N5 Chemistry: Whole Course REVISION

Lesson 15 – Mole Calculations

Learning Outcomes

By the end of this lesson you should have revised:

1. How to carry out calculations using the mole.
2. How to use the mole calculation to find the mass of a substance.
3. How to carry out calculations from equations.

Success Criteria

You will have been successful in this lesson if you:

1. Watch the links provided

2. Complete revision questions provided

3. Complete and submit homework assigned

There is also a further reading section to help you gain more depth of understanding for this section.

If you have any questions about the content of this lesson, you should ask your class teacher either through your class MS team or via email. MS Teams will be monitored throughout the week by a chemistry teacher. If you need help or clarification with either the task or the content of the lesson, just ask.

Links to Prior Knowledge

You may wish to revise the following to help you understand this lesson:

- N5 Unit 1: Calculations involving the mole and balanced equations

You do not need to copy any notes as this is all revision, but you should complete all questions and tasks as outlined in this document.

Calculations

Calculations can be worked out for many different types of reactions that you have experienced throughout the National 5 course.

Calculations can be performed using the relationship between the mass and the number of moles of a substance. This equation can be found on page 1 of the data booklet.

Given a balanced equation the mass or number of moles of a substance can be calculated given the mass or number of moles of another substance in the reaction.

Watch this video:

Lesson 15: Mole Calculations

https://youtu.be/ua138OiIwiE

Complete the following questions in your class work jotter. The answers can be found at the end of the document for you to self-mark.

Practice Questions – Mole Calculations

Complete the following questions from the **SNHS Nat 5 Chemistry Calculations Booklet** (access via S4 Chemistry team or use your paper copy)

4. Molar Calculations (1) – Test Yourself 4   (6)

5. Molar Calculations (2) – Test Yourself 5   (6)

6. Calculations – Test Yourself 6   (5)

Total: 17 marks

Past-Paper Questions – Mole Calculations

1. 0·25 moles of a gas has a mass of 7 g. Which of the following could be the molecular formula for the gas?

    A C_2H_6
    B C_2H_4
    C C_3H_8
    D C_3H_6 (1)

2. Oxalic acid is found naturally in rhubarb. A piece of rhubarb was found to contain 1·8 g of oxalic acid.
    Calculate the number of moles of oxalic acid contained in the piece of rhubarb.
    (Formula mass of oxalic acid = 90)   (1)

3. Read the passage and attempt the question that follows.

> ### Hydrogen Storage
>
> The portable storage of hydrogen (H_2) is key to the development of hydrogen fuel cell cars. While many chemists focus their attention on the use of metal alloys and hydrides for storing hydrogen, others have investigated the potential use of carbon nanotubes.
>
> A carbon nanotube is a tiny rolled up sheet of graphite. A research team has designed a pillared structure made up of vertical columns of carbon nanotubes which stabilise parallel graphene sheets. Graphene sheets are layers of carbon which are one atom thick.
>
> Lithium atoms are added to the pillared structure to increase the hydrogen storage capacity. Researchers claim that one litre of the structure can store 41 g of hydrogen gas, which comes close to the US Department of Energy's target of 45 g.
>
> Adapted from *InfoChem Magazine* (RSC), Nov 2008

Calculate the number of moles of hydrogen that, researchers claim, can be stored by one litre of this structure.   (2)

Show your working clearly.

4. Nonane burns to produce carbon dioxide and water.

$$C_9H_{20} + 14O_2 \rightarrow 9CO_2 + 10H_2O$$
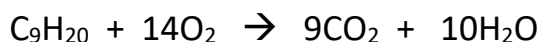
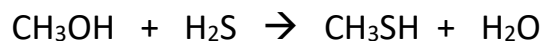Calculate the mass, in grams, of carbon dioxide produced when 32 grams of nonane is burned.   (3)

Show your working clearly.

5. Methanethiol, which smells like rotting cabbage, is added to natural gas to allow gas leaks to be detected.
    It is prepared industrially by the reaction of methanol with hydrogen sulfide gas.

$$CH_3OH \; + \; H_2S \; \rightarrow \; CH_3SH \; + \; H_2O$$

Calculate the mass of methanethiol, in grams, produced when 640 grams of methanol reacts completely with hydrogen sulfide.   (3)

Show your working clearly.

                                        Total: 10 marks

Further Reading

To learn more about graphs, try the following online resources:

BBC Bitesize: https://www.bbc.co.uk/bitesize/guides/z7c6fg8/revision/1

                           https://www.bbc.co.uk/bitesize/guides/z7c6fg8/revision/2

Scholar: Log in through GLOW

                      National 5 Chemistry → Chemical changes and structure → Topic 6 Calculations involving the mole and balanced equations

Extension Questions:

Yellow/Purple book   Calculations   page 41-42
                                                                  questions: 1-7