



Year 7

Chemistry

revision pack

Contents page:

Page 2: What are chemical substances?

Page 9: What gives substances their properties?

Page 14: What is chemical change?

Instructions:

- 1) When starting revising a big question use the short summary and your own knowledge to make a spider diagram in the space provided. The practice questions for each big question are broken into sections.
- 2) Before starting the practice questions for a section read the pages in the self-study pack that are noted at the top of each section.
- 3) Attempt all the practice questions in your book or on lined paper.
- 4) Check the answers using the markscheme in a green pen. Add any missing information to your spider diagram.

What are Substances?

(A short summary of what we have learnt this year in answer to the big question above)

Chemistry is all about substances but most materials around us are mixtures of different substances. Chemists can use different techniques to separate mixtures into pure substances. All substances can exist as solids, liquids or gases depending on their temperature. Chemists can identify a pure substance because it starts and finishes melting at the same temperature.

A chemical substance is made of atoms all joined together in the same way. Elements are substances made of only one type of atom. Most substances are not elements but compounds. Compounds are substances made of more than one type of atom joined together. Substances have chemical formulas which show the number of each type of atom they are made of. Chemists can classify all elements as either metals or non-metals based on their properties. Compounds are substances made of more than one type of atom joined together. Every chemical substance has its own properties.

Task - Draw a spider-diagram summarising the information in the text above

Knowledge Practise & Application:

Practise questions to test your recall of important knowledge and ability to apply this knowledge. Italics note relevant self-study packs to refer to should you get stuck.

Part A: C1 Topic self-study pack – Lessons 01, 02, 05, 06, 07 & 09

1. What are the three states of matter?
2. The state of matter of a substance depends on its _____.
3. How can you identify if a material is a pure substance?
4. How can you identify if a material is a mixture of substances?
5. Describe the arrangement of particles in a solid.
6. Describe the movement of particles in a solid.
7. Describe the arrangement of particles in a liquid.
8. Describe the arrangement of particles in a gas.
9. Describe the movement of particles in a gas.
10. To melt particles need to gain enough _____ to _____ the hold between particles

The table show some information about three substances (A-C).

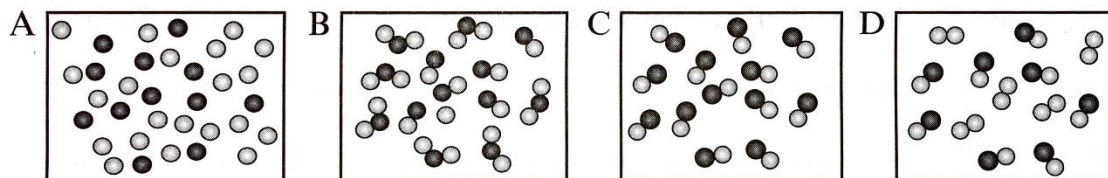
Substance	Melting Point (°C)	Boiling Point (°C)
A	-10.0	38.0
B	120-121.4	440.2-442.5
C	0	100

11. What state is substance A in at 42 °C?
12. What state is substance B in at 118 °C?
13. Describe what happens to a liquid sample of C at 100 degrees.
14. Name the substance that is impure. Explain your answer.
15. Which substance is pure water? Explain your answer.
16. Describe the arrangement of particles in B at 125 °C
17. Describe what happens to a solid sample of C when it is heated to 0°C.
18. A solid sample of B is added to same water. It does not dissolve.
 - a. Give the name to describe the above
 - b. Describe how a scientist could separate the above substances
 - c. Another substance (MP 752 °C) dissolves in water.
 - i. Name the separation method that could be used to separate the solution
 - ii. Describe what you would see if you were looking at this solution

Part B: C2 self-study pack – Lessons 01, 03 & 04

1. What is an element?
2. What is a molecule?
3. What is a compound?
4. Do compounds have the same properties as the elements they are made from?

The diagram represents particles present in four different substances. Circles represent atoms and different shades of grey represent different elements.

