

Rates

1 What do you see when magnesium is added to an acid?

A Fizzing and the magnesium disappears



Rates

2 How do you show that concentration affects rate (6)?

A: Add Mg to acid and start stopwatch. Count the number of bubbles in a given time frame. Repeat with different acid concentration. Keep size of Mg, time and volume of acid same.



Rates

3 Why do catalysts work for a long time before they need to be replaced?

A: They are not used up in a reaction.



Rates

4 What happens to a catalyst at the end of a reaction?

A: Regenerated.



Rates

5 Explain the shape of a 'volume-time' rates graph.

A: Steepest at start as concentration of reactants highest. Becomes less steep as concentration of reactants lowers as they form products. Flattens as concentration of reactants reaches zero and reaction is finished.



Rates

6 When water is sprayed onto a fire caused by the reaction between magnesium and acid, why does the reaction slow down?

A: temperature is lowered so particles slow down and there are fewer successful collisions. Acid gets diluted so concentration decreases and there are fewer collisions.



Rates

7 Chewing antacid tablets is better than swallowing them whole. Why?

A: Chewing increases the surface area so the tablets dissolve faster.



Rates

8 Define rate of reaction

A: Change of concentration of reactant (or product) over time



Rates

9 What is the collision theory?

A: The rate of reaction depends on the frequency of successful collisions between particles. For the collision to be successful the particles must exceed the activation energy.



Rates

10 Define activation energy

A: Minimum amount of energy needed to start a reaction.



Rates

11 How do you find the rate of a precipitation reaction?

A: Time how long it takes for the precipitate to obscure a black cross once the chemicals have been mixed.



Rates

12 How do you find the rate of a reaction that produces a gas?

A: Use a gas syringe and time how long it takes to collect a specified volume of gas.



Rates

13 Why should bread be placed in the fridge?

A: The temperature is lowered so the rate of decomposition slows down.



Rates

14 How and why does increasing temperature increase rate?

A: Particles gain kinetic energy so the collision frequency increases. Particles gain thermal energy and more particles have the activation energy to react on collision.



Rates

15 Why does increasing the concentration increase the rate?

A: There are more particles available so more collisions are likely.



Rates

16 What is a catalyst?

A: A substance that increases the rate of reaction.



Rates

17 How does a catalyst work?

A: It provides an alternative reaction pathway with a lower activation energy.



Rates

18 How does a biological washing powder work?

A: It contains enzymes which are biological catalysts. The cleaning process can occur at lower temperatures and save energy.



Rates

19 Draw a graph that shows a reaction at two different temperatures.

A: Both lines level out at the same volume and the graph for the higher temperature is steeper.



Rates

20 What can you tell me about the energy distribution of particles in a hot and a cold sample?

A: In a cold sample most particles have little energy and few have the required activation energy. In a hot sample more particles have the activation energy and fewer particles have little energy.



Rates

21 Which reaction is fastest?
1g limestone powder, 100ml acid, 30°C
1g limestone solid, 100ml acid, 40°C
1g limestone powder, 50ml acid, 40°C

A: last one



Rates

22 Which property of a catalyst will never change?

A: Mass



Rates

23 Why are catalysts often spread over a honeycomb surface?

A: To increase the surface area.



Rates

24 An experiment between magnesium and acid is carried out in the lab. The experiment is repeated with half the amount of magnesium. How is the time-volume graph different?

A: The graph levels out at half the volume of gas produced.



Rates

25 Although gold is rare and expensive, it is used as a catalyst in industry. Why?

A: You only need small amounts and the catalyst is not used up in the reaction.



Rates

26 Marble chips react with acid. At the end of the reaction there are still some chips left over. Why?

A: Either the chips were in excess or not sufficient acid was used.



Rates

27 Why does increasing the surface area increase the rate?

A: More particles are available for collisions.



Acids, Bases, Salts

28 Suggest a pH value for hydrochloric acid.

A: 1-3



Acids, Bases, Salts

29 What ions make ethanoic acid acidic?

A: H^+ ions.



Acids, Bases, Salts

30 What ions make ammonia solution alkaline?

A: OH^- ions.



Acids, Bases, Salts

31 Which acid is needed to make ammonium nitrate?

A: Nitric acid.



Acids, Bases, Salts

32 What is the formula of ammonium sulphate?

A:
 $(NH_4)_2SO_4$



Acids, Bases, Salts

33 Suggest a pH value for ammonia solution.

A: 10-13



Acids, Bases, Salts

34 What type of reaction occurs between sulphuric acid and ammonia?

A: Neutralisation.



