

GRAYS TUITION CENTRE – Online Tutoring

WEEK: 11

Week Beginning: (01/03/2021)

Subject: SCIENCE

Year: 7

Lesson Objective:

- Balancing equations.

Keywords/ Concepts

Class Questions

Homework

- **Worksheet.**

Additional Notes

- **Answers to homework week 10 can be found below.**

Answers to h/w week 10

1. Solids, liquids, and gases.
2. (see notes).
3. Gases exert pressure when the particles hit the surface of the container.
4. When the temperature increases, pressure increases. This is because the particles have more energy so they collide with the surface more often.
5. If the volume decreases, pressure increases. This is because the particles have less space to move so they collide with the surface more often.
6. Diffusion is the net (overall) movement of particles from an area of high concentration to an area of low concentration.
7. (see notes).
8. The particles have the most heat energy in the gas state.
9. A change of state does not involve a change in mass – it's only a change in heat energy.
10. When a substance is boiling, the heating curve has a flat bit because the heat energy is being used to weaken the forces between the particles.
11. An atom is a tiny particle that cannot be seen with the naked eye. It is the smallest unit of a chemical element.
12. An element is a substance that is made up of only one type of atom. There are over 100 elements in the periodic table.
13. a) A group is a vertical column on the periodic table.
b) A period is a horizontal row on the periodic table.
14. a) Na f) Al
b) Mg g) C
c) O h) Cl
d) Fe i) Ca
e) S j) Zn
15. Rubidium. This is because the reactivity increases as you go down group 1.
16. Iodine.
17. A compound is a substance made of two or more different elements that are chemically bonded together. A compound is different to a mixture because the elements in a mixture are not chemically bonded.
18. (see notes).
19. Iron sulfide is different to iron and sulfur because iron sulfide is not magnetic whereas iron is.
20. It is not easy because you need lots of energy to split the compound into its constituent elements (the elements that it's made from).
21. Rule 1: When two different elements combine, the ending is usually "something ide."
Rule 2: When three or more different elements combine, and one of them is oxygen, the ending is usually "something -ate."
22. The name stays the same.
23. a) Magnesium oxide
b) Calcium oxide
c) Sodium chloride
d) Calcium carbonate

- e) Copper sulfate
- 24. a) Sodium chloride
b) Magnesium chloride
c) Magnesium carbonate
- 25. A pure substance is a substance made up of only one type of element or one type of compound. A mixture is something that contains two or more different substances that are not chemically bonded together.
- 26. When a substance dissolves, the bonds holding the solute (solid) together break. The solute then mixes with the solvent (liquid) to form a solution.
- 27. When the temperature increases, solubility increases. This is because the particles move faster as they have more energy so more solute will dissolve.
- 28. 1) Filtration – separating rock salt and sand with water. 2) Evaporation – salt crystals from salt water.
3) Chromatography – separating the dyes of a pen.
4) Distillation – separating fuels from crude oil.
- 29. Chromatography.
- 30. (see notes).
- 31. a) Metals
b) Non-metals
c) Metals
d) Non-metals
- 32. 1) Insulators of heat and electricity.
2) Flexible
3) Low density
4) Can be easily moulded.
- 33. Ceramics can be used for: tea cups, brakes, spark plugs in cars.
- 34. Composites are materials that are made from two or more different materials mixed together. An example of a composite material is fibreglass and it is made of plastic with glass fibres embedded into it.

Balancing Equations

It's important to live a balanced life — that includes work, play, nutrition and chemical equations.

Chemical Equations Show What Happens in a Reaction

You can show what happens in a chemical reaction using:

- 1) A WORD EQUATION — where the names of the products and reactants are written out in full.
- 2) A SYMBOL EQUATION — which uses chemical symbols and formulae (see pages 35-37).
A balanced symbol equation shows how many of each chemical react or are made in a reaction.

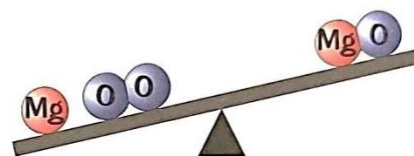
Chemical Equations are Equal on Both Sides

Here's an example of writing a balanced equation for burning magnesium in oxygen.

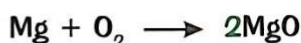
- 1) Write the word equation: magnesium + oxygen → magnesium oxide
- 2) Write in the chemical formulae of all the reactants and products: $\text{Mg} + \text{O}_2 \rightarrow \text{MgO}$
- 3) Check that the equation is balanced by counting the number of each atom on both sides of the equation. Then do steps A, B, C and D below to balance the atoms up one by one. Keep track of the number of atoms on each side as you go:

Oxygen gas is made up of pairs of atoms, called molecules — that's why it's O_2 .

