



Getting Ready for...

KS4 (GCSE) Chemistry

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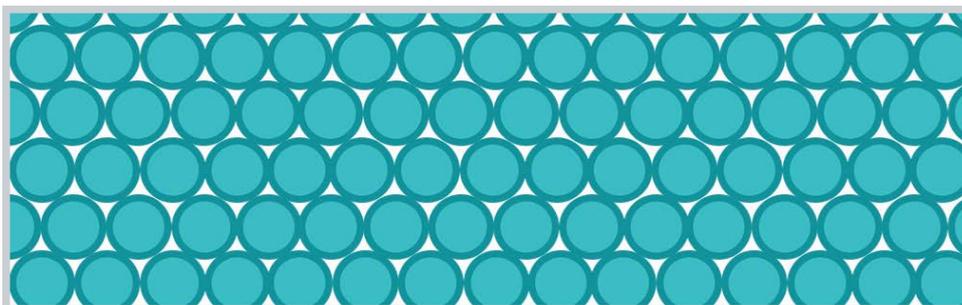
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Activities

1. Particles and states of matter

- Can you describe how particles in the three different states will behave? Can you explain gas pressure in terms of the movement of particles? You should be able to identify states from descriptions of the behaviour of the particles or from simple diagrams. You should be familiar with the use of the state symbols: s (solid), l (liquid), g (gas) and aq (aqueous or in solution). Practise drawing the particles in solids, liquids and gases.
- Can you name the different changes of state and explain them in terms of the energy and movement of particles? Write down why ice and iron have different melting points, using the idea of forces between the particles in your explanation. Write an explanation of why salt is able to dissolve in water in terms of what happens to the sodium and chloride ions in dissolving.



2. Atoms, elements and compounds

- Can you define the terms atom, element, compound and mixture and explain the differences between them? Can you name examples of each?
- Are you confident in your knowledge of the use of chemical symbols to represent elements and the formulae of commonly encountered compounds? Learn the symbols of the first 20 elements of the periodic table and formula for water, carbon dioxide, sodium hydroxide, ammonia, ammonium hydroxide and hydrochloric, nitric and sulphuric acids.
- Can you draw and label a simple model of an atom? Practise doing so. Do this for each of the first 20 elements of the periodic table if you can.

3. Pure and impure substances

- What is meant by a pure substance in chemistry?
- Can you name examples of mixtures? Do you understand that a solution is a mixture and can you explain what happens to the particles in the solid when



it dissolves? What mass does 5g of salt dissolved in 100ml [g] of water have? Why?

- Can you describe how to carry out different methods of separating the components of a mixture, including filtration, evaporation, distillation, chromatography?
- Can you define diffusion as the movement of particles of a liquid or gas from a region of high concentration to one of low concentration and explain it in terms of the movement of the particles? Can you use this knowledge to predict what will happen to the movement of particles in different situations?

4. Chemical reactions

- Can you explain chemical reactions as a rearrangement of chemical bonds and the changes that would be observed to indicate that a reaction has taken place? These include a change in temperature, colour or state or the production of light or sound as energy changes. Can you recall the law of the conservation of mass [and energy]?
- Can you represent chemical reactions as word equations and symbol equations? Have you interpreted symbol equations? Practise writing in long hand what is represented in different chemical [symbol] equations. Show these as word equations too.
- Can you explain what would happen in different kinds of chemical reactions such as combustion, thermal decomposition, oxidation and displacement? Can you name different examples of each?
- Can you define acids and alkalis in terms of their role in neutralisation reactions and place acidic and alkaline substances on the pH scale? Can you name different indicators and the colours they change to in different conditions of acidity and alkalinity? This includes the use of universal indicator, the pH scale and the range of colours that we see. Learn these and the pH of common substances.
- Learn the general equations:
Acid + metal \rightarrow a salt + hydrogen
And
Acid + alkali \rightarrow a salt + water
- You should be able to write word equations for common examples of those general equations and ideally also the balanced chemical equations. Remember that hydrochloric acid will produce salts that are chlorides, nitric acid will produce salts that are nitrates and sulphuric acid will produce sulphates. The name of the metal [or ammonium] comes at the start of the salt. Write word and balanced equations for the reactions of lithium and calcium with each of the three commonly encountered acids.