Acids, Bases, Salts

35 Why do farmers use ammonium salts on their fields?

A: To help plants grow (as fertilisers)



Acids, Bases, Salts

36 What is a precipitate?

A: A solid formed when two aqueous solutions react.



Acids, Bases, Salts

37 What do plants use the nitrogen in fertilisers for?

A: To build amino acids and proteins.



Acids, Bases, Salts

38 How can solid lead iodide be separated from solution?

A: Filtration



Acids, Bases, Salts

39 How can copper sulphate crystals be separated from copper sulfate solution?

A: Evaporation



Acids, Bases, Salts

40 Why is KOH a strong alkali?

A: Because in solution it fully dissociates into K^+ and OH^-



Acids, Bases, Salts

41 Why is ethanoic acid a weak acid?

A: Because it only partially dissociates in solution.



Acids, Bases, Salts

42 What is the Brønsted-Lowry definition of an acid and base?

A: Acids are proton donors and bases are proton acceptors.



Acids, Bases, Salts

43 Write an ionic neutralisation equation including state symbols.

A: $H^+_{(aq)} + OH^-_{(aq)} \rightarrow H_2O_{(l)}$



Acids, Bases, Salts

44 What are the four state symbols and what do they mean?

A: s- solid, l- liquid, g- gas, aq- aqueous



Acids, Bases, Salts

45 What is produced when an acid reacts with a metal oxide?

A: Salt and water



Acids, Bases, Salts

46 What is produced when an acid reacts with a metal hydroxide?

A: salt and water.



Acids, Bases, Salts

47 What is produced when an acid reacts with a metal?

A: Salt and hydrogen.



Acids, Bases, Salts

48 What is produced when an acid reacts with a metal carbonate or metal hydrogen carbonate?

A: Salt, water and carbon dioxide.



Acids, Bases, Salts

49 What is produced when an acid reacts with ammonia?

A: an ammonium salt.



Acids, Bases, Salts

50 What is the difference between ammonia and ammonium?

A: ammonia is a base, ammonium is the ion formed when ammonia acts as a base. NH_3 is ammonia, NH_4^+ is ammonium.



Acids, Bases, Salts

51 When copper sulphate is made by reacting copper oxide with sulphuric acid, the acid is heated. Why?

A: To increase the rate of reaction.



Acids, Bases, Salts

52 How would you remove unreacted copper oxide from solution?

A: Filtration



Acids, Bases, Salts

53 Here is a word equation:
Copper oxide + sulphuric acid \rightarrow copper sulphate + water. Write down everything this equation tells you about the reaction.

A: The reactants copper oxide and sulphuric acid react to make the products copper sulphate and water.



Acids, Bases, Salts

54 Name the salt formed from hydrochloric acid.

A: metal chloride



Acids, Bases, Salts

55 Name the salt formed from sulphuric acid.

A: metal sulphate



Acids, Bases, Salts

56 Name the salt formed from nitric acid.

A: metal nitrate



Acids, Bases, Salts

57 Why is dry hydrogen chloride gas not acidic?

A: H is bonded to Cl in dry HCl and not dissociated.



Acids, Bases, Salts

58 Why is NaCl neutral?

A: It does not contain any hydrogen or hydroxide ions.



Acids, Bases, Salts

59 How do you make a soluble salt from an acid and an alkali?

A: Measure out acid using a pipette and transfer into conical flask. Add a few drops of indicator. Fill a burette with alkali. Add alkali to acid until indicator changes colour. Note down the volume of alkali used. Repeat without indicator, adding the same volume of alkali. Evaporate water slowly. Wash and dry the salt.



Acids, Bases, Salts

60 How do you make a soluble salt from an acid and a solid base?

A: Warm acid. Add excess solid base until no more dissolves. Filter off excess base. Evaporate water slowly, wash and dry the salt.



Acids, Bases, Salts

61 Which salts are insoluble?

A: Barium, silver and lead sulphate; silver and lead halides, transition metal hydroxides.



Acids, Bases, Salts

62 Which salts are soluble?

A: nitrates, chlorides (apart from lead and silver chlorides), group 1 salts, ammonium salts



Acids, Bases, Salts

63 How does UI show the difference in acid strength when added to ethanoic acid and hydrochloric acid of same concentration?

A: UI goes red in HCl and orange in ethanoic acid.



Chromatography

64 What is the purpose of gas chromatography?

A: To separate substances in mixtures.



