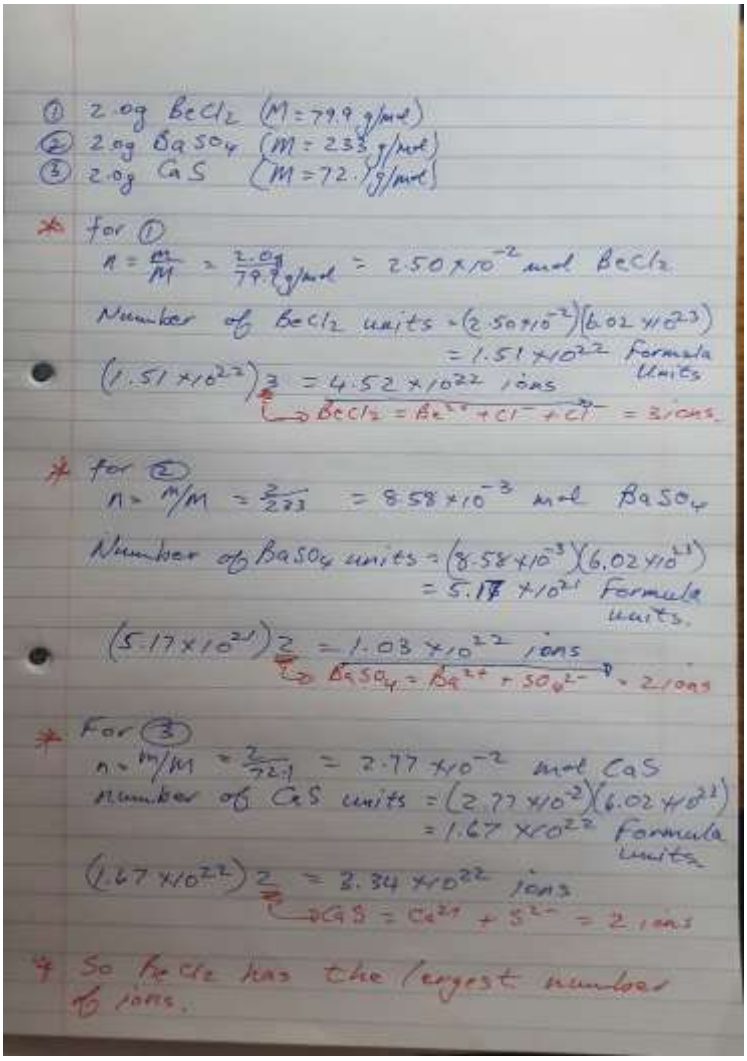
MEMORANDUM FOR E-TEST 1 (STUDY UNIT 2)

Question 1 (2 marks) Q1= 14% correct (n = 965 students)

Watter een van die ionieseverbindings hieronder het die grootste aantal ione? Doen jou berekeninge op papier en vul dan **slegs die formule** van die sout in die spasie in. / *Which one of the ionic compounds below has the largest number of ions? Do your calculations on paper and then **only type the formula** of the salt in the given space.*

2.0 g of $BeCl_2$ (M_{BeCl2} = 79.9 g.mol^{-1}); 2.0 g of $BaSO_4$ (M_{BaSO4} = 233 g.mol^{-1}); 2.0 g of CaS (M_{CaS} = 72.1 g.mol^{-1})

__$BeCl_2$__ has the largest number of ions.



OR because the mass of each compound was the same you could have just saved yourself some time and looked at the number of ions in each compound, thereby deducing that $BeCl_2$ will have the most ions – 3 ions as to the 2 ions each for $BaSO_4$ and Cas.

Question 2 (4 marks) Q2 = 23% correct

Bereken die massapersentasie ammoniak en water in die blou soliede verbinding $Cu(NH_3)_4SO_4 \cdot H_2O$. Bereken (in gram) ook die massa ammoniak en massa water in 12.0 g van die verbinding. Dui al jou antwoorde tot 2 desimale plekke na die punt (nie komma nie) aan. Moet ook nie die simbole % of g in die antwoord spasie tik nie. Slegs numeriese waardes sal aanvaar word.

