Chapter Summary Worksheet

Chapter 1 Rates: how fast?

Print out and complete this worksheet to generate a summary for Chapter 1.

1 Which is the best description of the rate of reaction?

- ☐ **A** the rate of change of the concentration of a reactant
- ☐ **B** the change in concentration divided by the time for that change
- ☐ **C** the time for the reaction to go to a certain point
- ☐ **D** 1/the time for the reaction to go to a certain point

2 The main reason that an increase in temperature increases the rate of a reaction is that:

- ☐ **A** there is an increase in the frequency of collision
- ☐ **B** the activation energy is less at a higher temperature
- ☐ **C** the activation energy is greater at a higher temperature
- ☐ **D** a greater proportion of the collisions have energy greater than or equal to the activation energy

3 Which would **not** work for following the oxidation reaction of propan-2-ol with acidified potassium dichromate(VI) solution?

- ☐ **A** colorimetry
- ☐ **B** quenching with ice-cold water and titrating the remaining potassium dichromate with iron(II) ions
- ☐ **C** IR spectroscopy
- ☐ **D** polarimetry

4 The rate equation for the substitution reaction between aqueous sodium hydroxide and 2-bromo-2-methylbutane is:

rate = k[2-bromo-2-methylbutane]

The first step in the mechanism is:

- ☐ **A** nucleophilic attack by OH^- ions on the carbon atom in the C–Br bond
- ☐ **B** breaking of the C–Br bond to form a carbocation
- ☐ **C** breaking of the C–Br bond to form a carboanion
- ☐ **D** the forming of the C–O bond as the C–Br bond breaks

5 When hydrogen cyanide, HCN, adds on to propanal in slightly alkaline solution, the product has no effect on the plane of polarisation of plane-polarised light. This is because:

- ☐ **A** the product is not chiral
- ☐ **B** the intermediate is planar
- ☐ **C** the bonds around the carbonyl carbon atom are in a plane
- ☐ **D** in propanal, there are only three atoms attached to the carbonyl carbon

6 The units of the rate constant, k, for a 3rd order reaction are;

- ☐ **A** $mol^{-1}\,dm^3\,s^{-1}$
- ☐ **B** $mol^{-2}\,dm^6\,s^{-1}$
- ☐ **C** $mol\,dm^{-3}\,s^{-1}$
- ☐ **D** $mol^2\,dm^{-6}\,s^{-1}$

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7 In a certain reaction, a graph of the concentration of a reactant, X, against time was a downward-sloping straight line. Which of A–D is a correct statement about the order of this reaction with respect to X?

- ☐ **A** It is zero order.
- ☐ **B** It is first order.
- ☐ **C** It depends on the order of the other reactants.
- ☐ **D** It cannot be told from the data.

8 Which is **not** shown in a reaction profile diagram?

- ☐ **A** the enthalpy change of the reaction
- ☐ **B** the activation energy of the forward reaction
- ☐ **C** the activation energy of the back reaction
- ☐ **D** the rate of the reaction

9 Which is true about the half-life for a second-order reaction?

- ☐ **A** It is constant.
- ☐ **B** It doubles as the concentration of the reactant halves.
- ☐ **C** It goes up by a factor of 4 as the concentration of the reactant halves.
- ☐ **D** Half-lives only apply to first order reactions.

10 The S_N1 alkaline hydrolysis of a single optical isomer of 1-fluoro-1-iodoethane would give:

- ☐ **A** a single isomer of 1-fluoroethan-1-ol
- ☐ **B** a racemic mixture of 1-fluoroethan-1-ol
- ☐ **C** a single isomer of 1-iodoethan-1-ol
- ☐ **D** a racemic mixture of 1-iodoethan-1-ol

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