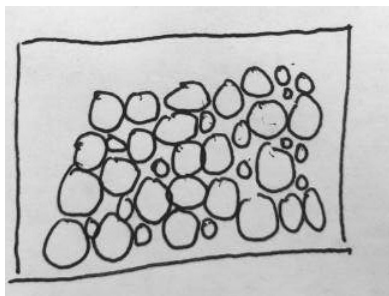


2020 Science (Chemistry) 5076&5078/03 Answer Key

- 1) Cooling a vapour into a liquid: **Condensation**  
Mixing equal amounts of strong acid and strong alkali: **Neutralisation**  
*\*Other two answers were removed due to CLT*

- 2) a) Alloy: Steel  
Constituent 1: Iron  
Constituent 2: Carbon  
*\*Other alloys such as Brass/Stainless Steel also accepted.*

b) i)



- ii) They can conduct electricity in both solid and molten states.  
They have high melting and boiling points.

- 3) a) 1. Iron is a finite resource and will be used up if not recycled.  
2. Less energy is needed to recycle metal.  
3. Extraction of iron from its ore releases harmful gases such as carbon monoxide into the atmosphere.

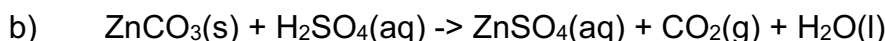
b)

Mistake	Corrections
Chemical Formula of Iron (II) Sulfate is not $\text{Fe}_2(\text{SO}_4)_3$	Chemical Formula of Iron (II) Sulfate is $\text{FeSO}_4$
Solution should not be heated until brown crystals form.	Solution should be heated till saturation and left to cool for crystals to form.
Crystals should not be washed with large quantities of distilled water.	Crystals should be rinse with small amounts of cold distilled water.



## 2020 Science (Chemistry) 5076&5078/03 Answer Key

- 4) a) A: Zinc Carbonate  
B: Copper Metal  
C: Copper (II) Oxide  
D: Copper (II) Sulphate  
E: Zinc Sulphate  
F: Zinc Hydroxide



5) *\*Removed due to CLT*

6) a) *\*Removed due to CLT*

b) Mr of Glucose =  $6(12) + 12(1) + 6(16)$   
= 180 g/mol  
Conc(mol/dm<sup>3</sup>) =  $\text{conc}(\text{g/dm}^3) / \text{Mr}$   
=  $360 / 180$   
= 2 mol/dm<sup>3</sup>

c) number of moles = 0.042mol

7) a) Chloride:  $\text{TaCl}_5$   
Oxide:  $\text{Ta}_2\text{O}_5$

- b) i) Exothermic reactions are reactions which release heat to the surroundings.  
ii) Sodium was oxidized  
Its oxidation state increased from 0 in Na to +1 in NaF.  
iii) Tantalum is less reactive than both carbon and zinc.

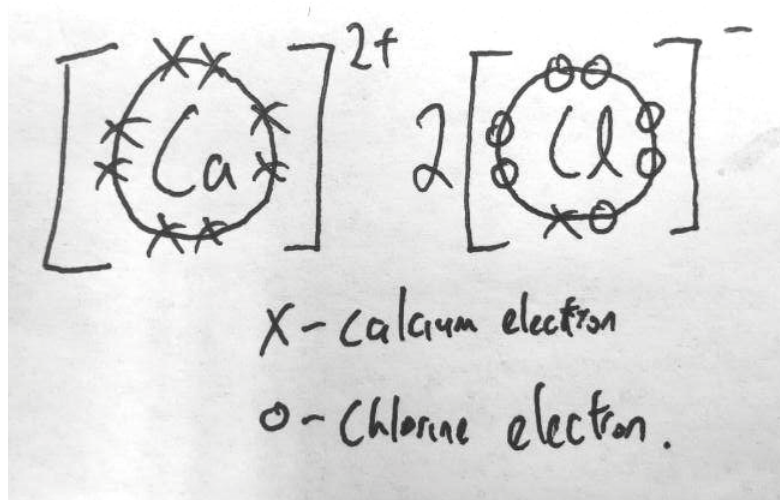
c) i) mass of  $\text{K}_2[\text{TaF}_7]$  = amt x Mr  
= 1 mol x  $(2 \times 39 + 181 + 7(19))$   
= 392g

ii) amt of Ta = mass / Mr  
=  $2000\text{g} / 181$   
= 11.049 mol  
amt of Na =  $5 \times (11.049)$   
= 55.248 mol  
Mass of Na = amt x Mr  
=  $55.248 \times 23$   
= 1270.7g  
= 1270g (3sf)

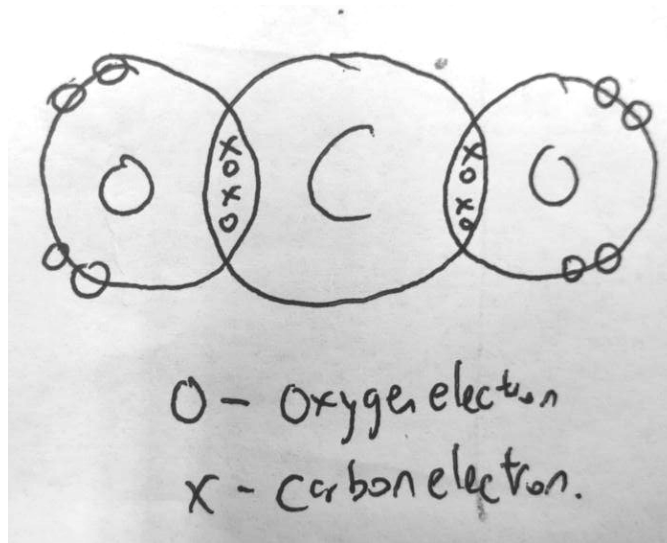


## 2020 Science (Chemistry) 5076&5078/03 Answer Key

- 8) \*Ethane was changed to Carbon Dioxide, due to CLT
- The ratio of the average mass of a molecule to one twelfth the mass of a 12-Carbon atom.
  - Carbon: 2,4  
Calcium: 2,8,8,2
    - Calcium Chloride



### Carbon Dioxide



2020 Science (Chemistry) 5076&5078/03 Answer Key

- c) In molten state, calcium chloride has free moving ions that act as mobile charge carriers to conduct electricity. When in solid state, ions of calcium chloride are held in a lattice structure and are unable to move freely.  
Carbon dioxide exists in simple molecular structure and do not have free moving ions or electrons to act as mobile charge carriers.

9) *\*Removed due to CLT*

- 10)a) i) Astatine  
ii) Flourine is higher in the group than the other halogens, thus is the most reactive.
- b) Down the group, the number of protons within the nucleus of the halogens will increase. Thus, there will be stronger intermolecular forces of attraction between the protons within the nucleus and electrons of neighbouring halogen molecules. This pulls the molecules closer together, resulting in them behaving more like solids down the group.
- c) i)  $\text{Cl}_2(\text{g}) + 2\text{Br}^-(\text{aq}) \rightarrow \text{Br}_2(\text{l}) + 2\text{Cl}^-(\text{aq})$   
ii) The colourless solution turns reddish brown.
- d) Using Gas Ratio,  
 $\text{Cl}_2(\text{g}) : \text{HCl}(\text{g})$   
 $= 2:1$   
Vol of  $\text{Cl}_2$  required  $= \frac{1}{2} \times 3000 \text{ dm}^3$   
 $= 1500 \text{ dm}^3$