Calculate the mass percent of ammonia and water in the blue solid compound $Cu(NH_3)_4SO_4 \cdot H_2O$. Also calculate (in gram) the mass of ammonia and the mass of water in 12.0 g of the compound? Indicate all your answers to 2 decimal places after the point (not commas). Also, do not add the symbols % or g into the space provided for your answers. Only numerical values are accepted.

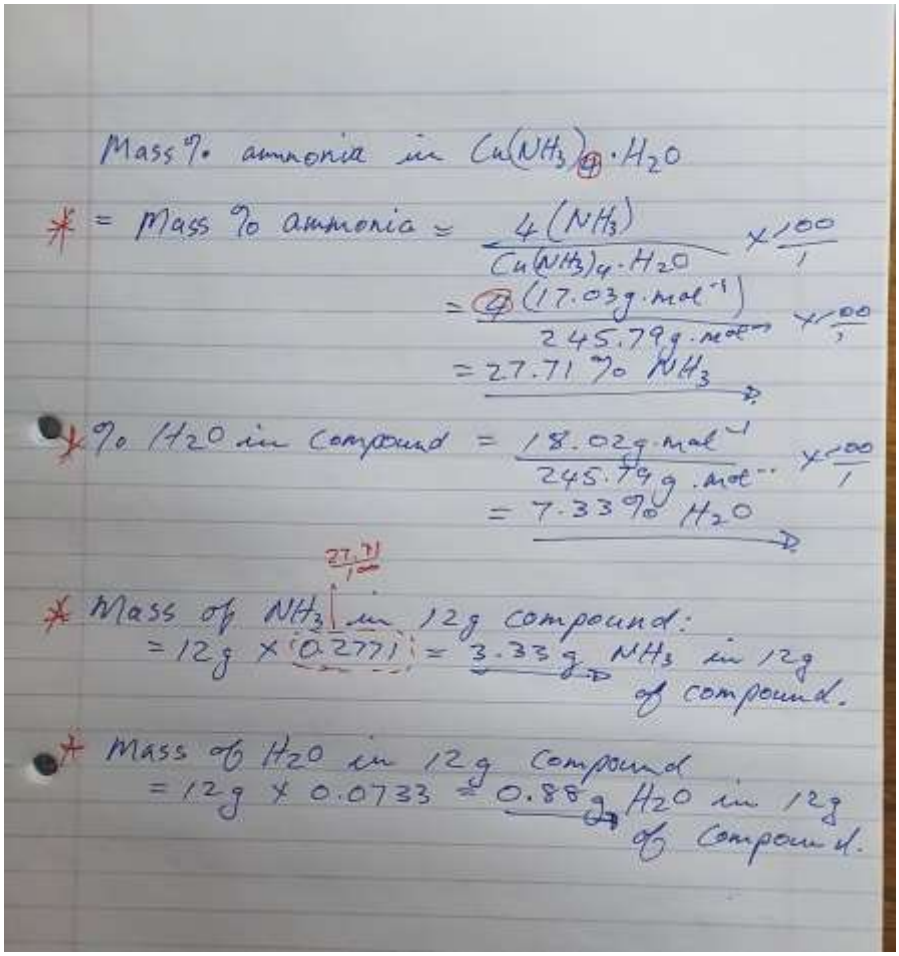
(Gegee: / Given: $M_{Cu(NH3)4SO4.H2O} = 245.79\ g.mol^{-1}$; $M_{Cu} = 63.55\ g.mol^{-1}$; $M_{NH3} = 17.03\ g.mol^{-1}$; $M_{SO42-} = 96.1\ g.mol^{-1}$; $M_{H2O} = 18.02\ g.mol^{-1}$)

