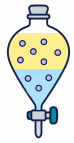
Partition Coefficients Map

Cambridge International AS & A Level Chemistry · Topic 25 Equilibria · 25.2 Partition coefficients

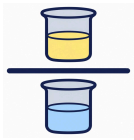
1 What Kpc means 25.2.1

- Two **immiscible** solvents
- Solute shared at **equilibrium**
- Kpc = **ratio of concentrations**
- Constant at one temperature



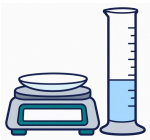
2 Writing Kpc 25.2.1

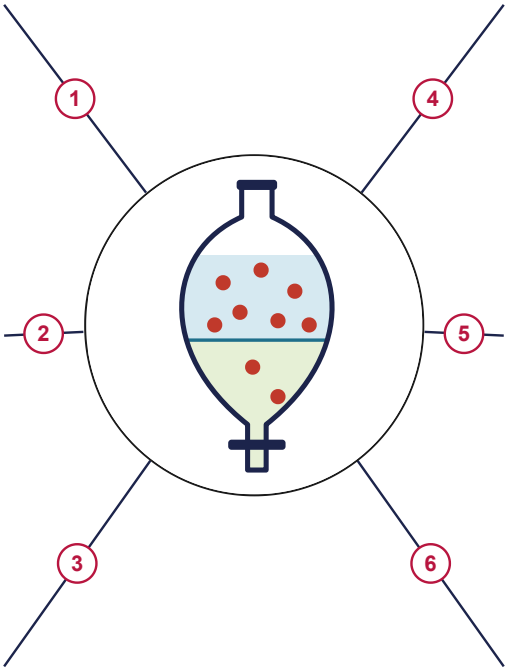
- **State the order** of solvents
- Kpc(A/B) = 1 ÷ Kpc(B/A)
- **No units**
- Same form in both layers



3 Kpc from data 25.2.2

- Concentration = **mass ÷ volume**
- Mr cancels: grams work
- Volumes cancel only if **equal**
- Given Kpc: rearrange





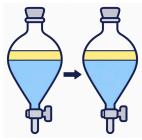
4 Solvent extraction 25.2.2

- Let **x g** move across
- Substitute and **solve for x**
- Mass left = start − x
- Then extract again



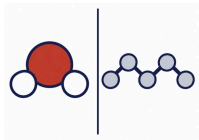
5 Several portions 25.2.2

- Two small portions **beat one**
- Each starts a **new equilibrium**
- Same total volume
- More solute removed



6 Polarity and Kpc 25.2.3

- Non-polar solute: **organic layer**
- O–H, N–H: **hydrogen bonds** to water
- Longer chain: Kpc(organic/water) **rises**
- Ions stay in water



What sets the value of Kpc (organic/water) at one temperature

Solute	Forces with water	Forces with the organic solvent	Kpc (organic/water)
Iodine, I_2	weak	London forces	large
Butane	weak	London forces	large
Butan-1-ol	hydrogen bonds	London forces	moderate
Ethanoic acid	hydrogen bonds	weak	below 1
An ammonium ion	ion–dipole	very weak	near 0

Worked examples

Kpc from data

- I_2: 0.0850 in hexane
- 0.00100 mol dm^{-3} in water
- **Kpc = 85.0**

One extraction

- 1.00 g in 100 cm^3 water
- 50.0 cm^3 hexane, Kpc 4.0
- **0.667 g extracted**

Two portions

- Kpc 9.0, 1.00 g solute
- one 50 cm^3: 0.818 g
- **two 25 cm^3: 0.905 g**

Kc (7.1) is the same idea for a reaction; chromatography (Topic 37) separates by partition between two phases.

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