		−635		+640
[K,Br]	95310	—	−5080	—
[H,Br,Aq]	28380	66930	—	—
[K,I]	80130	—	−5110	+30
[H,I,Aq]	13170	66960	—	—
		−30		+30

These relations obtain for the haloid salts of all the metals for which data were available for comparison. The only exception is $AuCl_3$ and $AuBr_3$, the difference of heats of solution of these salts being too great according to the foregoing laws. They are apparently proportional, however.

There is another way of showing these laws and also of showing the conditions which determine the absolute amount of heat of solution, whether positive or negative. If we take the sum of the heats of formation of any salt and of water on the one hand, and on the other, instead of measuring the heat of solution directly, take the sum of the heats of formation of the oxide, of the acid and of neutralisation, we shall find that the heat of solution is the difference of these sums—positive when the latter sum is the greater, and negative when it is the less. This exhibits in a striking manner the relations of the various affinities to solution, and is very suggestive when we consider that the heat of solution regularly increases with the heat of formation of [M,O,Aq], and when the heat of $[MO]>[M,Cl_2]$, decomposition of water takes place. Consider the following examples :—

Compound	Heat of combination	Compound	Heat of combination
[Mg,OAq]	148960	$[Mg,Cl_2]$	151010
[2H,Cl,Aq]	78630	$[H_2O]$	68360
Neutr.	27690		
	255280		219370
	219370		
Difference	35910 = Heat of solution.		
[Sr,O,Aq]	157780	$[Sr,S,O_4]$	330900
$[H_2,S,O_4,Aq]$	210770	$[H_2,O]$	68360
Neutr.	30710		
	399260		399260
	399260		
Difference	0 = Heat of solution. Salt insoluble.		
$[K_2,O,Aq]$	164560	$[K_2,N_2O_6]$	242970
$[H_2,N_2,O_6,Aq]$	102190	$[H_2,O]$	68360
Neutr.	27540		
	294290		311330
	311330		
Difference	−17040 = Heat of solution.		

The above illustrate the cases of positive, negative, and zero heats of solution. These relations obtain with all salts, whether the oxide is soluble or not. The only discrepancy I found was in the case of silver chloride, which showed a slight negative heat of solution ; but as its affinity for O is excessively small, it is not surprising it should be an abnormal case.

These laws of solution explain and are illustrated by many cases of constant differences in the heats of formation of similar compounds in water. Thus it has been pointed out in Muir and Wilson's "Thermo-Chemistry" that between the heats of formation of soluble chlorides, bromides, and iodides in water, there is a constant difference, no matter what the positive element is. For example, consider the following cases :—

Compound	Heat of formation	Compound	Heat of formation
[H,Cl,Aq]	39315	[H,Cl,Aq]	39315
[H,Br,Aq]	28380	[H,I,Aq]	13170
Difference	10935	Difference	26245
K],Cl,Aq]	101170	[K,Cl,Aq]	101170
[K,Br,Aq]	90230	[K,I,Aq]	75040
Difference	10940	Difference	26130

Now the reason of this is perfectly obvious in the light of the laws of solution. Any variation from the above differences in the heat of formation of the undissolved salt is at once counterbalanced by the heat of solution, which varies inversely. Thus :—

Compound	Heat of formation	Heat of solution	Total
[H,Cl]	22000	17315	39315
[H,Br]	8440	19940	28380
Difference	13560	−2625	10935
[Na,Cl]	97690	−1180	96510
[Na,Br]	85770	−190	85580
Difference	11920	−990	10930

and so on in other cases.

WM. DURHAM

Ice on the Moon's Surface

IN May 1884 Mr. Peal, of Sibsagar, in Assam, who has studied the moon's surface with great attention, sent me a paper in which he maintained views closely resembling those of Capt. Ericsson (NATURE, p. 248) on the glacial origin of the lunar craters. In my answer I suggested that it was difficult to admit the existence of ice on the moon's surface, without a layer of water vapour over it, and that the telescope proves that if such vapour exists it is only in extraordinarily small quantities. It seems due to Mr. Peal, who was undoubtedly ignorant of Capt. Ericsson's paper of 1869, to draw attention to the correspondence. I am not sure whether the paper has been yet published.

Cambridge, July 17 G. H. DARWIN

Luminous Clouds

I AM not sure of the date, but believe it was in June 1885 that I called attention in your journal to a strange effect of bright silvery lighted clouds, which remained visible in the north-west sky after sunset until nearly 11 p.m. Several times this summer I have noted repetitions of these same curiously lighted cloud-forms, but have never seen such a wonderful display of this "after-sheen" as that of this evening, July 12.

The day from 11 a.m. until 6 p.m. had been wet, followed by a clear-up toward sundown, with a warm orange-coloured sunset near the horizon ; above this, and extending nearly to the zenith, lay masses of brilliant and, one would almost say, self-illuminated cloud-ripples looking like an inverted sea of frosted silver or mother-of-pearl.

There was a strongly-marked focus in the light above the place of the sun, but it extended far beyond that both north and west. The vapour forming these cloud-waves, and which received this intense white light, must, I think, have been at a great elevation, for though all the lower vapour near the horizon retained its usual orange glow long after sunset, there was never any indication of colour upon these clouds from the beginning of the effect, about 7.30 p.m., until it disappeared soon after 10 p.m. The moon, which was in the southern part of the sky, looked quite warm in colour when contrasted with the almost bluish-white glare upon this vapour. ROBT. C. LESLIE

Moira Place, Southampton, July 12

THE luminous night clouds seen here on the 22nd ult. (NATURE, July 1, p. 192) have recurred, with a very remarkable development on the night of the 8th inst.

The sketches illustrate phases one hour apart from midnight to 2 a.m. ; the last made solely by "cloud-light" in a window with northern aspect ! The long luminous belt began to form at 11.30 p.m., fading out at 2.30 a.m. It extended obliquely from N. 10° W. to N. 30° E. in the wind's direction, which was light from N.W. Temperature subsequently fell.