Knowledge Quizzes

GCSE Chemistry

Foundation Paper 1

Tips:

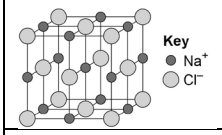
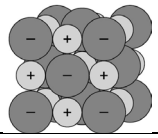
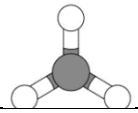
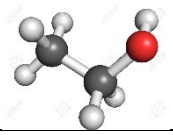
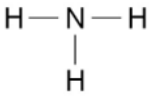
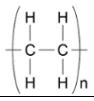
- Learn one quiz at a time. Cover the right hand side and go through each question, checking the answers as you go.
- Get a friend or family member to quiz you – in random order
- When you are feeling confident, cover the right side and write the answers to all the ones you can, then check them.

Atomic model

Question	Answer
1. What is an element?	A substance that contains only one type of atom
2. What is a compound?	A substance that contains 2 or more elements chemically bonded together
3. What is a mixture?	A substance containing 2 or more elements or compounds that are not joined together
4. What method would you use to separate a mixture of 2 or more dissolved substances?	Chromatography
5. What method would you use to separate a mixture of a liquid and an insoluble solid?	Filtering
6. Ethanol and water mix together to form a solution – what method could be used to separate the two liquids?	Distillation
7. What was the 'plum pudding' model of the atom?	The atom consisted of a cloud of positive charge with electrons randomly scattered within it
8. Which atomic particle was discovered first?	Electron
9. What was the major change to the atomic model that came from the 'alpha scattering' experiment?	The positive charge was contained in a very small nucleus
10. Which particle did Chadwick discover?	Neutron
11. What is needed in order to change a scientific model and replace it with a new one?	New evidence
12. What is the charge on a proton?	+1
13. What is the charge on an electron?	-1
14. Why are atoms neutral overall?	They contain the same number of protons and electrons
15. What makes one element different from another?	They have different protons
16. What is the size of an atom?	1×10^{-10}m
17. How much smaller than the atom is the nucleus?	10 000 X
18. What is an isotope?	An atom with the same number of protons but different numbers of neutrons
19. How do you use the numbers on the periodic table to calculate the number of neutrons in an atom?	Subtract the atomic number from the mass number
20. What are the differences between the plum pudding model and the nuclear model?	Plum pudding had positive charge throughout the atom, nuclear has it within a small nucleus Plum pudding has randomly scattered electrons, nuclear model has them orbiting in shells
21. What is the mass of a proton?	1
22. What is the mass of a neutron?	1

Question	Answer
1. What is used to order the elements in the modern periodic table?	Atomic number / proton number
2. What was used in early versions of the periodic table?	Atomic weight
3. What do all elements in the same group have in common?	Same number of electrons in the outer shell
4. What did Mendeleev do in his periodic table?	Left gaps for undiscovered elements
5. What do we call atoms with the same number of protons but different numbers of neutrons?	Isotopes
6. What do we call the elements that react to form positive ions?	Metals
7. What type of elements form negative ions?	Non-metals
8. Give 3 properties of metals	Conduct electricity, conduct heat, shiny when fresh cut
9. Give 3 properties of non-metals	Don't conduct electricity, low melting and boiling points, dull
10. Why are group 0 elements unreactive?	They have full outer shells so do not need to gain or lose any electrons
11. What happens to their melting and boiling points as you come down the group?	The melting and boiling points increase down the group
12. What are the group 1 metals called?	Alkali metals
13. What happens to reactivity coming down group 1?	Reactivity increases down the group
14. Why does this happen?	The outer shell electron is further away from the nucleus and more shielded, so is more easily lost
15. What are the two products when a group 1 metal reacts with water?	An alkali and hydrogen gas
16. What can be added to the solution to prove an alkali has formed?	Universal indicator
17. What are the group 7 elements called?	Halogens
18. How many electrons are in their outer shells?	7
19. What happens to melting and boiling point coming down group 7?	It increases
20. Why do melting and boiling points increase coming down group 7?	The molecules get bigger, so the intermolecular forces are stronger and so it takes more energy to overcome the forces
21. What happens to reactivity coming down group 7?	Reactivity decreases down the group
22. Why does reactivity increase coming down group 7?	The outer shell is more shielded and further away, so it gets harder to attract an electron into the outer shell
23. When a more reactive halogen is added to a solution of a compound of a less reactive halogen, what happens?	The more reactive halogen displaces the less reactive one
24. What sort of compounds do group 7 elements form with metals?	Ionic
25. Describe 2 properties of these compounds	White crystalline solids, high melting points