Mass % Ammonia = ____ % ammonia

Mass % H_2O = ____ % H_2O

Mass of ammonia in 12.0 g of the compound = ____ g ammonia

Mass of water in 12.0 g of the compound = ____ g H_2O

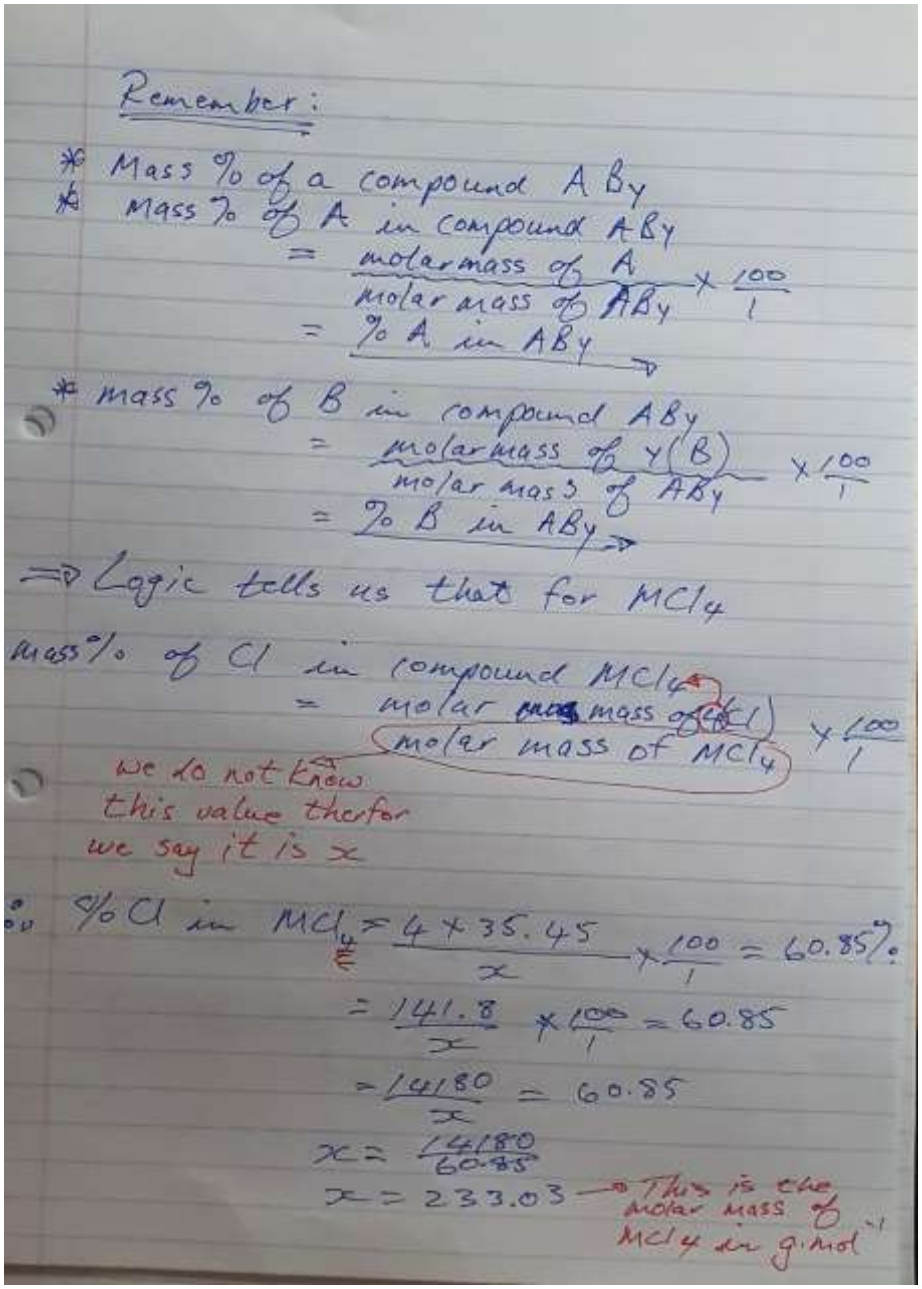


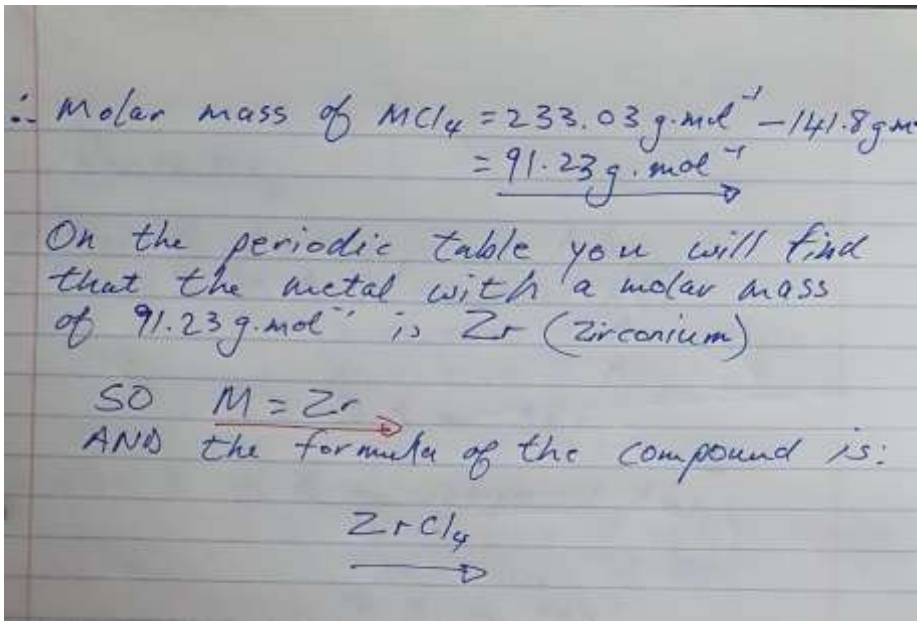
Question 3 (3 marks) Q3 = 32% correct

'n Metaal (M) vorm 'n verbinding met die formule MCl_4. Indien die verbinding uit 60.85% chloor bestaan, wat is die identiteit van die metaal, M? Werk die probleem op papier uit en skryf slegs die simbool van die metaal, M, in die spasie hieronder.

A metal (M) forms a compound with the formula MCl_4. If the compound is 60.85% chlorine, what is the identity of the metal, M? Work the problem out on paper and then only write the symbol of the metal, M, in the space provided.

The identity of the metal, M is __Zr__