5. Energetics

- Can you relate energy changes to changes of state? For example, can you explain the effect of cooling a gas or a liquid or of heating a solid or a liquid? You should be able to do that in terms of the movement of the particles and changes of states, including naming the process (melting, freezing, condensing, evaporating).
- Can you define exothermic and endothermic reactions? Can you name examples of each?

6. The periodic table

- Can you recall and compare the properties of metals and non-metals? Are you able to give examples? Can you describe or predict the properties of different elements according to where they are on the periodic table?
- Can you explain the creation of Mendeleev's version of the periodic table and describe its features? Can you define the terms 'group' and 'period' in relation to the periodic table?
- Can you predict the properties and reactivity of the group 1 alkali metals and the group 7 halogens?

57 La 38.9055	72 Hf 178.49	73 Ta 180.9479	W 183.84	107 Bh (262)	108 Hs (265)
89 Ac (227)	104 Rf (261)	105 Db (262)	106 Sg (263)	62 Sm 150.36	63 Eu 151.964
58 Ce 140.116	59 Pr 140.90765	60 Nd 144.24	61 Pm (145)	94 Pu (244)	95 Am (243)

7. Materials

- Are you familiar with the reactivity series of metals and carbon? Practise 'read, cover, write, check' with it until you have learned it.
- Can you relate the use of carbon to extract metals from their compounds to the reactivity series? You should be familiar with the extraction of copper and iron in this way.
- Can you describe the properties of glass and clay ceramics? Can you define what is meant by the terms monomer and polymer and explain how the properties of a polymer depend on the monomer from which it is made? Learn the definitions for thermosoftening and thermosetting polymers. Can you describe what a composite is and list the properties for two examples?



8. The Earth and atmosphere

- Learn the composition of gases in the Earth's atmosphere and be able to express these as percentages and fractions. Practise drawing the gases of the atmosphere in a labelled pie chart.
- Can you describe the processes in the carbon cycle, such as photosynthesis, combustion, respiration, decay, the development of fossil fuels and the role of the world's oceans and marshes in contributing to the atmospheric reservoir of carbon dioxide? Practise drawing the carbon cycle diagram.
- Can you describe the production of carbon dioxide by humans and explain arguments for and against human activity causing the greenhouse effect that is leading to global warming? Can you explain the impact of climate change on the environment and the implications of rising sea levels?
- Learn some examples of the natural resources that humans use. Can you explain the difference between finite and renewable resources? Can you explain what we mean by reduce, reuse and recycle? What are the benefits of this approach?



9. Scientific method

- Can you describe what is meant by a hypothesis and a prediction? Can you explain the difference between the independent, dependent and control variables in a test?
- Can you define the terms repeats, repeatable and reproducible? Can you identify possible sources of random and systematic error and can you define these?
- Are you familiar with the names of common chemical apparatus such as test tube, boiling tube, Bunsen burner, tripod, gauze, evaporating basin, beaker, measuring cylinder, conical flask, thermometer and are you able to draw them using chemical notation?
- Can you read measurements from a measuring cylinder, a beaker and thermometer accurately and record them appropriately? Are you able to identify hazards in a practical procedure and suggest methods of reducing them?



- Are you familiar with the correct method for recording data and how to make your table of data clear? Can you do the same for graphs, including plotting the points accurately with a cross and drawing in an appropriate line of best fit (that shows the relationship between variables)? This might be a straight line but in Chemistry it may also be a curve. Can you identify patterns and trends in data that has been presented to you in diagrammatic, table or graphical form and draw a conclusion? Look at examples in your textbook and even in the news and write down trends or patterns that you see.
- Can you calculate the average (mean, median and mode) from a set of data and in calculating the mean do so to an appropriate degree, with no more decimal places than the source data? Can you round numbers to the nearest decimal place?

10. Scientific theories and models

- Models and theories change as we learn more and new evidence is gathered that helps us refine them. The development of the periodic table is classic example of this. List the ways in which thinking about the periodic table changed from Dobereiner, to Newlands and to Mendeleev.
- Can you describe the different ways in which scientists communicate about their work and findings? What is meant by “peer review” and what benefits does it bring? What are the potential issues with the reporting of science in the media?
- Theories lead to predictions which can then be tested experimentally. This will often allow a relationship to be shown using mathematics and graphs. Sketch graphs to show relationships that are linear, directly proportional and indirectly proportional.