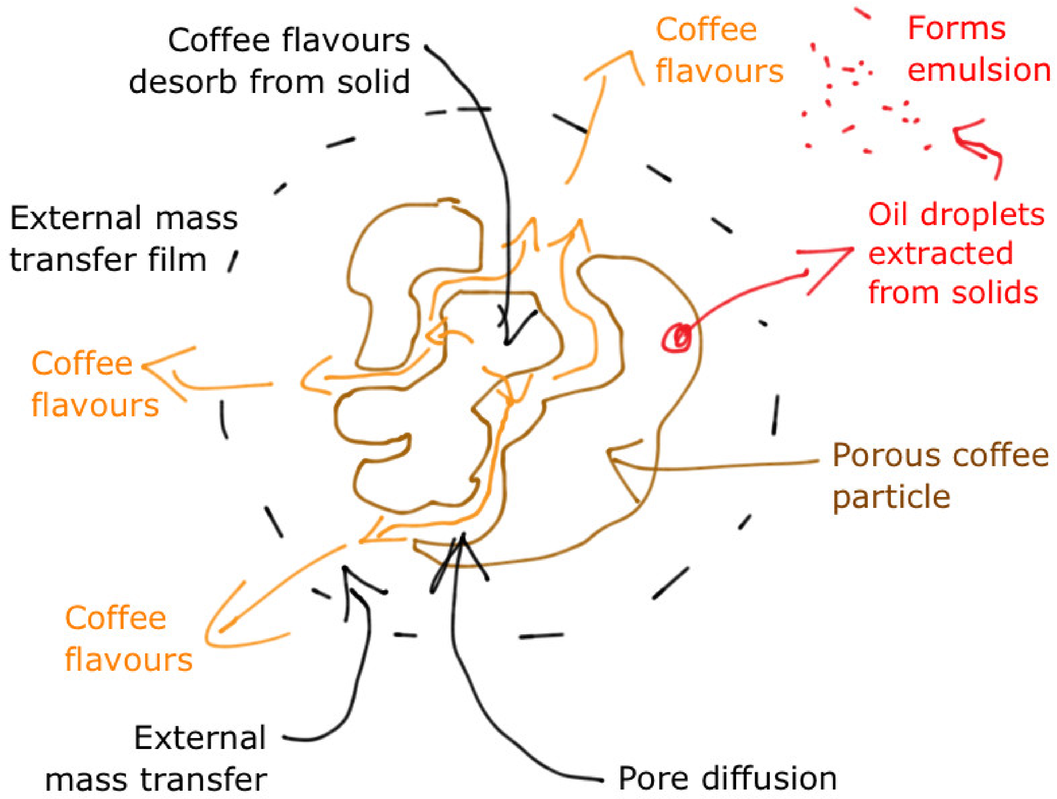
Transformation, Entities, Properties, Physics, Parameters, Order of Magnitude (TE3PO)

Britest's **TE3PO** table is a tool used to record and analyse knowledge about transformations. It is similar to a Driving Force Analysis table but was developed to capture information about parallel rate processes where the rates need to be balanced in order to deliver the desired transformations, e.g.:

- physical processing operations
- polymerisation chemistry

Coffee filter example (Rich Picture)

Table has one row for each transformation identified in the Rich Picture/ Transformation Map



Transformation	Entities	Properties	Physics	Parameters	Order of Magnitude
Extraction of oils	Coffee solids	Oil content Affinity for oil	Desorption	Temperature	?
	Oils	-			
	Aqueous	Surfactant content?			
Emulsion Formation	Aqueous	Viscosity	Emulsification	Shear (not controllable)	?
	Oils	Viscosity Surface tension			
	Emulsifiers	Effect on surface tension			
Desorption of flavours	Flavour components	Solubility Partition coeff.	Phase equilibrium	Temperature	?
	Aqueous	-			
	Solids	Flavour content			
Diffusion of flavours	Flavours	Diffusion coeff.	External mass transfer	$K_L a$	?
	Aqueous	-			
	Solid	Particle size (external area) Pore diameter Pore length	Pore diffusion	Nothing controllable	?

Order of Magnitude could be sec/min/hr; fast/med/slow etc.

Experimental planning can be targeted at key areas where properties are unknown

Information can be used to develop numerical models of the rate process(es)

Note: When considered at the larger filter bed scale, additional transformations would be present for "Liquid flow through the bed" and "Solid entrainment"

Supporting organisations in gaining value from process understanding