Chemical bonds

Question	Answer
1. What are the 3 types of bonds?	Ionic, covalent, metallic
2. What type of particles form ionic bonds?	Metals and non-metals
3. What is a covalent bond?	A shared pair of electrons
4. What type of particles form covalent bonds?	Non-metal atoms
5. What do the particles share in metallic bonding?	Delocalized electrons
6. Where is metallic bonding found?	Metals and alloys
7. What type of elements lose electrons to form positive ions?	Metals
8. What type of elements gain electrons to form negative ions?	Non metals
9. What type of force holds the ions together in the ionic lattice?	Electrostatic
10. Which group in the periodic table do ions resemble?	The noble gases
11. . What is the name of this structure? 	Giant ionic lattice (of sodium chloride)
12. What sort of bonding is shown: 	Ionic
13. What sort of bonding is shown: 	Simple covalent
14. How would you use the diagram below to write the formula for the compound it represents? 	Count the number of each type of atom and then use it to write the formula, eg C_2H_5OH
15. What sort of bonding is shown? 	Simple covalent
16. What are the two types of covalent substance?	Simple molecular and giant
17. What holds metals together in metallic bonding?	Attraction between the metal ions and the delocalized electrons
18. What does the ‘n’ represent in polymer diagrams? 	A large number

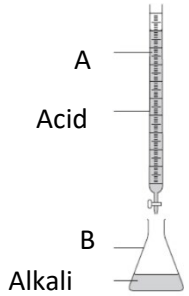
Bonding and properties

Question	Answer
1. What does an (s) in an equation mean?	Solid (insoluble)
2. What state of matter is represented by (l)?	Liquid
3. How would a gas be represented in an equation?	(g)
4. What two changes of state can happen at the melting point?	Melting and freezing
5. What two changes of state can happen at the boiling point?	Boiling and condensing
6. What does (aq) mean?	Aqueous solution – dissolved in water
7. What forces of attraction are found in ionic compounds?	Electrostatic
8. Why are the melting and boiling points of ionic compounds so high?	The electrostatic forces are strong so it takes lots of energy to overcome all of them in the ionic lattice
9. Why are carbon dioxide and oxygen gases at room temperature?	Because their boiling point is lower than room temperature (they are simple covalent molecules)
10. Why do small molecules have low melting and boiling points?	The forces between the molecules are weak and don't need much energy to overcome
11. What happens to melting and boiling points as molecules get bigger and why is this?	They increase
12. Why do simple covalent molecules not conduct electricity?	The molecules have no overall charge
13. What sort of bonding is found in polymers?	Covalent
14. Why are polymers normally solids at room temperature?	Because they are large molecules so the forces of attraction are fairly strong
15. What sort of structures are diamond, graphite and silica examples of?	Giant covalent structures
16. Why do they have high melting and boiling points?	Lots of energy is needed to break all the strong covalent bonds
17. What sort of bonding is found in metals like gold and silver?	Metallic
18. Why do metals conduct electricity?	Because they have delocalized electrons that are able to move through the metal
19. Why are pure metals easily bent and shaped?	The layers of atoms are able to slide over each other easily
20. What is an alloy?	A mixture of metals
21. Why are alloys stronger than pure metals?	Because the layers are disrupted so they cannot slide
22. How many other carbon atoms is each carbon bonded to in diamond?	4
23. Why is diamond hard?	Giant structure of very strong covalent bonds
24. How many covalent bonds does each carbon make in graphite?	3
25. Why does graphite conduct electricity?	It has delocalized electrons that can move through the graphite
26. Why is graphite slippery?	Graphite is in layers and they are able to move over each other
27. What is graphene?	A single layer of graphite
28. What type of molecules are based on hexagonal rings of carbon atoms?	Fullerenes
29. What type of structure is shown in the diagram: 	nanotube

