Nat 5 : Unit 1 – Chemical Changes and Structure

Key area – Formula and Reacting Quantities

Lesson 15 – Calculating Number of Moles

Learning Outcomes

By the end of the lesson you should be able to …

1. Explain that the number of moles can be calculated from the mass and the formula of a substance.
2. Carry out calculations using the relationship between the mass and the number of moles of a substance.

Success Criteria

You will have been successful in this lesson if you:

1. Understood how to calculate the number of moles if given the mass and the formula of a compound.
2. **Completed Part 2 Calculating the Number of Moles Quiz on forms by Friday 19th February.**

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:

It is essential that you have completed lesson 13 and that you are confident about calculating formula mass. **If not contact your class teacher. You may want to revise your knowledge using the link below or watching the recorded lessons again.**

National 4/5 Calculating gram formula mass (GFM) practice questions - YouTube

You may wish to have a copy of the data booklet handy for this lesson. Download from the SQA website - ChemistryDataBookletSQPN5.pdf (sqa.org.uk)

What to do

- **Follow the instructions to complete the check points. Remember to watch the video links**

Click on the link below to access the RECORDED lesson on Mass Calculations

https://youtu.be/wuo-JNiTgIs

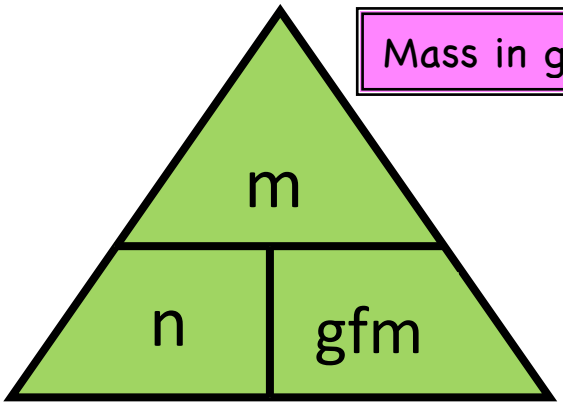
Remember to add to your notes by copying or printing out and sticking in.

Calculating the Number of Moles

n = number of moles

m = mass of substance (grams)

GFM n m GFM = gram formula mass



Mass in grams

Number of moles

Gram Formula Mass

$$n = \frac{\text{Mass}}{\text{gfm}}$$

No of moles = Mass ÷ Gram formula mass

Example

How many moles of water are there in 36g of water?

Step1 Work out the formula

In this case water = H_2O

Step 2 Calculate the formula mass

H_2O

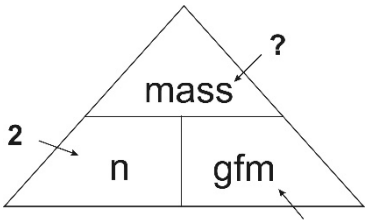
1x16 =16

2x 1 = 2

= 18

Step 3 Use the equation to calculate the mass

then, using the triangle :



$$n = \frac{mass}{gfm} = \frac{36}{18} = 2 \text{ mols}$$

Example 2 How many moles of substance are present in 22.2g of calcium chloride

Step1 Work out the formula

Symbol Ca Cl

Valency 2 1

Swap $CaCl_2$

Step 2 Calculate the formula mass

$CaCl_2$

3x 35.5 = 71

1 x 40 = 40

= 111

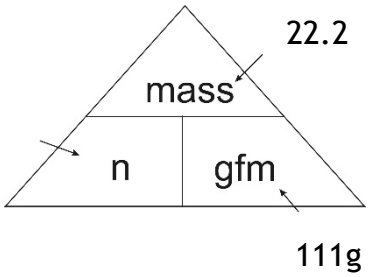
So, the formula mass =111

Step 3 Use the equation to calculate the mass

$n = \frac{mass}{gfm}$

m = 22.2 g

gfm = 111 g



$n = \frac{mass}{gfm} = \frac{22.2}{111}$ = 0.2 mols

Self-check Calculating Number of Moles Quiz

Calculate the **number** of moles of each the following. Add your answers to the forms quiz sheet to be marked. (Link below). **This may be posted as an assignment**. This is not optional and is the second part of your work for this week.

1. 20g of Ca
2. 54g of H_2O
3. 12g of He
4. 14g of N_2
5. 10g of $CaCO_3$
6. 280g of carbon monoxide
7. 10.1g of potassium nitrate
8. 8g of sulphur
9. 6.6g of ammonium sulphate
10. a spoonful of glucose ($C_6H_{12}O_6$) weighing 18g

You NOW MUST COMPLETE the calculating number of moles check test.

https://forms.office.com/Pages/ResponsePage.aspx?id=oyzTzM4Wj0KVQTctawUZKV9pDH2i_JVJvH-NwfFQ2VJUQ0JWRjhFWlExUVNKVzRNVlVOUzlPVVdRVS4u

Further reading

To learn more about atomic structure, try the following online resources:
Calculating relative formula masses - Formula mass and mole calculations - GCSE Chemistry (Single Science) Revision - Other - BBC Bitesize

Evans2 chem web: https://www.evans2chemweb.co.uk/login/index.php#
Username: snhs password: giffnock

Select any teacher ◊ revision material ◊ Nat5 chemistry◊ Unit 1: chemical changes and structure ◊ chemical formula Several online sections for you to expand your knowledge