ACTIVITY 3b – AO2 in Exams – Student Answers

Paper 2C, Q2(b)

Student 1

(b) Chlorine has two isotopes of mass numbers 35 and 37

The relative percentage of each isotope in a sample of chlorine is

chlorine-35 77.78% chlorine-37 22.22%

Calculate the relative atomic mass of this sample of chlorine.

Give your answer to one decimal place.

$(35 \times 77.78) + (37 \times 22.22)$ (3)

$= 3544.44$

relative atomic mass = 3544.4

Student 2

(b) Chlorine has two isotopes of mass numbers 35 and 37

The relative percentage of each isotope in a sample of chlorine is

chlorine-35 77.78% chlorine-37 22.22%

Calculate the relative atomic mass of this sample of chlorine.

Give your answer to one decimal place.

$\left(\frac{77.78}{100} \times 35\right) + \left(\frac{22.22}{100} \times 37\right) = 35.4444$ (3)

relative atomic mass = 35

Student 3

(b) Chlorine has two isotopes of mass numbers 35 and 37

The relative percentage of each isotope in a sample of chlorine is

chlorine-35 77.78% chlorine-37 22.22%

Calculate the relative atomic mass of this sample of chlorine.

Give your answer to one decimal place.

$(77.85 \times 35) + (22.22 \times 37)$ (3)

$= 3546$

$\div 100 = 35.4689$

relative atomic mass = 35.5

Paper 2C, Q4c(ii)

Student 1

(ii) Explain why magnalium is harder than aluminium.

(3)

In Magnalium the structure is less uniform as magnesium atoms disrupt the the uniformity of the aluminium atoms. This means the atoms can slide over each other less easily, this means the metal is harder and less soft/malleable.

Student 2

(ii) Explain why magnalium is harder than aluminium.

(3)

Magnalium contains the different sized atoms of Mg and Al, therefore this distorts the layers. This means the layers are unable to slide over each other meaning that ~~they~~ Magnalium is hard and not malleable. Aluminium has the same sized atoms so layers can slide over each other, ~~not~~ making it softer, and malleable.

(Total for Question 4 = 7 marks)

Student 3

(ii) Explain why magnalium is harder than aluminium.

(3)

Magnalium is harder than aluminium as its ~~it~~ atoms have different shapes which break up the ~~perfect~~ perfect lattice and make it harder for the layers to slide over each other as they are not uniform in shape making them harder.

Paper 2C, Q7b(i)

Student 1

The backwards reaction increases as the pressure in the gas syringe increases. This is because the backwards reaction produces fewer moles of gas which take up less space. So, less ~~moles of~~ NO_2 is ~~are~~ produced as a result but more N_2O_4 is and the position of equilibrium moves to the left.

Student 2

Increasing the pressure, favours the reaction ~~with~~ that produces the least amount of moles. $2NO_2$ has more moles than N_2O_4, therefore more N_2O_4 is produces and less NO_2 is produces.

Student 3

When the pressure increases, it favours the gas with less moles, so the equilibrium shifts to the left and creates more of the reactants - N_2O_4 - and less of the products - $2NO_2$.

Student 4

NO_2 has more moles on the right side of the reaction. The equilibrium will shift to the left as the reaction is trying to lower the pressure so there will be less NO_2 and more N_2O_4 N_2O_4 has less moles and therefore less pressure

Paper 2C, Q8(b)

Student 1

(b) (i) Calculate the amount, in moles, of chlorine gas produced.
Assume one mole of chlorine gas occupies 24000 cm³. (2)

moles = volume / 24

24000 / 60 = 400 24000/60 = 1/400

1 mol = 24 dm³ or 24000 cm³) x 0.4

x = 60 cm³

amount of chlorine = 1/400 mol

(ii) Determine the amount, in moles, of NaClO in 4.00 cm³ of bleach. (1)

4.00 / 24000 1/400

amount of NaClO = mol

(iii) Calculate the concentration, in mol/dm³, of the bleach solution. (2)

concentration = moles / volume 0.4 / 4÷1000 = 100

1 ÷ 400 / 4 ÷ 1000 = 0.625

concentration = 0.625 mol/dm³

Student 2

(b) (i) Calculate the amount, in moles, of chlorine gas produced.
Assume one mole of chlorine gas occupies 24000 cm³. (2)

Volume = moles x 24000

60 / 24000 = 0.0025 moles

amount of chlorine = 0.0025 mol

(ii) Determine the amount, in moles, of NaClO in 4.00 cm³ of bleach. (1)

23 + 35.5 + 16 = 74.5 ← RFM

4 / 74.5 = 0.05314... moles.

amount of NaClO = 0.05 mol

(iii) Calculate the concentration, in mol/dm³, of the bleach solution. (2)

4 cm³ = 0.004 dm³

0.05 / 0.004 = 12.5 mol/dm³

concentration = 12.5 mol/dm³

Student 3

(b) (i) Calculate the amount, in moles, of chlorine gas produced.
Assume one mole of chlorine gas occupies 24000 cm³. (2)

moles = mass ÷ Mr

conc = moles ÷ vol

↳ 24 dm³

~~volume = moles x 24 (or RTP)~~

~~moles = volume ÷ 24~~

~~= 24000 ÷ 24~~

~~= 1000~~

60.0 cm³ = 0.06 dm³

mol = vol ÷ 24

= 60 ÷ 24

= 2.5

amount of chlorine = ~~1000~~ 2.5 mol

(ii) Determine the amount, in moles, of NaClO in 4.00 cm³ of bleach. (1)

4 ÷ 24 = 0.16666

amount of NaClO = 0.17 mol

(iii) Calculate the concentration, in mol/dm³, of the bleach solution. (2)

conc = mol ÷ volume

= 0.17 ÷ 4/1000

= 42.5

concentration = 42.5 mol/dm³