∴ Molar mass of MCl_4 = 233.03 g·mol⁻¹ − 141.8 g·mol⁻¹
= 91.23 g·mol⁻¹
On the periodic table you will find that the metal with a molar mass of 91.23 g·mol⁻¹ is Zr (zirconium)
SO M = Zr
AND the formula of the compound is:
$ZrCl_4$

Question 4 (2 marks) Q4 = 52% correct

'n Onbekende verbinding het die volgende resultate gelewer toe dit geanaliseer is: C = 54.0 %; H = 6.00 % en O = 40.0 %. Vier verskillende studente het hierdie waardes gebruik om die empiriese formules hieronder te bereken. Watter een is korrek?

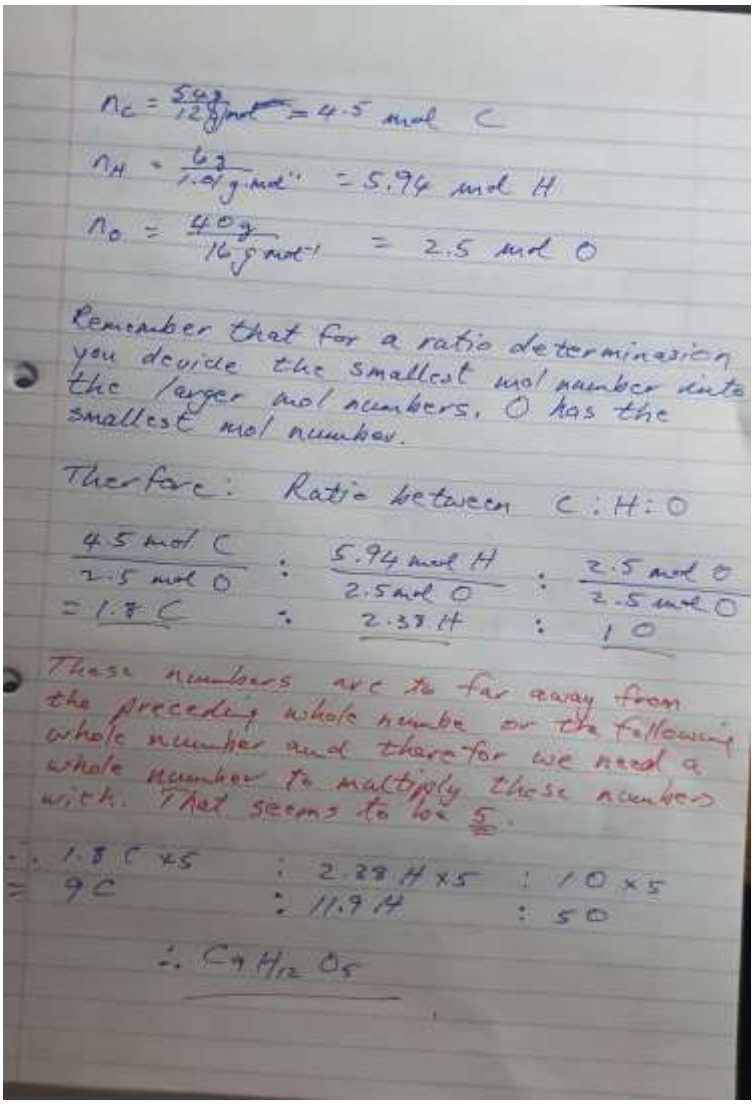
When analyzed, an unknown compound gave these experimental results: C = 54.0 %; H = 6.00 % and O = 40.0 %. Four different students used these values to calculate the empirical formulas shown below. Which one is the correct answer?