Chromatography

65 What information does the molecular ion peak provide?

A: Relative formula mass of a compound.



Chromatography

66 Give two reasons for and two against using instrumental methods for analysis.

A: they are quicker and more accurate than lab techniques and can detect smaller quantities. They take special training to use; results can only be interpreted by comparison with data from known substances.



Chromatography

67 Describe how paper chromatography works.

A: Place pencil line 1cm from paper base (pencil will not smudge). Place ink sample on pencil line and place paper in water. Careful that the water level is below the pencil line. Wait for the water to rise up the paper. Water is a solvent which will dissolve the solute (ink). Ink that dissolves well will travel further up the paper.



Chromatography

68 Describe how gas chromatography works.

A: Sample is injected and vaporised. Sample is carried by a carrier gas through the column packed with a solid. Sample is separated inside column as substances travel through the column at different speeds. (time taken to travel is called the retention time). Substances arrive at detector which matches the retention time against a known database.



Chromatography

69 Why is it important to identify food additives in foods?

A: To check that they are safe to consume.



Chromatography

70 When a blood sample is taken from an athlete, it is split into 2 portions and tested in different labs.

Why

A: To avoid bias and improve reliability.



Chromatography

71 Give two advantages of gas chromatography over paper chromatography.

A: Faster, more accurate, works with smaller amounts.



Chromatography

72 How do you interpret a paper chromatogram?

A: Compare the number of dots and the level at which they appear to that of a known substances.



Endo Exo

73 How can you show that a reaction is exothermic?

A: Use a thermometer to find the temperature of the surroundings before and after the reaction. If the temperature rises, the reaction is exothermic. If the temperature drops, the reaction is endothermic.



Endo Exo

74 What is the meaning of endothermic?

A: Energy is taken from the surroundings to the chemical system.



Endo Exo

75 In an endothermic reaction the temperature of the surroundings drops. Why?

A: Energy is transferred from the surroundings to the chemical system.



Endo Exo

76 Give examples of endo and exothermic reactions.

A: Combustion and respiration are exothermic. Thermal decomposition and photosynthesis are endothermic.



Endo Exo

77 If a forward reaction is exothermic, what do you need to do to reverse the reaction?

A: Add heat as the reverse reaction will be endothermic.



Endo Exo

78 How do you know from an energy profile diagram that a reaction is exothermic?

A: The energy of the products is below the energy of the reactants.



Endo Exo

79 How do you know from an energy profile diagram that a reaction is endothermic?

A: The energy of the products is above the energy of the reactants.



Endo Exo

80 How do you convert blue hydrated copper sulphate into white anhydrous copper sulphate?

A: Supply heat to evaporate the water present in the blue hydrated copper sulfate



Endo Exo

81 Give a use for anhydrous copper sulphate.

A: To detect/absorb moisture. It will turn blue if water is present.



Electrolysis

82 Write a half equation for the formation of chlorine gas from chloride ions.



Electrolysis

83 Write a half equation for the formation of hydrogen gas from hydrogen ions.



Electrolysis

84 Write a half equation for the formation of oxygen gas from oxide ions.



Electrolysis

85 Write a half equation for the formation of aluminium from aluminium ions.



Electrolysis

86 Why is the formation of chlorine from chloride ions classed as oxidation?

A: Each chloride ion loses an electron.



Electrolysis

87 Why is the formation of sodium from sodium ions classed as reduction?

A: Because each sodium ion gains an electron.



Electrolysis

88 What is an electrolyte?

A: The substance that is to be electrolysed. Molten ionic substance or ionic solution.



Electrolysis

89 What is electrolysis?

A: Decomposing a compound using electricity.



Electrolysis

90 Why do chloride ions move to the anode?

A: Chloride ions (anions) are negatively charged, the anode is positively charged; opposites attract.



Electrolysis

91 Why do hydrogen ions move to the cathode?

A: hydrogen ions (cations) are positively charged and move to the negatively charged cathode because opposites attract.



Electrolysis

92 How can you plate a spoon in silver?

A: Make the spoon the cathode. Use a silver anode and silver nitrate electrolyte. Silver atoms from the anode lose an electron each and join the electrolyte. The electrons travel via the external circuit to the cathode. The silver ions move through the electrolyte to the cathode where they gain one electron each and form silver atoms.



Electrolysis

93 During the electrolysis of brine hydrogen is produced at the cathode instead of sodium. Why?

A: sodium is more reactive than hydrogen so the sodium ions will stay in solution.



