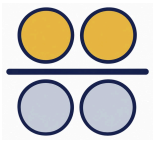
Equilibrium Constant Kc Map

Edexcel International A Level Chemistry · Unit 4 · Topic 13A Equilibrium Constant Kc

1 Writing Kc

13.1

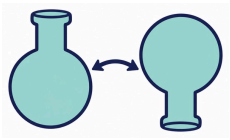
- **Products** over **reactants**
- Powers = **balancing numbers**
- Terms multiplied, never added
- [ ] = concentration **at equilibrium**



2 Kc and its equation

13.1

- Reversed: **1 ÷ Kc**
- Doubled: **Kc²**; halved: **√Kc**
- Same mixture, new description
- Always state the equation

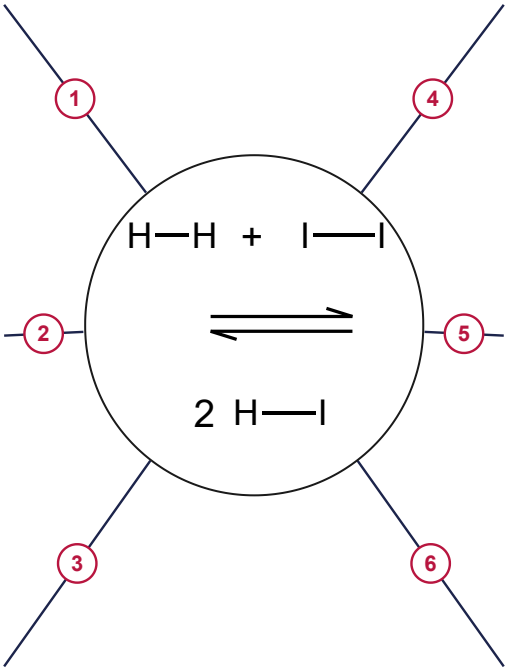


3 Heterogeneous

13.1

- More than one **phase**
- **Solids** and **pure liquids** left out
- Solvent water left out
- Gases and (aq) stay in

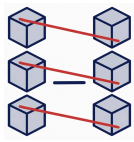




4 Units of Kc

13.3

- Put in mol dm⁻³ and **cancel**
- Equal powers: **no units**
- One more on top: mol dm⁻³
- One more underneath: dm³ mol⁻¹



5 ICE tables

13.3

- **I**nitial, **C**hange, **E**quilibrium
- Changes follow the **ratio**
- Work in moles, then **÷ V**
- Equal terms: V cancels



6 Measuring it

13.3

- **Quench** in ice-cold water, titrate
- Subtract the **acid catalyst**
- **Colorimeter** + calibration line
- Closed, constant T, at equilibrium



Units of Kc: count the powers

powers on the top minus powers underneath

Equilibrium	Powers top	Powers underneath	Units of Kc
$H_2 + I_2 \rightleftharpoons 2HI$	2	2	none
$PCl_5 \rightleftharpoons PCl_3 + Cl_2$	2	1	mol dm⁻³
$2NO_2 \rightleftharpoons N_2O_4$	1	2	dm³ mol⁻¹
$N_2 + 3H_2 \rightleftharpoons 2NH_3$	2	4	dm⁶ mol⁻²
$CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$	1	0	mol dm⁻³

Worked examples

ICE: V cancels

- H_2 0.500, I_2 0.400 mol
- 0.688 mol HI: x = 0.344
- **Kc = 54**, no units

Working back

- $Kc = [PCl_3][Cl_2] \div [PCl_5]$
- $[PCl_5] = 0.0500^2 \div 0.0400$
- **0.0625 mol dm⁻³**

Titration

- titre 0.0670 mol acid
- minus 0.0050 catalyst
- **0.0620 mol** ethanoic acid

Kp (Topic 13B) uses partial pressures in the same way; Ka (Topic 12) is the equilibrium constant of a weak acid.

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