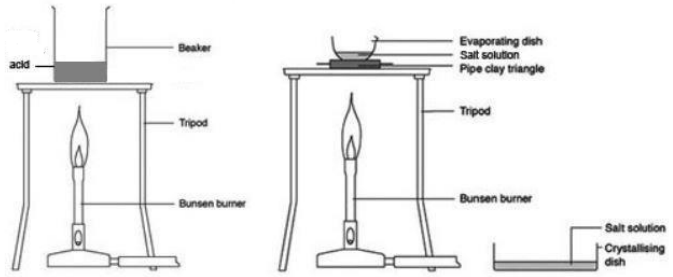
Bulk properties and nanoparticles

Question	Answer
1. How big is a nanoparticle?	1-100 nm
2. Approximately how many atoms does a nanoparticle contain?	A few hundred
3. Which particles have diameters of between 100 and 2500 nm?	Fine particles ($PM_{2.5}$)
4. Which particles have diameters of 1×10^{-5} m and 2.5×10^{-6} m?	Coarse particles (PM_{10})
5. What are coarse particles more commonly known as?	Dust
6. Why do nanoparticles have different properties than the same material in bulk?	Nanoparticles have a much larger surface area to volume ratio
7. Name a possible use for nanoparticles	Catalysts, sunscreens,
8. Name a concern with using nanoparticles for e.g sunscreen	They are small enough to get into the body and through cell membranes, and their effects are unknown
9. How do you calculate the surface area of a cube?	Calculate the area of one side (lxw) and then multiply by 6
10. How do you calculate the volume of a cube?	Length x width x height
11. If the side of cube decreases by a factor of 10, what happens to the surface area to volume ratio?	It decreases by a factor of 10
12. How does the size of a nanoparticle compare to the size of an atom?	A nanoparticle is larger – up to 1000 times larger as it contains a few hundred atoms
13. Why is 1g of nanoparticles of a metal likely to be a better catalyst than 1g of the same metal in powder form?	Larger surface area
14. Why is using nanoparticles for catalysts cost effective?	Because less is needed

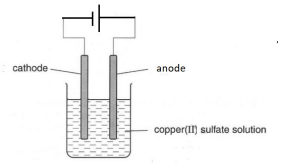
Q 15 -20 refer to the required practical on titration

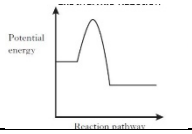
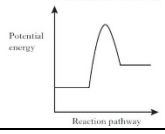
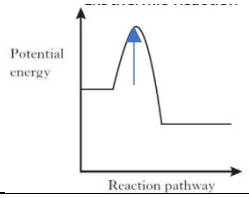
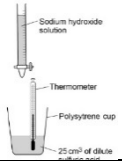


15. Name the equipment labelled A	
16. Name the equipment labelled B	
17. What is added to the conical flask to monitor the change in pH?	
18. Why are repeated readings taken?	
19. What equipment is used to measure out the volume of alkali as accurately as possible?	
20. What colour would universal indicator go when the solution is neutral?	

Question	Answer
1. What are the products when metals react with acids?	Salt and hydrogen gas
2. What is produced when acids react with bases?	Salt and water
3. What is an alkali?	A soluble base – contains OH^- ions
4. What type of salt is formed if hydrochloric acid is neutralized?	Chloride
5. What type of salt is formed if sulfuric acid is neutralized?	Sulfate
6. What type of salt is formed if nitric acid is neutralized?	Nitrate
7. How can soluble salts be obtained from solutions?	Crystallization / evaporation
8. Which particle makes a solution acidic?	H^+
9. Which particle makes a solution alkaline?	OH^-
10. Write the ionic equation for neutralization	$H^+ + OH^- \rightarrow H_2O$
11. What is the range of pH in the pH scale?	0-14
12. How can pH be measured?	Using universal indicator or a pH probe
13. What is the pH of a neutral solution?	7
14. What is the pH of an acid?	0-6.9
15. What is the pH of an alkali?	7.1-14
Q 16-24 relate the equipment below which can be used to make copper chloride 	
16. Which acid should be used?	Hydrochloric (to give a chloride)
17. Why is the acid heated?	To speed up the reaction
18. Name a suitable base to neutralize the acid	Copper oxide or copper carbonate
19. Why can copper metal not be used?	Copper does not react with acids
20. Why is the base added in excess?	To make sure the acid is fully neutralized
21. How would you know when the base is in excess?	Solid collects at the bottom of the beaker
22. How could the excess base be removed?	Filter
23. How would the salt be obtained from the solution?	Crystallization / evaporation
24. Name a piece of equipment that the dish could be placed in to crystallise the solution safely	Drying oven