Electrolysis

94 During electrolysis, which particles carry the electric current through the solution and which particles carry the current through the external wire?

A: ions carry the current through the solution and electrons carry the current through the wire.



Electrolysis

95 During the electrolysis of brine, what are the three products? What are they used for?

A: Hydrogen gas is produced at the cathode. Hydrogen is used to make ammonia. Chlorine is produced at the anode. Chlorine is added to water to disinfect the water. Sodium hydroxide solution is left behind. This is used to make soap or paper.



Electrolysis

96 Why does electrolysis of solid KBr not work?

A: The ions are not free to move in solid KBr.



Electrolysis

97 Describe the electrolysis of brine.

A: graphite electrodes and sodium chloride solution as electrolyte. Hydrogen ions travel to the cathode where they gain an electron each, pair up and form H_2 molecules. Chloride ions travel to the anode where they lose one electron each, pair up and form Cl_2 molecules. Na^+ and OH^- ions are left behind in solution.



Electrolysis

98 Describe the electrolysis of molten aluminium oxide.

A: Cryolite is added to the mix to reduce the melting point and save energy. Graphite electrodes are used. Aluminium cations move to the cathode to gain 3 electrons each and form aluminium atoms. Oxide ions travel to anode to lose 2 electrons each, pair up and form oxygen molecules and react with the anode to make CO_2 . Anodes need to be replaced periodically as a result.



Electrolysis

99 Describe how you would produce pure copper from a lump of impure copper.

A: Use impure copper as anode. Use pure copper as cathode. Use copper sulphate as electrolyte. Copper atoms from anode lose 2 electrons each, form copper ions and join electrolyte. Electrons travel through wire to cathode. Copper ions receive two electrons each, form copper atoms and join the cathode.



Moles

100 What is a mole?

A: An amount of substance. Specifically, a mole represents the number 6.023×10^{23}



Moles

101 What is the mass of one mole of HCl?

A: 36.5 g



Moles

102 What is the mass of 2 moles of carbon?

A: mass = Mr x mole
 $2 \times 12 = 24\text{g}$



Moles

103 What is an empirical formula by definition?

A: The simplest ratio of elements in a compound. For example if the molecular formula is $\text{C}_6\text{H}_{12}\text{O}_6$, the empirical formula is CH_2O .



Moles

104 How do you work out the empirical formula from mass or % by mass data?

A: divide each mass or % by the relative atomic mass of the appropriate element. Work out the simplest whole number ratio by dividing all answers by the smallest answer.



Moles

105 Why is the % yield rarely 100% in an experiment?

A: if the reaction is reversible, some product reacts back to the reactant. Reactants might be impure. Side reactions might occur, some product lost during filtration processes.



Moles

106 A company wants to make 6.8t of ammonia from nitrogen and hydrogen. How much nitrogen and hydrogen do they need?

A: $\text{N}_2 + 3\text{H}_2 \rightarrow 2\text{NH}_3$.
Using the atomic masses:
 $28\text{t N}_2 + 6\text{t H}_2 \rightarrow 34\text{t NH}_3$.
6.8 is $1/5^{\text{th}}$ of 34, so $1/5^{\text{th}}$ less of nitrogen and hydrogen is needed: 5.6t nitrogen and 1.2t hydrogen.



Moles

107 How do you calculate percentage yield?

A: Actual yield/theoretical yield $\times 100$



Moles

108 What is the relative formula mass on water?

A: 18. $\text{H} = 1$, $\text{O} = 16$; $\text{H}_2\text{O} = 2 + 16 = 18$



Bonding

124 Describe how potassium atoms are formed from potassium ions.

A: Each potassium ion (K^+) gains one electron.



Bonding

125 Why are alloys harder than pure metals?

A: In an alloy the layers are distorted due to different sized atoms being part of the structure. This means the layers cannot slide in an alloy.



Bonding

126 Why is methane a gas at room temperature?

A: It has a boiling point below room temperature as there are only weak intermolecular forces that hold the molecules together. Little energy is needed to overcome these forces.



Bonding

109 Name the type of bond present in methane.

A: Covalent bond



Bonding

110 What is a covalent bond?

A: A shared pair of electrons.



Bonding

111 What is an ionic bond?

A: The electrostatic attraction between oppositely charged ions.



Bonding

112 What is a metallic bond?

A: The electrostatic attraction between the positive metal ions and the sea of delocalised electrons.