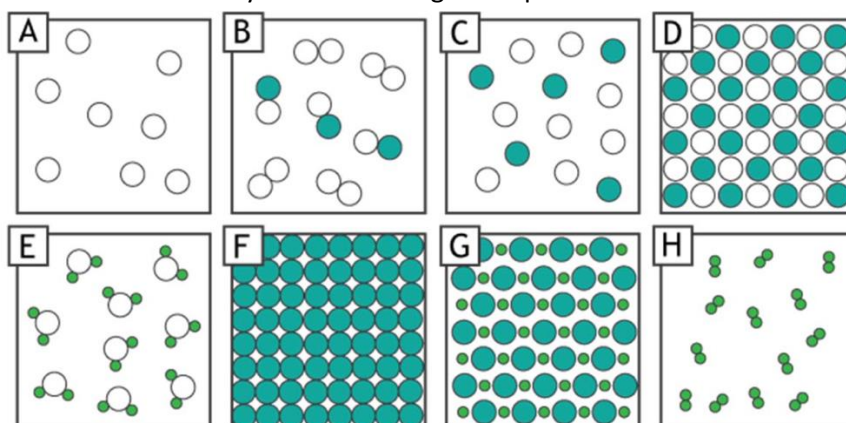


Which box, A, B, C, or D, represents:

5. Particles of a mixture of two different elements?
6. Molecules of the compound NO?
7. Molecules of a mixture of two compounds?
8. Is Box C pure or impure? Explain your answer.
9. Describe the melting point of D
10. Describe the boiling point of C.
11. Is Box B pure or impure? Explain your answer.
12. C is made up of hydrogen and chlorine. Give the chemical formula of this substance.

Look at the particle diagrams below. Use the information to identify what each diagram represents:






13. Which substances are elements?
14. Which substances are compounds?
15. Which substances are mixtures?
16. Which images show molecular structure?
17. Which image shows a giant lattice structure.
18. Which image is a mixture composed of an element and a compound?



Part C: C2 Self-study pack – Lessons 02, 03, 04, 05, 06 & 07

1. What is a chemical symbol?
2. What is a chemical formula?
3. What does a chemical formula of a molecular substance tell us?
4. Where is the number of each type of atom written in a chemical formula?
5. How can we represent the number of molecules in a chemical formula?
6. What does the chemical formula of a giant substance represent?
7. Why is mixing not a chemical change?
8. What happens in a chemical change?

The table shows some chemical elements.

 Hydrogen H	 Helium He	 carbon C	 Nitrogen N	 Oxygen O
 Fluorine F	 Lithium Li	 Magnesium Mg	 Boron B	 Aluminium Al
 Silicon Si	 Phosphorus P	 Sulfur S	 Chlorine Cl	 Argon Ar
 Gold Au	 Silver Ag	 Iron Fe	 Lead Pb	 Tin Sn

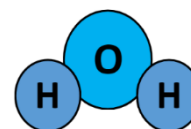
9. What is the chemical symbol of the following elements?

- a. Phosphorus
- b. Gold
- c. Helium

10. All substances have a chemical formula which shows how many atoms of each element they contain. Water has the chemical formula H_2O because every molecule is made of two atoms of hydrogen and one atom of oxygen joined together.

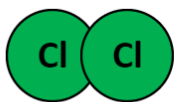
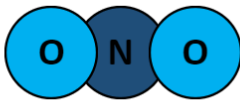
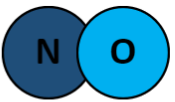
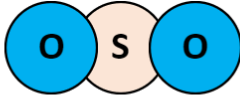
Water has the chemical formula H_2O because every molecule is made of two atoms of hydrogen and one atom of oxygen joined together.

- a. Draw molecules for each substance using it's chemical formula below. Write the symbol of each element inside the atom. Use the table of elements in question 4 to help you.



- i. H_2
- ii. C_1O_2
- iii. CH_4
- iv. H_1F_1

- b. Write out the chemical formula of the following particles.