A. $C_4H_5O_2$

B. $C_7H_{10}O_4$

C. $C_5H_7O_3$

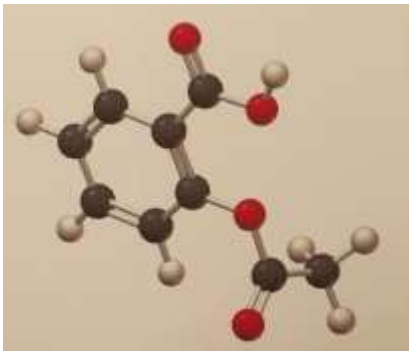
D. $C_9H_{12}O_5$



Question 5 (3 marks) Q5 = 9% correct (does not count anymore - hence mark now out of 18 instead of 21)

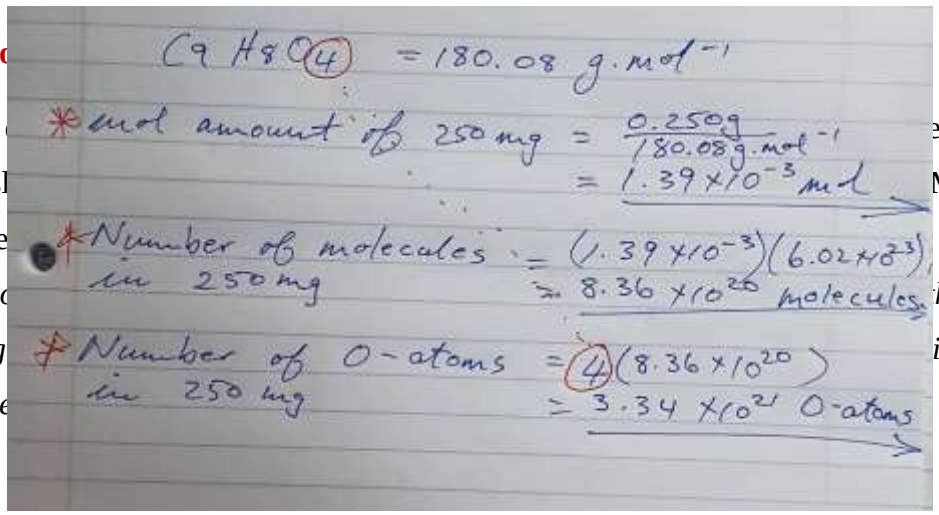
1. Bereken die molhoeveelheid van 250 mg van die verbinding hieronder. **2.** Bereken hoeveel molekules van die verbinding is in 250 mg. **3.** Bereken hoeveel suurstofatome daar in 250 mg van die verbinding is. Die swart balletjies in die verbinding is koolstofatome, die rooi balletjies is suurstofatome en die wit balletjies is waterstofatome. Dui jou antwoorde in wetenskaplike notasies aan tot 2 desimale plekke na die punt (nie 'n komma nie). Vir die eksponent gebruik jy die simbool E of e. Byvoorbeeld: 3.259 x 10^{21} word aangedui as: 3.26E21 of 3.26e21

