Exercise walk-through

7.1
Introduction to Equilibrium

AP Chemistry

You must be able to

- describe **dynamic equilibrium** (forward rate = reverse rate)
- explain that concentrations stay **constant**, not equal
- recognise the $\rightleftharpoons$ symbol

1 The method

Method — Dynamic equilibrium

In a closed system a reversible reaction reaches **equilibrium** when the **forward and reverse rates are equal**. Both reactions still happen – it is **dynamic**, not stopped.

Exercises 2.1–2.3

2.1 At equilibrium, how do the forward and reverse rates compare? [1]

2.2 Are reactant and product concentrations equal at equilibrium? [1]

2.3 What does “dynamic” mean in dynamic equilibrium? [1]

Exercises 2.1·2.3

2.1 At equilibrium, how do the forward and reverse rates compare? [1]

2.1

- They are equal

2.2 Are reactant and product concentrations equal at equilibrium? [1]

2.2

- Not necessarily – they are constant, but usually not equal

2.3 What does “dynamic” mean in dynamic equilibrium? [1]

2.3

- Both the forward and reverse reactions continue at the molecular level

Exercise 3.1

3.1 At equilibrium, the concentrations of reactants and products are [1]

- [ ] **A** equal to each other
- [ ] **B** constant over time
- [ ] **C** zero
- [ ] **D** always increasing

Exercise 3.1

3.1 At equilibrium, the concentrations of reactants and products are [1]

- **A** equal to each other
- **B** constant over time
- **C** zero
- **D** always increasing

3.1 B

- constant over time

Exercise 3.2 (a)

3.2 A reversible reaction is placed in a closed flask starting with only reactants.

(a) Describe how the forward and reverse rates change until equilibrium. [2]

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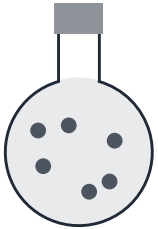
(a)

- The forward rate starts high and falls as reactants deplete; the reverse rate starts at zero and rises as products build, until they meet

Exercise 3.2 (b)

3.2 A reversible reaction is placed in a closed flask starting with only reactants.

(b) State what is true of the rates at equilibrium. [1]



closed flask

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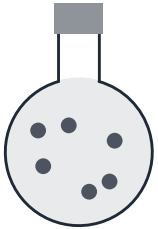

closed flask

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(b)

- They are equal

Exercise 3.3

3.3 Explain why equilibrium is called “dynamic” even though concentrations do not change. [2]

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3.3

- The forward and reverse reactions continue at equal rates, so molecules keep converting both ways; the concentrations stay constant only because the two rates cancel