Answers:

Part A:

1. Solid, liquid and gas
2. Temperature
3. If they start and finish melting at the same temperature
4. If they finish melting at a higher temperature than when they start melting
5. Closely packed together in a regular arrangement
6. Can only vibrate
7. Closely packed in a random arrangement
8. Far apart and randomly arranged
9. Move freely in all directions
10. Energy, weaken
11. Gas
12. Solid
13. Substance will boil and turn from liquid to gas
14. Substance B – melts and boils over a range of temperatures
15. Substance C – melting point is 0 °C and boiling point is 100 °C
16. Liquid state so close together and randomly arranged
17. It melts so changes from solid to liquid
18. a) Insoluble
 - b) Filtration – using filter paper to filter the insoluble solid from the water
 - c) i) Distillation
 - ii) A clear solution

Answers:

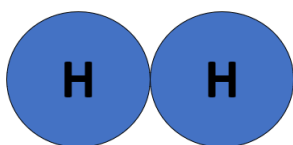
Part B:

1. A substance made of only one type of atom
2. A small group of atoms strongly held together
3. A substance that contains more than one type of atom strongly joined together
4. Compounds have different properties from the elements they are made from
5. A
6. C
7. B
8. Pure – all molecules are the same
9. Start and finish melting at different temperatures, as it is a mixture
10. Fixed boiling point. Will start and finish boiling at the same temperature, as it is a pure substance
11. Impure – not all molecules are the same
12. HCl
13. A, C, F, H
14. B, D, E, G
15. B, C
16. A, B, C, E, H
17. D, F, G
18. B

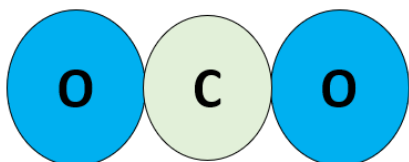
Answers:

Part C:

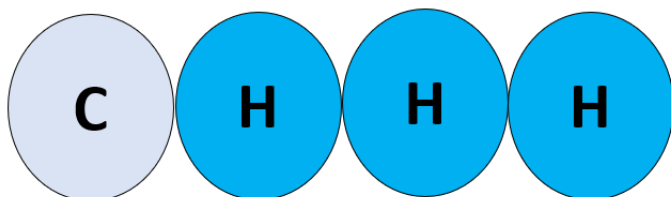
1. A one or two letter code for an element
2. A way of representing a substance
3. The number of each type of atom in a molecule of a substance
4. Small, low down, and after its symbol
5. By writing a multiplier in front of the symbol
6. The proportions of atoms a giant substance is made of
7. No new substances are produced
8. Atoms are rearranged to form new substances
9. a) P b) Au c) He
10. a) i)



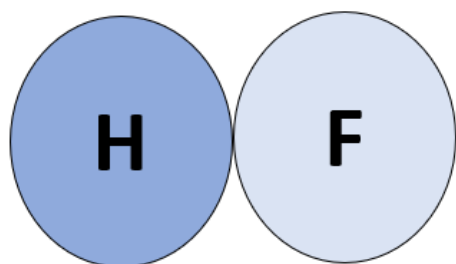
ii)



iii)



iv)



b) Cl_2 , N_1O_2 , N_1O_1 , S_1O_2

What gives substances their properties?

(A short summary of what we have learnt this year in answer to the big question above)

Metals have high melting points because they have giant structures. Lots of energy is needed to weaken the hold between atoms before they can start moving over each other.

Non metal elements have low melting points because they are molecular. Molecules are small groups of atoms joined together. Molecules have weak holding power so need less energy to start moving over each other.

Solubility is a property of all substances. The more soluble a substance is the more mass of that substance will dissolve in 100 cm^3 of a solvent. Substances are very soluble if solvent particles are able to "hold on" to the solute particles well enough to carry lots of them into the solution.

Task - Draw a spider-diagram summarising the information in the text above

Knowledge Practise & Application:

Practise questions to test your recall of important knowledge and ability to apply this knowledge. *Italics note relevant self-study packs to refer to should you get stuck.*

Part A: C2 self-study pack - Lessons 01 &02.

1. What is an element?
2. What two groups can elements be sorted into?
3. What are the characteristic properties of metals?
4. Metallic elements usually have _____ melting points
5. Non metal elements usually have _____ melting points
6. How are the atoms arranged in a metal?
7. Do atoms have strong or weak holding power?
8. Why do metallic substances have high melting points?
9. How are atoms arranged in non-metal elements?

The table below shows some information about some elements.

