Electronic Supplementary Material (ESI) for RSC Sustainability.

List of symbols for the gold paper

Symbol	Meaning
D_M	Distribution ratio of metal M. Defined as the total concentration (all chemical forms) of an element in the organic phase divided by the total concentration in the aqueous phase
φ_r	The fraction of a metal lost to the raffinate from a counter current extraction battery
P	The mathematical product of the distribution ratio and the organic to aqueous volume ratio
$SF_{A/B}$	Separation factor of A over B, defined as D_A / D_B
ppm	Parts per million, often in milligrams per litre or milligrams per kilo.
$DF_{A/B}$	Decontamination factor of a process. Defined as $([A]_{product}[B]_{feed})/([A]_{feed}[B]_{product})$
K_n	Thermodynamic stability constant of a complex
K_A	Dissociation constant for an acid
K_{ex}	Extraction constant, this is a thermodynamic constant. Depending on the mechanism of extraction its units will vary.
k	Extraction constant which is a kinetic constant.
K_D	Partition constant. Defined as the activity of a species in the organic phase divided by the activity in the aqueous phase. Normally used in this paper for describing the partition of an extractant.
[X]	Concentration of X in moles per litre (dm^3)
f_x	Activity function of X, activity function is for when concentrations are in moles per litre
U	A constant which contains activities in the organic phase and the concentration of the extractant in the organic phase
A	The linear part of the polynomial in a Pitzer equation, units are mol^{-1} dm^3
B	The quadratic part of the polynomial in a Pitzer equation, units are mol^{-2} dm^6
β_n	Cumulative thermodynamic stability constant for a complex
Θ	The volume fraction of the denser phase which is made of the deep eutectic solvent
ϕ	A constant used to describe the effect of changing Θ on the activity function ratios
q	A constant used in equations 7 and 8, this is expressed in $\%^{-n}$ terms The percentage is the % (v/v) of the organic phase which is the extraction agent.
Q	An alternative to U for use when the chloride concentration in the denser phase is constant, in addition to the terms hidden inside Q it contains the chloride concentration in the denser phase.
v	The percentage (v/v) of the extraction agent in the organic phase
ψ	An alternative to ϕ used in the paper in PCCP
λ	Partition constant. Defined as the activity of a species in the organic phase divided by the activity in the aqueous phase. Normally used in this paper for describing the partition of an metal extractant complex.
C	An alternative to U where the constant is placed in a different part of an equation