Bonding

113 What are nano-particles?

A: Very small particles 1-100nm in size.



Bonding

114 Describe in terms of electrons what happens when Magnesium reacts with iodine.

A : Magnesium loses 2 electrons and forms a Mg^{2+} ion. Iodine gains 1 electron and forms a I^- ion. Each magnesium atom reacts with 2 iodine atoms. The oppositely ions attract and form a giant ionic lattice.



Bonding

115 Explain why a high temperature is needed to melt ionic substances.

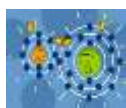
A: Ionic substances have giant ionic structures. Many strong bonds need to be broken. A lot of energy is needed to overcome the strong electrostatic attraction forces between the oppositely charged ions.



Bonding

116 Explain why metals have high melting points.

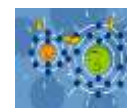
A: Metals form giant lattices made up of positive metal ions surrounded by a sea of delocalised electrons. A lot of energy is needed to overcome the strong metallic bonds.



Bonding

117 Explain why carbon nanotubes and graphite can conduct electricity.

A: Each carbon forms 3 covalent bonds with other carbon atoms. This leaves one outer electron per carbon atom free to move between the structure and carry a current.



Bonding

118 why does sodium chloride solution conduct electricity

A: The ions are free to move and carry charge.



Bonding

119 Explain why metals are good conductors of electricity and why this conductivity increases from Na to Al.

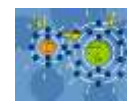
A: The outer shell electrons are free to move within the giant structure. Current is the flow of electrons. From Na to Al there are more free electrons per atom available to move.



Bonding

120 Explain why NaCl melts when heated and why molten NaCl conducts electricity.

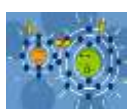
A: When heated the ions vibrate more until they have enough energy to break out of the rigid lattice and move freely. They are then able to move freely to the electrodes.



Bonding

121 Why is the melting point of diamond higher than that of NaCl?

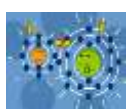
A: The attractive forces between the atoms in diamond are stronger. Each carbon atom in diamond forms 4 strong covalent bonds with other carbon atoms.



Bonding

122 Why is the melting point of NaCl high whereas paraffin wax melts easily?

A: NaCl is ionic so has strong ionic bonds between ions; paraffin is molecular and has weak intermolecular forces between molecules.



Bonding

123 The formula of ammonia is NH_3 . What does this tell you about ammonia?

A: It contains nitrogen and hydrogen atoms that are covalently bonded. Each nitrogen atom is bonded to 3 hydrogen atoms. Nitrogen has 3 bonded electron pairs and one lone electron pair.



Bonding

127 How can the shape of a metal be changed without the metal breaking?

A: The metal ions can move when a force is applied. The free electrons can move between the ions to prevent repulsion.



Bonding

128 What property of diamond makes it suitable for use on the cutting drill bit?

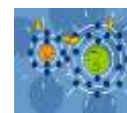
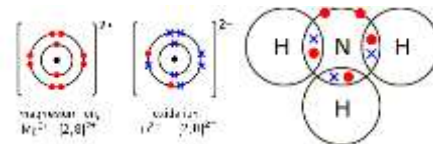
A: Hard, rigid, high melting point.



Bonding

129 Draw a dot and cross diagram for MgO and NH₃.

A:.



Bonding

130 Why does graphite rub off a pencil onto paper?

A: There are only weak intermolecular forces between the layers in graphite. These are easily broken so that the layers can slide and transfer onto the paper.



Bonding

131 Explain why a thermosoftening polymer is not suitable for packaging hot food.

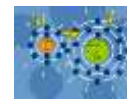
A: It would melt and lose its shape because there are only weak intermolecular forces between the polymer chains which require little energy to break.



Bonding

132 Explain why some polymers are thermosetting.

A: Because the chains cannot slide because they have cross-links between them.



Bonding

133 Poly(ethene) can be made with different properties. The properties depend on the conditions used when poly(ethene) is made. Suggest **two** conditions which could be changed when poly(ethene) is made.

A: Pressure, temperature, solvent, catalyst.



Bonding

134 Describe, as fully as you can, the structure and bonding in diamond and explain why it does not conduct electricity.

A: Diamond forms a giant covalent structure. Each atom forms 4 strong covalent bonds to other carbon atoms.



Bonding

135 Explain why silicon dioxide is a suitable material for lining furnaces.

A: forms a giant covalent structure and has a very high melting point.

