Science Knowledge Organiser

Year:	**9**
Term:	**Au1**

	Topic:	**The Three States (C.1)**
1	In which state do atoms have strong bonds between them?	Solid
2	Describe motion of particles in a solid, liquid and gas	S = Vibrating, L = Sliding, G = quick & random
3	In which state can diffusion NOT happen?	Solid
4	In which states, can particles not be compressed?	Solid & liquid
5	Which state is the least dense?	Gas
6	Which state is the most dense?	Solid
7	In which state are there weaker forces between particles?	Gases
8	In which state do particles remain in a fixed position?	Solid
9	What is the name for the change of state when a solid changes to a liquid?	Melted
10	What is the name for the change of state when a liquid changes to a gas?	Evaporation
11	What is the name for the change of state when a gas changes to a liquid?	Condensation
12	What is the name for the change of state when a liquid changes to a solid?	Freezing/solidifying
13	What is the name for the temperature where a liquid turns into a gas?	Boiling point
14	What is the name for the temperature where a solid turns into a liquid?	Melting point
15	Why is there no overall temperature change when a substance is changing state?	The particles are absorbing thermal energy to overcome the forces between them. The particles are absorbing thermal energy to overcome the forces between them. Particles are absorbing the thermal energy to overcome the forces between them.

	Topic:	**Elements, compounds (C.2)**
1	What is the name for substances made of only ONE type of atom?	Elements
2	What is the name for substances made of two or more types of atoms NOT chemically bonded together?	Mixtures
3	What is the name for substances made of two or more types of atoms chemically BONDED together?	Compounds
4	What is the formula for water?	H2O
5	What is the formula for Methane?	CH4
6	Define "alloy"	A mixture of a metal and at least one other element
7	Why are alloys harder than pure metals?	Different sized atoms distort the regular rows so that the layers can't slide over each other
8	What is the word for an element that always exists as two atoms bonded together?	Diatomic
9	Is an alloy an element, compound or mixture?	Mixture
10	What is the formula for glucose?	C6H12O6
11	Which elements exist diatomically?	N2, H2, O2 and all of group 7
12	How many electrons can be held in the first shell and then second and third shell of an atom?	First shell is TWO, all other shells EIGHT
13	What is the different between Ar (relative atomic mass) and Mr (relative molecular mass)	Ar = for an element Mr = for a compound
14	Define "ion"?	An electrically charged atom that has gained or lost electrons
15	How do you calculate Ar of an element	It is it's mass number

	Topic:	**Mixtures (C.3)**
1	Define "pure" substance	A single element or compound
2	What temperature is the melting point of water?	0ºC
3	What temperature is the boiling point of water?	100ºC
4	Define "formulation"	A mixture designed as a useful product
5	Give three examples of a formulation	Fuel, paint, alloys
6	Define "soluble"	Can dissolve
7	Define "insoluble"	Cannot dissolve
8	Define "solute"	A solid which can dissolve
9	Define "solvent"	A liquid in which a solid will dissolve
10	Define "solution"	A mixture of a dissolved solute and solvent
11	What is filtration used to separate?	An insoluble solid and a liquid
12	What is crystallisation used to separate?	A soluble solid and a solvent (collect solid)
13	What is simple distillation used to separate?	A soluble solid and a solvent (collect liquid)
14	What is fractional distillation used to separate?	Liquids with different boiling points
15	What is chromatography used to separate?	Different colours of ink or dye

	Topic:	**Chromatography (C.4)**
1	What are the two "phases" in chromatography?	Mobile and stationary phase
2	What is the "mobile phase" in chromatography	The solvent (that travels up the paper)
3	What is the "stationary phase" in chromatography	The paper
4	Why should the start line be drawn in pencil?	Because pencil will not dissolve and affect the results.
5	Why should the start line sit above the solvent?	So that the dots of ink or dye do not wash off the paper
6	Why do the dots of ink or dye need to be the same size?	To make it a fair test
7	How is the Rf value calculated?	Rf = distance by dye / distance by solvent
8	What does a high Rf value tell us?	The substance is more soluble and travelled further
9	What does a low Rf value tell us?	The substance is less soluble and travelled less distance
10	What should the Rf value always be?	A number between 0 - 1
11	What solvents are used in chromatography?	Water, alcohol, acetone
12	Where should the distance moved by the dye be measured from?	The same place each time (top, bottom or middle)
13	What is chromatography used for?	To separate different coloured compounds(dyes or inks)
14	How will temperature affect the rate of chromatography?	The higher the temperature, the faster the rate
15	How can chromatography be used to identify an unknown substance?	Compare with a known substance

	Topic:	**Structure of an atom (C.5)**
1	What is the charge, relative size and location of a proton?	Charge: 1+, Size = 1, Location = Nucleus
2	What is the charge, relative size and location of a neutron?	Charge: 0, Size = 1, Location = Nucleus
3	What is the charge, relative size and location of an electron?	Charge: -1, Size = 1/2000, Location = Shells
4	What is the radius of an atom?	0.1 nm (1 x 10 -10m)
5	What is the radius of a nucleus?	1 x 10 -14m
6	Define "atomic number"	No. of protons in an atom
7	Define "atomic mass number"	Sum of protons and neutrons in an atom
8	Define isotope?	Atoms of the same element that have the same number of protons but different numbers of neutrons
9	What was the Dalton model of the atom?	Atoms = tiny spheres
10	Describe Thompson's 'Plum Pudding' model of an atom.	Ball of positive charge with electrons embedded throughout
11	Describe Rutherford's model of the atom	1) Mostly empty space 2) dense, positive mass in the centre (the nucleus),
12	Describe the Neil's Bohr model of the atom	Positive nucleus orbited by negative electrons at specific distances from nucleus
13	Describe Chadwick's 'Nuclear Model' of an atom	Neutrons & protons in a +ve nucleus, -ve electrons in shells
14	What is the name for the current model of the atom?	Nuclear model
15	What 3 things did the alpha scattering experiment prove?	1) Nucleus = positive (deflected & reflected +ve α particles) 2) Nucleus = dense mass in centre of atom, 3) Rest = empty space