Electrolysis

Question	Answer
1. Why can ionic compounds conduct electricity when molten or in solution?	The IONS can move
2. Why can ionic compounds NOT conduct electricity when they are solids?	The ions are unable to move as they are stuck in the lattice
3. What is an electrolyte?	A solution or liquid that is able to conduct electricity
4. What is electrolysis?	Splitting (NOT separating) a compound using electricity
5. What is the name of the negative electrode?	Cathode
6. What is the name of the positive electrode?	Anode
7. What happens to positive ions at the cathode?	They gain electrons (reduced) to become atoms
8. What happens to negative ions at the anode?	They lose electrons (oxidized) to become atoms
9. What is the gain of electrons called?	reduction
10. Which metals are extracted by electrolysis?	Metals that are too reactive to be reduced using carbon
11. Why does electrolysis use a lot of energy?	Lots of energy is needed to melt ionic compounds and then the production of the electric current
12. Why is graphite used in the electrodes?	Because it has delocalized electrons that can move and so it conducts electricity
13. Why is cryolite added to aluminium oxide before electrolysis?	To lower the melting point
14. What is formed at the cathode in the electrolysis of aluminium oxide?	Aluminium
15. What is the product at the anode in the electrolysis of aluminium oxide?	Oxygen
16. Why do the anodes need to be continually replaced?	The oxygen produced reacts with the carbon electrodes to make carbon dioxide
17. What does (aq) mean?	Dissolved in water – an aqueous solution
18. Which ions are also present if an ionic compound is dissolved in water and then electrolysed?	H^+ and OH^- ions
19. Why does hydrogen form at the cathode when solutions are electrolysed?	If the metal in the solution is more reactive than hydrogen, then hydrogen will be released
20. What is formed at the anode if solutions are electrolysed?	Oxygen or, if a halogen is present, the halogen (group 7 element)
Questions 21-26 are about the following equipment, used to electrolyse a solution of copper sulfate 	
21. Complete the diagram to label the other electrode and to complete the supply of electricity	
22. Which ions are present in the solution?	Cu^{2+} H^+ SO_4^{2-} OH^-
23. What will be formed at the cathode and why?	Copper – as it less reactive than hydrogen
24. What will be formed at the anode and why?	Oxygen – there is no halogen present
25. Name a solution that could be used instead of copper sulphate to produce hydrogen at the cathode	Potassium sulfate (substitute any metal that is more reactive than copper)
26. Name a solution that could be used instead of copper sulfate to produce chlorine at the anode	Copper chloride

Question	Answer
1. What is activation energy?	The minimum amount of energy needed to get a reaction started
2. What is an exothermic reaction?	One in which energy is transferred to the surroundings
3. Give 3 examples of exothermic reactions	Combustion, neutralization, oxidation reactions
4. Give an everyday use of exothermic reactions	Self heating cans and hand warmers
5. What is an endothermic reaction?	One in which energy is transferred from the surroundings to the reaction
6. Give 2 examples of endothermic reactions	Photosynthesis, thermal decomposition
7. What is energy needed for in a reaction?	In order to break bonds in the reactants
8. When is energy released during a reaction?	When new bonds are made in the products
9. When is a reaction exothermic overall?	If more energy is released when bonds are made than was needed to break bonds
10. When would a reaction be endothermic overall?	When more energy was required to break bonds than was released when bonds were made
11. What type of reaction is represented by the diagram shown: 	Exothermic
12. What type of reaction is represented by the diagram shown: 	Endothermic
13. Draw an arrow on the diagram to represent the activation energy	 Do NOT just draw an arrow pointing to the tip of the slope
Questions 14 – 18 relate to the equipment below which can be used to investigate the variables that affect temperature change by testing 'The temperature change in the solution depends on the volume of sodium hydroxide added' 	
14. Why is a polystyrene cup used for the reaction instead of a beaker?	To **reduce** energy transfers (don't say 'stop')
15. How could energy losses be reduced further?	Put a lid on the cup
16. If the reaction is exothermic, what will happen to the temperature?	It will increase
17. A digital temperature probe can be used instead of a thermometer. How could this affect the readings' a) accuracy b) resolution	a) It would increase the accuracy as the digital readout is easier to read b) resolution could be increased if the probe can measure to 1 or two decimal places
18. Name 3 control variables for the experiment	Concentration of both acid and alkali, volume of acid, starting temperature of the liquids (NOT the 'temperature of the room')