**Year 12 preliminary work mark scheme (2014 – 2015)**

**Activity 1**

*1 mark for each correctly balanced equation*

Allow any correct multiples

1. C3H8 + 5 O2 🡪 3 CO2 + 4 H2O
2. Al2(SO3)3 + 6 NaOH 🡪 3 Na2SO3 + 2 Al(OH)3
3. 4 Al2O3 + 3 Fe 🡪 3 Fe3O4 + 8 Al
4. 2 KClO3 🡪 2 KCl + 3 O2
5. NH4NO3 🡪 N2O + 2 H2O
6. 2 NaHCO3 🡪 Na2CO3 + H2O + CO2
7. P4O10 + 6 H2O 🡪 4 H3PO4
8. 2 Al + 3 H2SO4 🡪 Al2(SO4)3 + 3 H2
9. Be2C + 4 H2O 🡪 2 Be(OH)2 + CH4

*Maximum 9 marks*

**Activity 2**

**Relative atomic mass**

(From the Periodic Table in the back of the course text book, decimal places quoted may vary)

*3 correct = 1 mark*

*6 correct = 2 marks*

*9 or more correct = 3 marks*

1. Sodium = 23.0
2. Oxygen = 16.0
3. Magnesium = 24.3
4. Sulfur = 32.1
5. Calcium = 40.1
6. Chlorine = 35.5
7. Aluminium = 27.0
8. Hydrogen = 1.0
9. Potassium = 39.1
10. Nitrogen = 14.0

*Maximum 3 marks*

**Relative formula mass**

*1 mark for every two correct formula mass*

1. NaOH = 23 + 16 + 1 = 40
2. KNO3 = 39.1 + 14. 0 + (16 x 3) = 101.1
3. SO2 = 32.1 + (16 x 2) = 64.1
4. CaSO4 = 40.1 + 32.1 + (16 x 4) = 136.2
5. MgCO3 = 24.3 + 12.0 + (16 x 3) = 216.3
6. CuCO3 = 63.5 + 12.0 + (16 x 3) = 123.5
7. HNO3 = 1 + 14 + (16 x 3) = 63
8. Ca(OH)2 = 40.1 + ((16 + 1) x 2) = 74.1
9. Na2CO3 = (23 x 2) + 12 + (16 x 3) = 106
10. H2SO4 = (1 x 2) + 32.1 + (16 x 4) = 98.1

*Maximum 5 marks*

**Moles**

*1 mark for each correct answer*

1. Sodium

1 x 23.0 = 23.0 g

1. Magnesium

1 x 24.3 = 24.3 g

1. Lead

1 x 207.2 = 207.2 g

1. Barium

0.1 x 137.3 = 13.73 g

1. Chromium

0.1 x 52.0 = 5.2 0 g

1. Tin

0.1 x 118.7 = 11.87 g

1. HNO3

1 x 63 = 63 g

1. CuO

2 x 79.5 = 159 g

1. O2

1 x 32 = 32 g

10) H2O

0.5 x 18 = 9 g

*Maximum 10 marks*

**Percentage mass**

1. Molecular mass of Li2O = 29.8  
   Percentage by mass of Li = (6.9 x 2 / 29.8) x 100 = 46.3 % (1 mark)  
   Percentage by mass of O = (16 / 29.8) x 100 = 53.7 % (1 mark)
2. Molecular mass of C2H6 = 30  
   Percentage by mass of C = (12 x 2 / 30) x 100 = 80 % (1 mark)  
   Percentage by mass of H = (1 X 6 / 30) x 100 = 20 % (1 mark)
3. Molecular mass of NaOH = 40  
   Percentage mass of sodium = (23 / 40) x 100 = 57.5 % (1 mark)  
   Percentage mass of oxygen = (16 / 40) x 100 = 40 % (1 mark)  
   Percentage mass of hydrogen = (1 / 40 ) x 100 = 2.5 % (1 mark)
4. Molecular mass of NaCl = 58.5  
   Percentage mass of Na = (23 / 58.5) x 100 = 39 % (1 mark)  
   Percentage mass Cl = (37.5 /58.5) x 100 = 64 % (1 mark)

*Maximum 8 marks*

**Percentage yield**

1. (150 / 200) x 100 = 75 % (1 mark)
2. (60 / 80) x 100 = 75 % (1 mark)
3. 75 / 100 = 0.75  
   80 / 0.75 = 107  
   You need 107 g of A (1 mark)

*Maximum 3 marks*

**Empirical formula**

*Each is worth a total of 3 marks*

1. Na : O  
   Moles = 2.3 : 0.8   
    23 16 (1 mark)  
   Ratio = 0.1 : 0.05  
   Divide by smallest = 0.1 : 0.05  
    0.05 0.05  
    2 : 1 (1 mark)  
    Na2O (1 mark)
2. Mg : N  
   Moles = 0.27 : 0.28  
    24.3 14.0 (1 mark)  
   Ratio = 0.01 : 0.02  
   Divide by smallest = 0.01 : 0.02  
    0.01 0.01   
    1 : 2 (1 mark)  
    MgN2­ (1 mark)
3. Fe : O  
   Moles = 1.68 : 0.64  
    55.8 16 (1 mark)  
   Ratio = 0.03 : 0.04  
   Divide by smallest = 0.03 : 0.04  
    0.03 0.03  
    1 : 1.3 (1 mark)   
   Multiply to get whole numbers 3 : 4  
    Fe3O4 (1 mark)
4. Hg = 55.5 g, Br = 44.5 g  
    Hg : Br  
   Moles = 55.5 : 44.5  
    200.6 79.9 (1 mark)  
   Ratio = 0.277 : 0.557  
   Divide by smallest = 0.277 : 0.557  
    0.277 0.277  
    1 : 2 (1 mark)  
    HgBr2 (1 mark)

*Maximum 12 marks*

**More balancing equations**

*1 mark for each correctly balanced equation*

Allow any correct multiples

1. Na2O + H2O 🡪 2 NaOH
2. 2 KClO 🡪 2 KCl + O2
3. 2 Fe + 1.5 O2 🡪 Fe2O3
4. 2 Mg + O2 🡪 2 MgO
5. H2S + 1.5 O2 🡪 H2O + SO2

*Maximum 5 marks*

Total = 55