Left side of equation	Right side of equation
One Magnesium	One Magnesium
Two Oxygen	One Oxygen

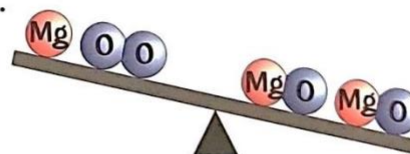


- A** Find an element that doesn't balance and pencil in a number to try and sort it out.
There isn't enough oxygen on the right side of the equation — add "2" before MgO.

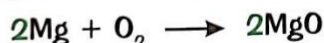


- B** See where that gets you by counting up the atoms again.

Left side of equation	Right side of equation
One Magnesium	Two Magnesium
Two Oxygen	Two Oxygen

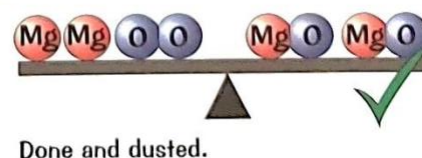


- C** Continue to chase the unbalanced atoms by going back to A) — pencil in a number before a formula, then see where it gets you when you count up the atoms.
There isn't enough magnesium on the left side of the equation — add a "2" before Mg.



- D** See where that gets you by counting up the atoms again.

Left side of equation	Right side of equation
Two Magnesium	Two Magnesium
Two Oxygen	Two Oxygen



1.	$C + O_2$	\rightarrow	CO_2
2.	$H_2 + O_2$	\rightarrow	H_2O
3.	$Na + H_2O$	\rightarrow	$NaOH + H_2$
4.	$Na + O_2$	\rightarrow	Na_2O
5.	$Na + Cl_2$	\rightarrow	$NaCl$
6.	$NaOH + HCl$	\rightarrow	$NaCl + H_2O$
7.	$NaOH + HNO_3$	\rightarrow	$NaNO_3 + H_2O$
8.	$NaOH + H_2SO_4$	\rightarrow	$Na_2SO_4 + H_2O$
9.	$Na_2CO_3 + HCl$	\rightarrow	$NaCl + H_2O + CO_2$
10.	$NaOH + CO_2$	\rightarrow	$Na_2CO_3 + H_2O$

Balancing Equations

Q1 Write down how many atoms of each element are present in the formulas written below. The first one has been done for you.

- a) Carbon dioxide CO_2 **1 carbon (C), 2 oxygen (O)**
- b) Copper sulfate CuSO_4
- c) Sodium chloride NaCl
- d) Iron oxide Fe_2O_3
- e) Ammonia NH_3
- f) Water H_2O
- g) Copper oxide CuO

Q2 Complete the following word equations by writing in the correct product after the arrow.

- a) Aluminium + oxygen \rightarrow
- b) Magnesium + oxygen \rightarrow
- c) Sodium + chlorine \rightarrow

Q3 Joshua wants to write a balanced symbol equation for burning calcium in oxygen.

- a) What does a balanced symbol equation show?

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- b) Write down the word equation for this reaction.

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- c) Write down the chemical formula for each of the reactants in this reaction.

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- d) Use your answers to parts a)-c) to help you write a balanced symbol equation for burning calcium in oxygen. The chemical formula for calcium oxide is CaO .

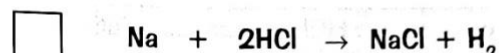
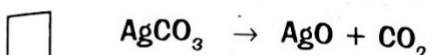
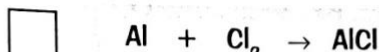
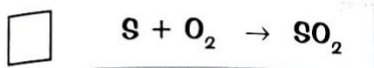
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Homework

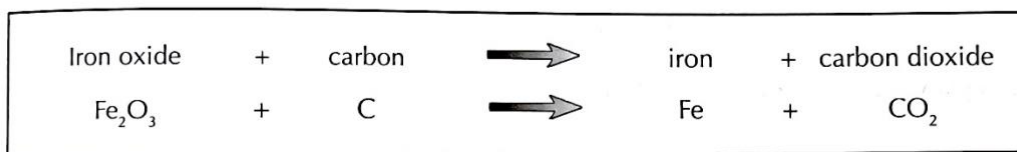
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Balancing Equations

Q4 Write the letter B next to all the following equations that are balanced, and U next to those that are unbalanced.



Q5 Oxygen can be removed from iron oxide using carbon. The word equation and symbol equation for this reaction is shown below. The symbol equation is **not balanced**.



a) Count up the number of atoms of each element on each side of the symbol equation above and write them in this table.

Element	Number of atoms	
	Left side of the equation	Right side of the equation
Fe		
O		
C		

b) Try and balance the **oxygen** atoms in the equation. What numbers do you need to put in front of Fe_2O_3 and CO_2 to make the number of oxygen atoms on each side of the equation the same? Put these numbers in the gaps next to these molecules in the equation below.



c) Use your answer to parts a) and b) to work out the numbers you need to multiply the carbon (C) and iron (Fe) atoms by to balance the equation. Write the complete balanced equation below.

