Feedback Lesson

Answer the questions below.

1. State the chemical formula for sulfuric acid.
   H_2SO_4
2. Calculate the relative formula mass of sulfuric acid.
   (1x2)+32+(16x4) = 98
3. Calculate the percentage by mass of sulfur in sulfuric acid.

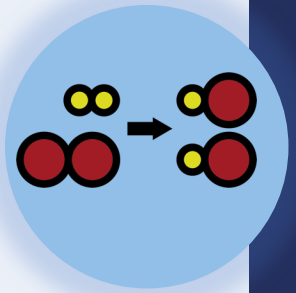
$$\%\ \text{by mass} = \frac{\text{mass of element}}{\text{mass of compound}} \times 100$$

$$\%\ \text{by mass} = \frac{32}{98} \times 100$$

$$\%\ \text{by mass} = 32.65\%$$

4. State the ion that acids produce in aqueous solutions.
   Hydrogen ion (H+)
5. State the pH range of acids.
   Less than 7 (1-6)

Do Now



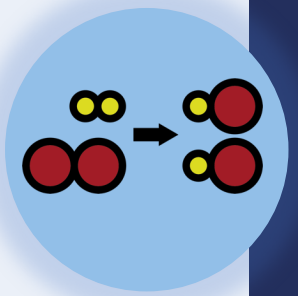
Feedback Lesson

Do Now:

1. State the chemical formula for sulfuric acid.
2. Calculate the relative formula mass of sulfuric acid.
3. Calculate the percentage by mass of sulfur in sulfuric acid.
4. State the ion that acids produce in aqueous solutions.
5. State the pH range of acids.

Drill:

1. Calculate the M_r of sodium hydroxide.
2. Calculate the M_r of calcium carbonate.
3. Calculate the M_r of lithium sulfate.



Do Now

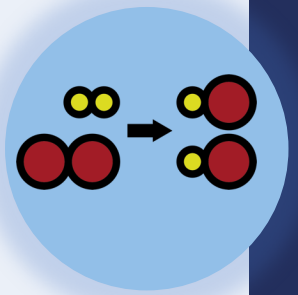
Feedback Lesson

Read Now:

Quantitative chemistry (which can sometimes also be called stoichiometry) is the use of balanced chemical equations to determine quantitative (numerical) values of reactants and products in chemical reactions. As atoms cannot be created or destroyed in a chemical reaction, chemical equations must always be balanced using coefficients. These coefficients help us work out the ratios in which reactants react and products are made.

1. Describe where the reactants and products are found in a chemical equation.
2. Explain why chemical equations have to be balanced.
3. State the name given to the 'big' numbers used to balance chemical equations.
4. Give the other name for quantitative chemistry.

Do Now

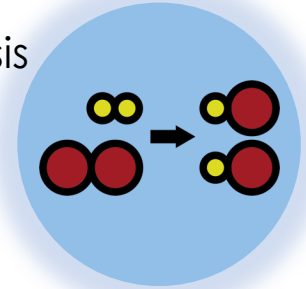


Feedback Lesson

C4.3.16

Science
Mastery

C4.3.1 Prior Knowledge Review
C4.3.2 Introducing the Mole
C4.3.3 Mole Calculations
C4.3.4 PKR: Concentration
C4.3.5 TIF: Calculating Concentration
C4.3.6 TIF: Calculating an Unknown Concentration
C4.3.7 (HT) Amounts of Substances in Equations
C4.3.8 (HT) Limiting Reactants
C4.3.9 PKR: Reactions of Acids
C4.3.10 Acids, Alkalis and Neutralisation
C4.3.11 TIF: Acid-Alkali Titration
C4.3.12 TIF: Acid-Alkali Titration Analysis
C4.3.13 TIF: Titration Calculations
C4.3.14 (HT) Strong and Weak Acids
C4.3.15 TIF: Volumes of Gases
➢ **C4.3.16 Feedback Lesson**

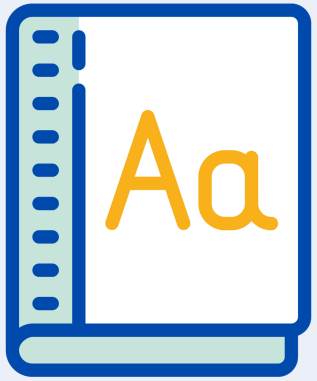


Lesson Objectives

Following this lesson, students will be able to:

- [Teacher to edit objectives based on mastery quiz outcomes]
- [Teacher to edit objectives based on mastery quiz outcomes]
- [Teacher to edit objectives based on mastery quiz outcomes]

Key Words:



This is the fix-it portion of the lesson

The **fix-it** is an opportunity to respond to gaps in knowledge, especially those identified by the **pre-unit quiz**.

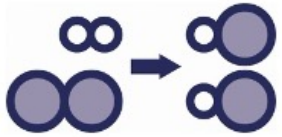
- The teacher should customise this slide as needed, to facilitate
  - **reteach**, **explanation, demonstration** or **modelling** of ideas and concepts that students have not yet grasped or have misunderstood.
  - **practise** answering specific questions or of key skills.
  - **redrafting** or **improving** previous work.

Fix-it

The Big Idea: Reactions rearrange matter

Science Mastery

Quantitative Chemistry



What does it mean to have an amount of a substance? How can I use information about different elements and compounds to predict the outcomes of reactions? How could we use this information in industrial processes to calculate how much of a reactant we need to make a certain amount of product?

