

Core questions – Chemistry unit 6 – Rate and extent of chemical change

No.	Question	Answer
1	What is the rate of a chemical reaction?	The speed at which the reactants are changed into products
2	What equations can we use to calculate the rate of reaction?	$\text{mean rate of reaction} = \frac{\text{quantity of reactant used}}{\text{time taken}}$ $\text{mean rate of reaction} = \frac{\text{quantity of product formed}}{\text{time taken}}$
3	What units are used to measure the quantity of reactant or product?	Mass in grams (if it is a solid), or volume in cm ³ (if it is a gas)
4	What units can be used to represent the rate of reaction?	Grams per second (g/s) or cubic centimetres per second (cm ³ /s)
5	What is 'collision theory'?	Chemical reactions only occur when the reacting particles collide with each other with sufficient energy
6	What is the 'activation energy'?	The minimum amount of energy the particles need to collide with to react
7	What four factors can affect the rate of reaction?	Temperature, concentration or pressure, surface area, use of a catalyst
8	What happens to the rate of reaction if the temperature is increased?	Increases
9	Why does the rate of reaction increase if the temperature of the reactants is increased?	There are more successful collisions because the particles have more energy There are more frequent collisions because they are moving faster
10	What happens to the rate of reaction if concentration or pressure is increased?	Increases
11	Why does the rate of reaction increase if the concentration or pressure of the reactants is increased?	There are more frequent collisions because there are more particles in the same space
12	What happens to the rate of reaction if the surface area of the reactant is increased?	Increases
13	How can you increase the surface area of a reactant?	Cut it into smaller pieces
14	Why does the rate of reaction increase if the surface area of the reactant is increased?	There are more frequent collisions because there is a higher surface area to volume ratio meaning there are more particles exposed
15	What is a catalyst?	A substance used to speed up a chemical reaction
16	Why does using a catalyst increase the rate of reaction?	They provide an alternative reaction pathway with a lower activation energy
17	What happens to a catalyst during a reaction?	Nothing, they are not used up
18	Draw a reaction profile for an exothermic reaction before and after a catalyst has been used?	

19	What are three different ways we can measure the rate of a reaction?	Time how long it takes for the colour of a solution to change Time how long it takes for a substance to lose mass (if a gas is given off) Time how long it takes to collect gas in a gas syringe
20	Why might the colour of a solution change during a reaction?	If one of the products of the reaction is a precipitate (a solid)
21	What would be plotted on the axis of a graph if you were recording the volume of gas produced at regular time intervals?	Time on the x - axis, volume of gas on the y - axis
22	Draw a sketch graph of the volume of gas produced over time during a chemical reaction?	
23	How do we tell when the reaction has stopped on a rate of reaction graph?	The line becomes horizontal (the line is flat – no more gas is produced)
24	How can you calculate the rate of a chemical reaction at a certain point, from a graph?	The gradient of the graph at that point
25	What is a reversible reaction?	A reaction in which the products of the reaction react to produce the original reactants
26	What is the symbol for a reversible reaction?	\rightleftharpoons
27	How are reversible reactions represented?	$A + B \rightleftharpoons C + D$
28	When does a reversible reaction reach 'equilibrium'?	When the forward and reverse reactions occur at exactly the same rate
29	What is needed for equilibrium to be achieved in a reaction?	A closed system – none of the reactants can escape, and nothing else can get in
30	What happens to the concentration of the products if the equilibrium of a reaction lies to the right?	The concentration of products is greater than that of the reactants
31	What happens to the concentration of the products if the equilibrium of a reaction lies to the left?	The concentration of the products is less than that of the reactants
32	What factors can change the position of equilibrium?	Temperature, pressure, changing the concentration of reactants or products
33	What sort of energy transfers take place in a reversible reaction?	If it is exothermic in one direction (gives out energy), it is endothermic in the opposite direction (takes in energy)
34	What happens to the total amount of energy in the forward and backward reaction in a reversible reaction?	It remains the same
35	What is Le Chatelier's Principle? (higher tier)	If you change the conditions of a reversible reaction at equilibrium, the system will try to counteract that change
36	What happens to the reaction's equilibrium if the temperature of the reaction is decreased? (higher tier)	It will move in the exothermic direction to produce more heat You will get more products for the exothermic reaction

37	What happens to the reaction's equilibrium if the temperature of the reaction is increased? (higher tier)	It will move in the endothermic direction to try to decrease the temperature. You will get more products for the endothermic reaction
38	What happens to the reaction's equilibrium if the pressure of the reaction is decreased? (higher tier)	It will move towards the side where there are more molecules of gas
39	What happens to the reaction's equilibrium if the pressure of the reaction is increased? (higher tier)	It will move towards the side where there are less molecules of gas
40	What happens to the reaction's equilibrium if the concentration of the reactants is increased? (higher tier)	The reaction makes more products
41	What happens to the reaction's equilibrium if the concentration of the products is decreased? (higher tier)	More reactants will react (decreasing the number of reactants)