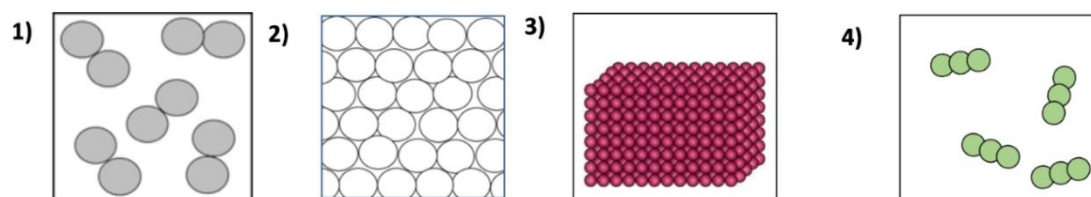
Elements	Melting Point (°C)	Boiling Point (°C)
A	-84	-16
B	1005	4004
C	245	405
D	0	100

10. Which elements are metals. Explain your answer.
11. Which elements are non-metals. Explain your answer.
12. What state will element A be at 0 °C?
13. What state will element C be at 100 °C?
14. What state will element D be at 75 °C?

Copper is a metal used to make wires for iPad charging cables.

15. Explain why copper is chosen for this product.
16. Copper can also be shaped into cooking pans. Give the name for the property of a metal which means it can be shaped.
17. Explain why copper can be shaped.
18. Give another property of copper which makes it a good substance to make cooking pans out of.

The diagrams below show some metals and non-metal substances.



19. Which of the diagrams represent giant structures?
20. Which of the diagrams represent molecular structures?
21. Which diagrams represent metals
22. Which diagram represents 4CO_2 ?
23. Diagram one is only made up of hydrogen atoms.
 - a. Give the formula of the molecule
 - b. Give the expression to represent this sample.
24. Sample 2 has a melting point of 1084 °C. Explain why.
25. Sample 4 has a melting point of -56 °C. Explain why.

Part B: C3 self-study pack – all lessons

1. What is solubility?
2. What are the units of solubility?
3. Why do solvents dissolve some substances?
4. Why can substances dissolve without stirring?
5. How does stirring effect dissolving?
6. How does increasing temperature effect solubility?
7. What happens to solubility when a solution cools?
8. How can a chemist increase the solubility of a substance?

Safia reads that sugar has a solubility of 26 g/100cm³ in water.

9. How much sugar will dissolve in 200 cm³?
10. How much sugar will dissolve in 500 cm³?
11. How much sugar will dissolve in 25 cm³?
12. Name the solvent
13. Name the solute
14. Explain what happens to the particles of sugar and water to produce a solution.
15. She wants to speed up the making of her solution. Give one way she could do so.
16. Safia adds more sugar to her 100 cm³ sample. No more sugar will dissolve. What is the name given to when no more will dissolve?

The table below shows the solubility of sodium chloride at different temperatures

Temperature/°C	0	20	50	80	100
Solubility/ g in 100g water	35.7	35.8	36.8	38	39.2

17. Describe the relationship between temperature and solubility of sodium chloride
18. Explain you answer.
19. What is the maximum mass of sodium chloride that can dissolve in 80°C?
20. A student dissolves 39.2g of sodium chloride in boiling water. She leaves it at the side of the classroom and it cools down to 50 °C. Explain what she would observe.

Answers:

Part A:

1. A substance made of only one type of atom
2. Elements can be sorted into metals and non metals
3. Metals have high melting points, are sonorous, malleable and ductile.
4. high
5. low
6. All atoms have a strong hold on each other forming one giant structure
7. Atoms have strong holding power.
8. Metallic substances have high melting points as lots of energy is needed to weaken the hold between atoms.
9. Non-metal elements have a molecular structure
10. B and C because they have high melting and boiling points
11. A and D because they have low melting and boiling points
12. Gas
13. Solid
14. Liquid
15. Copper is a metal so it's a good conductor of electricity. It is also ductile so it can be drawn into long thin wires.
16. Malleable
17. The layers of metal atoms can slide over each other.
18. It has a high melting point so can cook food at high temperature without melting.
19. 2 and 3
20. 1 and 4
21. 2 and 3
22. 1 and 4
23. Diagram 4
24.
 - a. H_2
 - b. $5 H_2$
25. Sample 2 has a giant structure.
The atoms have a strong holding power
It takes lots of energy to weaken the hold between all the atoms.
26. Sample 4 has a molecular structure
The atoms have a weak holding power
It task little energy to weaken the hold between all the molecules.