Quantitative chemistry allows us to do calculations to find out about quantities of substances. This is a very important application of chemistry that is used in industry and research. Using the relative formula mass and number of moles of a substance we can look closely at the amount of reactants and productions in chemical reactions.

This is the **fourth** unit we are studying as part of the big idea: **Reactions Rearrange Matter**

In this unit, we will begin by recapping the ideas of relative atomic mass and relative formula mass, as well as how we can use relative formula mass to determine the percentage by mass of an element in a compound. We will then look at the concept of moles in chemistry and how we can use them in chemical equations to calculate reacting masses and limiting reactants.

We will also review the idea of concentration and learn how to calculate the concentration of different solutions. We will also look at acids, alkalis and neutralisation and the difference between strong and weak acids. Separate science students will also look at titrations of acids and alkalis and the volume of gases.

In this unit, we will revisit some key skills including balancing equations, calculating percentages and substituting into and solving equations.

TASKS:
What subject will this unit focus on? BIOLOGY CHEMISTRY PHYSICS
(circle the correct subject)

There are lots of keywords underlined above. List these into the two columns:

Words I know	Words I haven't seen before

Science Mastery

To answer before the unit:

1. What are you most excited to learn about in this topic?

2. What do you already know about this topic?

3. Why do you think it's important to learn how reactions rearrange matter?

4. What knowledge from previous science lessons might help us?

5. What questions do you have about this topic?

To answer at the end of the unit:

1. Tick off any words in the 'words I haven't seen before' column that you are now confident with. Circle any you still need more practice to use.
2. What have you most enjoyed about this unit?

3. What more would you like to learn about reactions as part of the big idea: 'Reactions Rearrange Matter'?

Introduction

Answers – Section A: Combined Science

Question	Answer
1	C
2	B
3	B
4	C
5	A
6	C
7	B
8	B
9	C
10	C

11	B
12	A
13	A
14	B
15 (HT)	A
16 (HT)	B
17 (HT)	C
18 (HT)	A
19 (HT)	C
20 (HT)	B
21 (HT)	B

Answers – Section B

1a. The law of conservation of mass states that the mass of the products is equal to the mass of the reactants. [1]

1b.

- The total mass of the reactants (Beaker A and contents before mixing + beaker B and contents before mixing) is not equal to the measured mass of beaker A and B and contents after mixing. [1]
- This is because a gas (CO_2) is produced, which dissipates into the atmosphere and so it's mass is not measured on the balance. [1]

1c. 0.01 g [1]

1d. (23x2)+12+(16x3) = 106 [1]

1e. $\%\ \text{by mass} = \frac{\text{mass of element}}{\text{mass of compound}} \times 100$

$\%\ \text{by mass} = \frac{(23\times2)}{106} \times 100$

$\%\ \text{by mass} = 43.4\%$ [2]

1f. CO_3^{2-} [1]

1g. H^+ ions [1]

1h. Red [1]

Correcting Answers

Answers – Section B

2a.

1 mole of sodium chloride = 23 + 35.5 = 58.5 g

11.5 grams of sodium chloride = 11.5/58.5 = 0.1965 moles

1 mole of sodium carbonate makes 2 moles of sodium chloride (from the equation)

So, 0.098 moles of sodium carbonate make 0.17965 moles of sodium chloride

To find the mass of sodium carbonate that is equal to 0.098 moles:

0.098 moles = mass/relative formula mass

0.098 x relative formula mass = mass

0.098 x (106) = 10.42 g [5]

2b.

The solution with a concentration of 1.0×10^{-3} mol/dm^3 is more concentrated than the solution with a concentration of 1.0×10^{-5} mol/dm^3 by a factor of 100 (10 x 10). Therefore the pH of the second solution will be greater by 2. So, the second solution has a pH of 4. [2]

Answers – Section A: Separate Science

Question	Answer
1	C
2	A
3	B
4	C
5	C
6	C
7	C
8	B
9	C
10	B

11 (HT)	A
12 (HT)	A
13 (HT)	B
14 (HT)	A
15 (HT)	B
16a (HT)	C
16b (HT)	A
17 (HT)	C

Correcting Answers

Answers – Section B

1a.

- add potassium hydroxide solution to the conical flask/use a pipette to measure out the correct volume of potassium hydroxide
- add a few drops of indicator
- add the sulfuric acid from the burette
- until the colour of the indicator changes
- read the volume from the burette [5]

1b. H^+ ions [1]

1c. Red [1]

Correcting Answers

Answers – Section B

2a.

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0.098 x relative formula mass = mass

0.098 x (106) = 10.42 g [5]

2b.

H_2O = 1 + 1 + 16 = 18 g

36/18 = 2 moles [2]

Correcting Answers

Answers – Section B

2c.

The solution with a concentration of 1.0×10^{-3} mol/dm^3 is more concentrated than the solution with a concentration of 1.0×10^{-5} mol/dm^3 by a factor of 100 (10 x 10). Therefore the pH of the second solution will be greater by 2. So, the second solution has a pH of 4. [2]

2d.

$45/1000 = 0.045$ dm^3

$0.045/24.0 = 0.023$ moles [2]

Lesson C4.3.16	
What was good about this lesson?	What can we do to improve this lesson?

[Send us your feedback by clicking this link. Thank you!]

Feedback