

Working with ratio

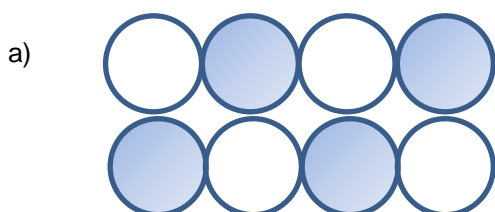
Education in Chemistry

January 2020

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Working with shapes

- Count the number of different coloured shapes, then work out the following ratios. Write your answers in their simplest whole number form. Read the questions carefully.

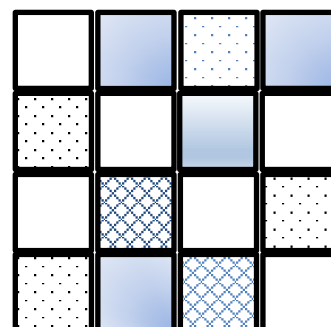


- Light counters to dark counters.
- Light counters to the total number of counters.



- Blue squares to orange squares.
- Orange squares to blue squares.
- Blue squares to the total number of squares.

- c)
- White squares to dotted squares.
 - Hatched squares to light squares.
 - Dotted squares to the total number of squares.



- Represent as a **fraction** the total number of triangles for each of these. Write your answers in their simplest form.

- White
- Black
- Dotted



3. In this piece of modern art, there are six different colours used: red, white, yellow, black, blue and green. The ratio of the pink area to the total area is 1:6. The ratio of the white area to the total area is 1:12.



- a) Calculate the **fraction** of the whole area represented by the following colours:
- Red
 - White
- b) Given that the total area of the painting is 9.1 m^2 , calculate the area of the:
- Red paint
 - White paint
- c) Using your answers to b, calculate the **total** area of the yellow, black and green areas.

Working with ratio in chemistry

These questions illustrate how ratio may be used at GCSE level, in chemistry.

1. Analysing mixtures

A bronze alloy has a mass of 5.20 g.

It contains copper and tin in the ratio of 2:3, by mass.

- What is the fraction of copper in the sample?
- Using your answer to task a, calculate the mass of the copper in the sample.

Another sample of bronze contains copper and tin in the ratio of 2:5. The mass of tin in the sample is 10.2 g.

- What is the fraction of tin in this sample?
- Using your answer to task c and the total mass of the sample, calculate the mass of the sample. Show your working.

2. Empirical formulas

A compound X contains carbon, hydrogen and oxygen only. A sample of X of mass 1.56 g is found to contain 0.585 g of carbon and 0.195 g of hydrogen.

- Calculate the mass of oxygen in compound X.
- Complete the table that shows masses being changed to moles.
[A_r data: C = 12, H = 1, O = 16]

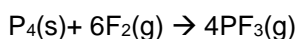
	Carbon	Hydrogen	Oxygen
Mass of element in g			
Moles of element ($\frac{\text{mass in g}}{A_r}$)			
Simplest whole number ratio (divide each number by the smallest amount of moles)			

So the simplest formula for X is:

- c) If the relative molecular mass of X is 32, calculate the molecular formula for X. Show your working.
- d) Draw a possible structure for molecule X.

3. Mole calculations

White phosphorus, P₄, reacts with fluorine to form phosphorus(III) fluoride:



In a reaction, 20.7 g of white phosphorus reacts with excess fluorine.

[A_r data: P = 31, F = 19]

In tasks a to c, give your answers to two significant figures and show your working.

- a) Calculate the number of moles of phosphorus used in the reaction.
- b) Deduce the number of moles of phosphorus(III) fluoride formed.
- c) Calculate the mass of phosphorus(III) fluoride formed.