Part B:

1. Solubility is the mass of solute that will dissolve in 100 cm³ of a solvent
2. Solubility is measured in grams per 100 cm³ (g/100 cm³)
3. Because solvent particles are constantly moving and have the ability to "hold on" to solute particles.
4. Because particles in a solvent are constantly moving over each other.
5. Stirring makes dissolving faster but does not change solubility.
6. Increasing temperature increases the solubility (of a substance).
7. Solubility decreases when a substance cools.
8. Increase the temperature of the solvent.
9. 52 g
10. 130 g
11. 6.5 g
12. Water
13. Sugar
14. When the sugar is mixed with the water, the water particles are in constant motion, they move over each other, as they do so they have the ability to hold on to particles of sugar.
15. Stir it
16. Saturation point
17. As temperature increases the solubility increases.
18. Solubility increases at higher temperatures because particles in the liquid are moving faster and can "hold on to" more particles of a solute.
19. 38 g
20. Some of the sodium chloride will recrystallise because the particles in the liquid are moving slower and therefore has less hold on the particles of solute.

What is Chemical Change?

(A short summary of what we have learnt this year in answer to the big question above)

Chemical changes form new substances. The new substances which are produced have different properties from the substances which are reacted together. Chemical changes are often hard to reverse.

Chemists represent chemical reactions in different ways including word and symbol equations. Chemical equations help chemists observe reactions and describe what is happening to atoms and substances. The process of change is represented by an arrow. Reactants are the substances that are there at the start. Products are the new substances formed. Substances are separated by + signs.

Mass always stays the same during chemical reactions. This is because atoms are rearranged not created or destroyed. Chemists call this the 'law' of conservation of mass because it is true for every chemical reaction.

Task - Draw a spider-diagram summarising the information in the text above

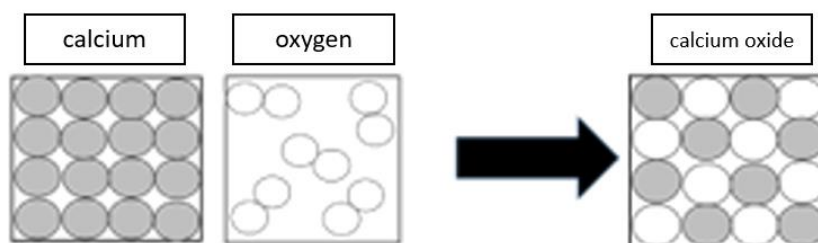
Knowledge Practise & Application:

Practise questions to test your recall of important knowledge and ability to apply this knowledge. *Italics note relevant self-study packs to refer to should you get stuck.*

Part A: C2 self-study pack – Lesson 07, C4 self-study pack – Lessons 01, 02 & 03.

1. What do chemical changes produce?
2. What is the main evidence a chemical change has occurred?
3. Why is mixing not a chemical change?
4. What symbol means “converted into” in a chemical reaction?
5. What are “the reactants” in a chemical reaction?
6. What are the “the products” of a chemical reaction?
7. Which reactants or products are hard to observe during a chemical change?
8. What are the four main state symbols?
9. What state symbol is used for a solute dissolved in water?
10. What state symbol is used for a substance in a suspension?
11. What happens to the number of each type of atom in a chemical reaction?

The diagram below shows a chemical reaction.



12. What new substance has been produced above?
13. How do the particle diagrams show this is a chemical reaction?
14. Name the reactant(s) in this reaction.
15. Explain why melting calcium by heating it until it becomes a liquid is not a chemical reaction.
16. A student mixes two clear colourless liquids. When she mixes them a yellow solid forms in the beaker. What evidence does she have that a chemical reaction has happened?

The following sentences describe reactions. Turn each of them into a word equation.

