Volume-weighted means

It is not always appropriate to simply take the mean value of ions without taking the volume into account, especially when more detailed estimates of loadings are required. With episodic events such as rainfall then associated ions may only be deposited in large amounts on a small number of occasions. In these cases the normal mean would be highly screwed. It is very simple to calculate, especially using EXCEL .

Method:

Volume	Ion (e.g. Zn^{2+})
a	*w*
b	*x*
c	*y*
d	*z*

Therefore the volume-weighted mean is:

$$Zn^{2+} = \frac{aw + bx + cy + dz}{a + b + c + d}$$

Exercise: Calculate the volume-weighted mean for Fe and Zn recorded in acid mine drainage. Compare with the unweighted mean. Then explore the concentration with flow rate.

Day	Flow $l\ d^{-1}$	Fe mgl^{-1}	Zn mgl^{-1}
1	95	14	12
2	70	26	20
3	60	44	24
4	45	59	33
5	30	91	51
6	10	148	72
7	5	160	78
8	15	123	67
9	25	102	58
10	15	116	70