1. Which step comes first in a reacting-mass calculation?

   ☐ Compare masses without an equation

   ☐ Assume every mole ratio is 1:1

   ☐ Use a balanced equation and convert mass to amount

2. Which process requires energy?

   ☐ Breaking a covalent bond

   ☐ Forming every chemical bond

   ☐ Cooling a hot solution

3. Why rinse the pipette with the solution it will transfer?

   ☐ To avoid dilution by residual water

   ☐ To create more moles of analyte

   ☐ To make the solution neutral

4. What is equal at dynamic equilibrium?

   ☐ Concentrations of all species

   ☐ Masses of every reactant and product

   ☐ Forward and reverse reaction rates

5. What happens when bromine is added to aqueous iodide?

   ☐ No displacement

   ☐ Iodine forms

   ☐ Chlorine forms

6. For $\Delta H = +24{,}000$ J per mole and system entropy +80 J per mole per kelvin, find the zero-total-entropy boundary temperature in kelvin.

   _____

7. A TLC spot travels 3.6 cm and solvent front 6.0 cm from the baseline. Find Rf.

   _____

8. Three isolated bonds predict hydrogenation −354 kJ per mole; benzene gives −206. Find stabilisation magnitude in kJ per mole.

   _____

_____

10. $A(g) + B(g) \rightleftharpoons C(g)$: equilibrium amounts are 0.300, 0.300 and 0.200 mol in 2.00 dm^3. Calculate Kc in dm^3 per mol.

    _____ dm^3 per mol

1. **Use a balanced equation and convert mass to amount**

   A reacting-mass calculation starts from the balanced equation, because only the equation gives the mole ratio, and masses must be converted to amounts before the ratio applies. Comparing masses directly or assuming 1:1 skips the chemistry.

2. **Breaking a covalent bond**

   Breaking a bond always requires energy input to separate the atoms; forming a bond releases energy. A reaction is exothermic overall only when the energy released in bond formation exceeds the energy taken in for bond breaking.

3. **To avoid dilution by residual water**

   Water left in the pipette would dilute the solution being transferred, so fewer moles are delivered than intended. Rinsing with the solution itself means what remains in the pipette has the right concentration.

4. **Forward and reverse reaction rates**

   At dynamic equilibrium the forward and reverse reactions continue at equal RATES, so concentrations stay constant. The concentrations themselves are usually not equal to each other, and equal rates do not require equal masses.

5. **Iodine forms**

   Bromine is the stronger oxidant and accepts electrons from iodide.

6. **300**

   Set $80 - 24000/T = 0$; $T = 24000/80 = 300$ K.

7. **0.6**

   Rf = 3.6/6.0 = 0.60, with no units.

8. **148**

   Stabilisation magnitude = $(-206) - (-354) = 148$ kJ per mole. The benzene starting structure lies this much below the hypothetical localised model for the same hydrogenation products.

9. **36**

   Neutrons = A − Z = 65 − 29 = 36. Ion charge, if present, would affect electron count only.

10. **4.444444 dm^3 per mol**

    Equilibrium concentrations are 0.150, 0.150 and 0.100 mol per dm^3. $Kc = 0.100/(0.150 \times 0.150) = 4.44$ dm^3 per mol. Using amounts alone would omit the required volume factor.