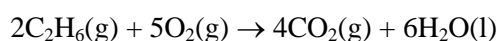


Exemplar exam questions – Chapter 1

- 1 What is the mass in g of one molecule of methanal, HCHO?
- A 30.03
B 4.99×10^{-23}
C 1.81×10^{25}
D 2.00×10^{22}
- 2 When 5.00 dm³ of ethane reacts with 5.00 dm³ of oxygen according to the equation given below, what volume of CO₂ is produced? All gases are measured under the same conditions of pressure and temperature.



- A 5.00 dm³
B 4.00 dm³
C 10.0 dm³
D 6.25 dm³

The correct answers are:

1 B, 2 B

Commentary

You are not allowed to use a calculator for multiple choice questions. Therefore, it is usually easier to try to do these with the minimum amount of calculation.

Question 1

It is important here to read the question carefully. The question requires you to give the mass of one molecule, which is very small. The answer can be given **without** calculation as B is the only number which is of the correct order of magnitude. Answer A is the mass of 1 mole of methanal rather than of one molecule.

Question 2

In this question too much information has been given. In order to do a moles question we only need to have enough information to work out the number of moles of one quantity. The fact that we have enough information to work out the number of moles of both ethane and oxygen suggests that there is a limiting reactant.

To work out the limiting reactant quickly just divide the volume by the coefficient in the stoichiometric equation and the smallest number will indicate the limiting reactant. The values are ethane = $\frac{5}{2}$ and oxygen = $\frac{5}{5}$. The value for oxygen is smaller, so oxygen is the limiting reactant.

The volume of oxygen is then used to work out the volume of CO₂. It can be seen that the coefficient of CO₂ is smaller than that of O₂, so the volume of CO₂ will be smaller than that of O₂, and the only possible answer is B.

Note that it is not necessary to convert from volumes to number of moles. All the quantities that we are interested in are gases and the volume of a gas is proportional to the number of moles as long as all volumes are measured at the same temperature and pressure.