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	Topic:	**The periodic table (C.6)**
1	How are elements arranged in the periodic table?	In order of atomic number (lowest to highest)
2	What does the column (group) in the periodic table tells us?	Number of electrons in the outer shell
3	What are the rows of the periodic table called?	Periods
4	What did Mendeleev do when creating the modern periodic table?	Left gaps to make the pattern fit
5	Where are alkali metals found in the periodic table?	Group 1
6	Where are non-metals found in the periodic table?	Right
7	Name the groups in the periodic table (1, 7, 0)	1 = Alkali metals, 7 = Halogens, 0 = Noble gases
8	State 3 properties of group 7	Non-metal, highly reactive, diatomic
9	What happens to reactivity as you move down group 7?	They become less reactive - it is harder to gain an electron
10	What is the name of the elements found in the middle of the periodic table that are not part of a group?	Transition metals
11	Give 4 properties of metals	1) High melting point, 2) Good thermal and electrical conductors, 3) Ductile, 4) Malleable
12	Give 3 properties of non-metals	1) Low melting point, 2) Poor thermal and electrical conductors, 3)Brittle
13	Give 5 properties of the alkali metals	1) Highly reactive, 2) Low melting and boiling points, 3) Low density, 4) Shiny when cut, 5) Soft
14	What is formed when alkali metals react with water?	Alkaline metal hydroxide
15	What happens to reactivity as you move down group 1?	They become more reactive - it is easier to lose their outer electron.

	Topic:	**Metals and Prevention of Corrosion (Separate Only) (C.23)**
1	What is Corrosion? (separate only)	Destruction of materials by chemical reactions with substances in the environment
2	Give three ways of preventing corrosion (separate only)	Apply a coat that acts as a barrier (greasing, painting, electroplating)
3	Why doesn't aluminium rust? (separate only)	It is covered in a layer of aluminium oxide
4	What is it called when a less reactive metal is coated with a more reactive metal to prevent corrosion? (separate only)	Sacrificial protection
5	Give two conditions necessary for rusting (separate only)	Water and air (oxygen)
6	Which metals are contained within Bronze? (separate only)	Copper and Tin
7	Which metals are contained within Brass? (separate only)	Copper and zinc
8	When gold is used in jewellery, which metals is it normally mixed with? (separate only)	Silver, copper, zinc
9	What carat is pure gold? (separate only)	24 carat
10	Which elements do steel contain? (separate only)	Iron + carbon and other metals
11	State two properties of high carbon steel (separate only)	Strong but brittle
12	State two properties of low carbon steel (separate only)	Soft and easy to shape
13	Which elements do stainless steels contain? (separate only)	Iron, chromium and nickel
14	Give two properties of stainless steel. (separate only)	Hard and resistant to corrosion
15	State one property of aluminium alloys (separate only)	Low density

	Topic:	**Metals and Alloys (C.25)**
1	What is an 'ion.'?	A particle with a positive or negative charge.
2	How do atoms become ions?	Atoms become ions by gaining or losing electrons.
3	How do metals form ions?	Metals lose electrons to form positive ions (cations).
4	How do non-metals typically form ions?	Non-metals typically gain electrons to form negative ions (anions).
5	How do atoms become stable (no longer reactive)?	By gaining a full outer shell
6	State what the groups number tells us	How many electrons need to be lost (metals) or gained (non-metals) to become stable
7	What is a chemical property?	How a substance reacts with something
8	What is a physical property?	How a substance behaves physically e.g. boiling point, melting point, conductivity, density, state of matter
9	How would you describe atoms in pure metals?	The same size as one another
10	How are atoms in pure metals arranged?	In regular rows (in a lattice).
11	How would you describe atoms in alloys?	Of varying size because more than one type of atom is present.
12	How are atoms in alloys arranged?	Irregularly in distorted rows
13	Why are pure metals soft when hit?	Regular layers can easily slide over each other
14	State the definition of an alloy.	An alloy is a solid mixture containing at least one metal.
15	Why are alloys stronger than pure metals?	The irregular rows cannot easily slide over each other.

	Topic:	**RP: Chromatography (C6) (C.40)**
1	What is the aim of the experiment?	Investigate the colours that are found within a mixture of food colourings
2	What is the independent variable?	Dye/ink colour
3	What is the dependent variable?	Rf value
4	Name 3 controls variables	1) Start point of the colour 2) Size of the coloured dot 3) Start point of the solvent
5	Name 3 sources of error	1) Starting line drawn in ink 2) Solvent above the starting line 3) Dots too close together or too big
6	Why is a pencil used to draw the starting line?	To avoid any dye in a pen also moving up the paper
7	Name 3 types of solvent that can be used	Water, alcohol and acetone
8	How should the distance of the dye be measured?	Use a ruler to measure the distance between the starting line and the centre of the dye
9	How should the distance moved by the solvent be measured?	Use a ruler to measure the distance between the starting line and the top of the solvent line/curve
10	How is the Rf value calculated?	Rf value = distance moved by dye / distance moved by solvent
11	How do you use the Rf value to identify the unknown substance?	Compare with a known value from a data base
12	How could you identify the unknown substance visually?	Observe which known colours the unknown dye lines up with on the chromatography paper
13	What is used to transfer the dyes to the chromatography paper?	Capillary tube
14	What are the units for the Rf value?	No units
15	What are possible variations in this method?	Investigate whether this pen is a pure colour or a mixture.

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