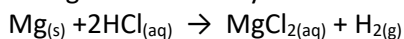
17. Glucose reacts with oxygen to produce carbon dioxide and water.
18. Hydrogen and oxygen react together to make water
19. Lithium reacted with water. It produced lithium hydroxide and hydrogen
20. Methane and oxygen react to produce the substances carbon dioxide and water.

The following statements describe different substances. Identify the state symbol for each substance

21. Magnesium carbonate is found in lumps which have a fixed shape at room temperature.
22. Magnesium carbonate is smashed into a powder so it can be poured into a small beaker.
23. The magnesium carbonate powder is poured into water and mixed. The image of a test tube shows the result.
24. Hydrogen chloride is added to water and mixed. The image shows a bottle of this.



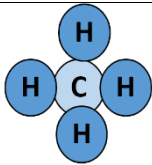
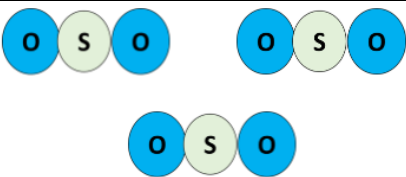
The symbol equation shows the reaction of magnesium with hydrochloric acid.



25. Predict two observations you would see watching this reaction
26. Why is an arrow (\rightarrow) not an equals sign ($=$) used to represent a chemical change?

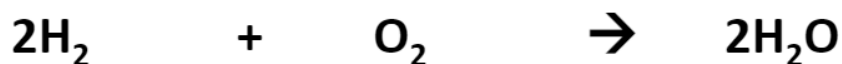
The table below shows different substances used by a chemist for different reactions. Some have multipliers to show that more than one molecule is used in that reaction.

27. Complete the missing boxes of the table.

Diagram	Formula:
	
	S_1O_3
	
	$3 C_1H_4$

The symbol equation below shows a reaction.

28. In the boxes, firstly draw diagrams to show the molecules involved and then complete the table.



Atom	Number in reactants		Number in products

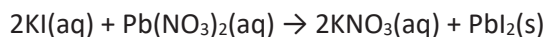
29. How does the equation follow the law of conservation of mass?

Part B: C4 self-study pack – Lesson 06.

1. What happens to mass during a chemical reaction?
2. What happens to the number and type of atoms during a chemical reaction?
3. Name the law which states what happens to mass during chemical reactions:
4. Why do chemists call 'conservation of mass' a "law"?

Potassium iodide and lead nitrate react to make potassium nitrate and lead iodide. The reactants are placed on a balance. The total mass is 148.2g. The reactants are mixed. A yellow precipitate forms.

This is the symbol equation for the reaction:



5. What is the mass of the products produced?
6. Write a word equation for this reaction.
7. Identify the yellow precipitate produced. Give its chemical formula.
8. 2 potassium atoms are found in the reactants. How many potassium ions in total will be in the products?

Potassium combines with Sulfuric Acid to produce Potassium Sulfide and Hydrogen gas.

9. Write a word equation for this reaction.
10. 97 g of potassium is reacted with 85g of sulfuric acid producing 12 g of hydrogen gas. What mass of potassium sulfide is produced?

Hydrogen Peroxide decomposes into Water and Oxygen.

11. Write a word equation for this reaction.
12. The reaction produces 18g of water and 41 g of oxygen. What mass of hydrogen peroxide was used in the reaction?

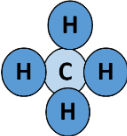
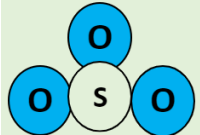
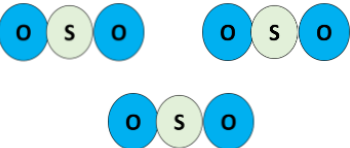
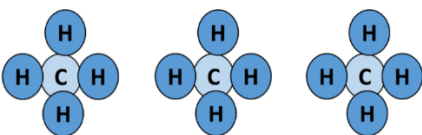
Copper Carbonate reacts with Sulphuric Acid to form Copper Sulphate, Carbon Dioxide and Water.

13. Write a word equation for this reaction.
14. The reaction uses 150 g of reactants. It produces 123g of copper sulphate and water. How much carbon dioxide is produced?

