

## 7 Equilibrium – Part 1 —Answers

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### Answers

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Work through these after trying the questions yourself.

**7.1** The forward and reverse rates are equal; the concentrations stay constant.

**7.2** So that nothing enters or leaves (no products escape), letting the rates balance.

**7.3** If a system at equilibrium is changed, the equilibrium moves to oppose (reduce) that change.

**7.4** Towards the reactants (the endothermic direction).

**7.5** No —a catalyst speeds up the forward and reverse reactions equally, so equilibrium is reached faster but its position is unchanged.

**7.6**  $K_c = [\text{HI}]^2/([\text{H}_2][\text{I}_2]) = 1.6^2/(0.20 \times 0.20) = 64$ .

**7.7** (a) Higher pressure shifts the equilibrium towards the side with *fewer* gas molecules ( $4 \rightarrow 2$ ), i.e. towards  $\text{NH}_3$ , so the yield rises. (b) The forward reaction is exothermic, so raising the temperature shifts the equilibrium in the *endothermic* (reverse) direction, lowering the yield.