1. *Calculate the mole amount of 250 mg of the compound below.* ***2.*** *Calculate how many molecules of the compound are in 250 mg.* ***3.*** *Calculate how many oxygen atoms are in 250 mg of this compound. The black balls in the compound is carbon atoms, the red balls are oxygen atoms and the white balls are hydrogen atoms. Indicate your answers in scientific notations with 2 decimal places after the period (not a comma). For the exponent you must use the symbol E or e. Example: 3.259 x 10^{21} is indicated as: 3.26E21 or 3.26e21*



1. The mole amount of 250 mg of the compound = ____ mole
2. The number of molecules in 250 mg of the compound are ____ molecules
3. The number of oxygen atoms in 250 mg of the compound is ____ O-atoms.

Questi



Watter eltpunt hê?
Skryf sl Moet asb nie die sme
Which he lower
melting ided. Please
do not e

Na_2S or CaS or Rb_2S

The lower melting point ionic compound is __**Rb_2S**__

Correct Feedback: Na_2S = 1176 ^oC and CaS = 2500 ^oC and Rb_2S = 530 ^0C

For all of the examples, you can not use Coulombs Law for the 1st educement (the product of the charges on the cation and anion has a direct proportionality to the strength of the bond. This is because all of the have the same product value, i.e. 4) The second part of Coulombs Law will be valid here – in short; the larger the ions involved the weaker the bond. Rb is the largest of all the cations (has the largest molar mass) and will therefore have the weakest bond – lowest melting point.

Question 7 (4 marks) Q7 = 42% correct

Skryf die formules van die vier ionieseverbindings neer wat kan vorm deur die katione Mg^{2+} en Fe^{3+} the kombineer met die anione PO_4^{3-} en CO_3^{2-}. / *Write down the formulas for the four ionic compounds that can be formed by combining the cations Mg^{2+} and Fe^{3+} with the anions PO_4^{3-} and CO_3^{2-}.*

In no particular order

$MgCO_3$ NOT mgco3 nor MgCo3 The universal rules apply and an element should be written correctly as it appears on the periodic table. Also Co = Cobalt metal.
But in the e-Test it should be MgCO3 (No brackets because there are only 1 polyatomic anion and no confusion is prevalent.

$FePO_4$ NOT fepo4 nor FePo4 The universal rules apply and an element should be written correctly as it appears on the periodic table. Also Po = Polonium metal.
But in the e-Test it should be FePO4 (No brackets because there are only 1 polyatomic anion and no confusion is prevalent.

$Mg_3(PO_4)_2$ [xxx] and {xxx} brackets are not allowed!!

But in the e-Test it should be Mg3(PO4)2 (There is a round bracket for the fosfate ion because it is a polyatomic anion and there are 2 of them. There would have been confusion if no bracket was typed because then it would have looked as follow: Mg3PO42 and this indicates that there are 42 O-atoms (which is wrong).

$Fe_2(CO_3)_3$ [xxx] and {xxx} brackets are not allowed!!
But in the e-Test it should be Fe2(CO3)3 (There is a round bracket for the carbonate ion because it is a polyatomic anion and there are 3 of them. There would have been confusion if no bracket was typed because then it would have looked as follow: Fe2CO33 and this indicates that there are 33 O-atoms (which is wrong).

PLEASE READ THE INFORMATION REGARDING AN E-TEST THAT I WILL SUPPLY BEFORE EACH TEST. ALL THESE RULES ARE IN THERE!!!!

Question 8 (2 marks) Q8 = 70% correct

Gee die naam of formule van die volgende verbindings: / *Give the name or formula of the following compounds:*

difosfortetrafluoried: / *diphosphorus tetrafluoride:* **P_2F_4 in e-Test it will be P2F4**
$CaCO_3$ **kalsiumkarbonaat OR calsium carbonate**