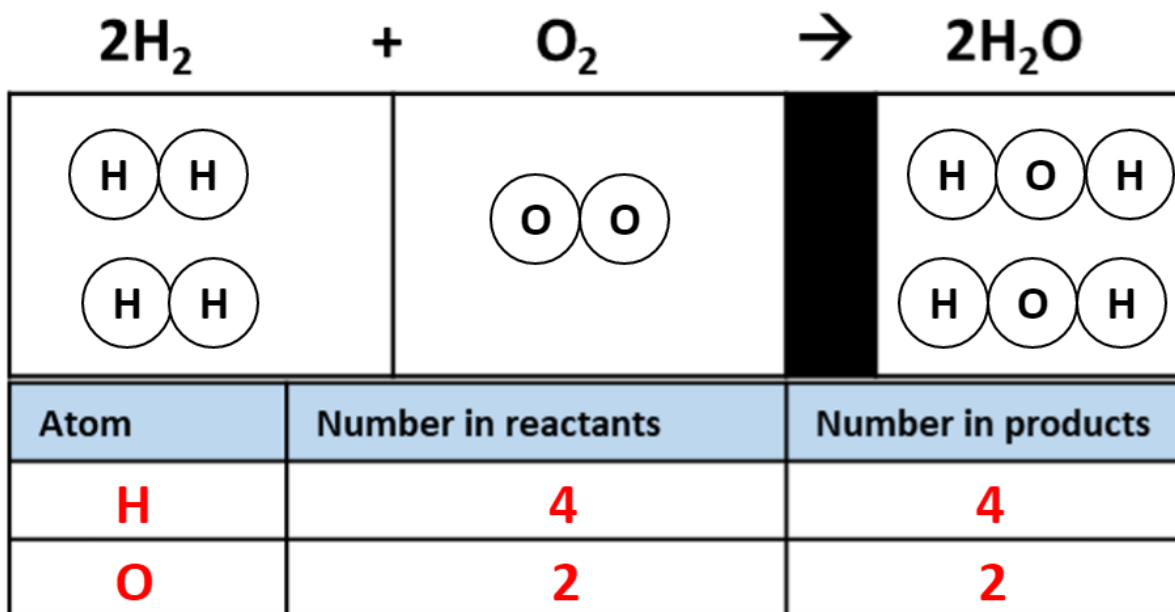
Answers:

Part A:

1. Chemical changes produce new substances.
2. If new properties are observed.
3. No new substances are produced.
4. An arrow
5. The substances which are reacted away during the reaction.
6. The new substances that are produced by a reaction.
7. Colourless substances in the gas state (colourless gases)
8. Solid (s), Liquid (l), Gas (g), aqueous (aq)
9. (aq)
10. (s)
11. The number of each type of atom stays the same
12. Calcium oxide
13. Atoms are rearranged to form new products
14. Calcium and oxygen
15. Because the atoms have not been rearranged / Or no new substance has been produced
16. Evidence of a new property / new yellow colour appears
which is evidence a new substance has been produced
17. glucose + oxygen -> carbon dioxide + water
18. hydrogen + oxygen -> water
19. lithium + water -> lithium hydroxide + hydrogen
20. methane + oxygen -> carbon dioxide + water
21. (s)
22. (s)
23. (s)
24. (aq)
25. Solid disappears
Observe bubbles forming / Gas
26. Shows reactants are converted / changed into products. **OR** shows atoms are being rearranged to form new products/substances
Reactants are not the same as products / products are not the same as (or "equal to")

Diagram	Formula:
	C ₁ H ₄
	S ₁ O ₃
	3 S ₁ O ₂
	3 C ₁ H ₄

27.



28. The number of atoms of each elements is the same in the reactants and the products.

Part B:

1. The mass stays the same
2. The number & type of atoms stays the same
3. The law of conservation of mass
4. Because it applies to every chemical reaction.
5. 148.2g
6. potassium iodide + lead nitrate -> potassium nitrate + lead iodide
7. Lead iodide / PbI_2
8. 2 potassium ions will be in the products.
9. potassium + sulfuric acid -> potassium sulfate + hydrogen
10. 170 g
11. hydrogen peroxide -> water + oxygen
12. 59 g
13. copper carbonate + sulfuric acid -> copper sulfate + carbon dioxide + water
14. 27 g