

BBSS GCE 'O' Level Prelim Exams 2020
Sec 4 Express
Chemistry (6092) Paper 1 MCQ
Solutions

Paper 1 (40 marks)

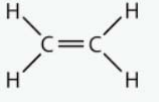
1	2	3	4	5	6	7	8	9	10
D	A	D	C	D	B	C	C	D	B
11	12	13	14	15	16	17	18	19	20
B	A	C	D	C	D	B	D	C	B
21	22	23	24	25	26	27	28	29	30
B	C	A	C	B	B	D	A	C	B
31	32	33	34	35	36	37	38	39	40
B	A	D	A	C	A	A	C	A	B

MCQ

- Ammonia, butane and hydrogen chloride all exist as gases at room temperature. Hence, they cannot be condensed using a water condenser.
- Both the green and red dyes have same boiling point, so cannot be separated by fractional distillation. Chromatography helps to separate the components in the lollipop.
- Rate of diffusion of gases is dependent on molecular mass and temperature. Having the same molecular mass does not mean the same gas, hence boiling point, solubility and number of atoms in one molecule would be different.
- Dilute sugar solution means there is less sugar dissolved in a large volume of water. This means the sugar molecules are far apart in water. With more water molecules, the particles are closely packed.
- Impurities increase the boiling point of a substance. Sodium chloride added to water act as an impurity which causes boiling point of water to increase.
- Graphite is an allotrope of carbon. Crude oil is a mixture of hydrocarbons. Methane is CH₄, a compound.
- $$2\text{HCl} + \text{CaCO}_3 \rightarrow \text{CO}_2 + \text{CaCl}_2 + \text{H}_2\text{O}$$

$$\text{CO}_2 + \text{C (charcoal)} \rightarrow 2\text{CO}$$

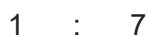
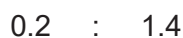
Any unreacted carbon dioxide is removed by Y (aqueous sodium hydroxide).
- Both X⁻ and Y⁺ have 18 electrons.
 X⁻ = 2, 8, 8 Y⁺ = 2, 8, 8 Both ions have 8 valence electrons.
 When an ion is formed, there is no change in no. of neutrons.
 No. of neutrons in X⁻ = 39 - 19 = 20 = no. of neutrons in Y⁺ = 37 - 17 = 20.
 X is a metal . It forms an ionic compound with a non-metal, Y.

- 9 element 1 is hydrogen which is a gas, a non-metal, which does not conduct electricity. Group I metal is more reactive than Group II metal. Element 2 is lithium, a Group I metal, is more reactive than element 4, magnesium. Group I metals have low melting points and boiling points compared to other metals. Element 4, magnesium, is a metal with a giant metallic structure.
- 12 Tl has a charge of $1+$ and ClO_2 has a charge of $1-$. The ratio of $Tl : ClO_2$ is $1 : 1$.
- 13 Each covalent bond consists of 2 electrons.
 $N \equiv N$ has 6 electrons involved in bonding, $H - S - H$ has 4 electrons involved in bonding,
 $H - C \equiv C - H$ has 10 electrons involved in bonding,
 has 12 electrons involved in bonding.
- 14 Both MgO and Al_2O_3 are ionic compounds which conduct electricity in molten state. So the temperature range must include the melting points of both compounds. Both compounds are in molten state between $2852^\circ C$ to $2880^\circ C$.
- 15 Nitrogen is in group V, it forms 3 covalent bonds with other atoms. Chlorine is in group VII, it forms a single covalent bond with other atoms. Oxygen is in group VI, it forms 2 covalent bonds with other atoms. Hence $Cl - N = O$.
- 17 Bronze is a mixture of metals which have giant metallic structure with high melting points.
- 18 $2HCl + CaCO_3 \rightarrow CO_2 + CaCl_2 + H_2O$
 no. of moles of $CO_2 = 100 / 24000$
 $= 0.004167$
 $=$ no. of moles of $CaCO_3$
 mass of $CaCO_3$ in chalk $= 0.004167 \times 100 = 0.4167$ g
 % purity of $CaCO_3$ in chalk $= 0.4167 / 0.5 = 83.3\%$
- 19 $2C_2H_2 + 5O_2 \rightleftharpoons 4CO_2 + 2H_2O$
 vol of O_2 needed $= 1 \times 5/2 = 2.5$ dm³ (mol ratio = vol ratio for gases)
 vol of air needed $= 2.5 \times 100/20 = 12.5$ dm³
- 20 To calculate % change, add up the total volume of reacting gases (which is the original volume) and subtract it from the total volume of gases produced, then divide by original volume and multiply by 100.
 Options C is incorrect as there is a large change in volume due to change from gas to solid.
 Change in volume for option A : $(3-1)/3 \times 100 = 66.7\%$
 Change in volume for option B $= (6-3)/6 \times 100 = 50.0\%$
 Change in volume for option D $= (7-2)/7 \times 100 = 71.4\%$
 Hence option B has the smallest % change in volume.
- 21 Statements 2 and 4 are correct. Statement 3 is incorrect as each molecule of carbon dioxide has 3 atoms but each molecule of hydrogen chloride has 2 atoms. 1 mole of carbon dioxide has more atoms than 1 mole of hydrogen chloride gas.
 Mr of $CO_2 = 44$; Mr of $HCl = 36.5$ so 1 mole of each gas does not have same mass.

22 Mass of water = 49.2 – 24.0 = 25.2 g

No. of moles of water = 25.2 / 18 = 1.4 mol

No. of moles of magnesium sulfate = 24.0 / [24+(32 +(16x4))] = 0.2 mol



23 $\text{HX} + \text{NaOH} \rightarrow \text{NaX} + \text{H}_2\text{O}$

no. of moles of acid = 0.1 x 0.02 = 0.002 mol. = no. of moles of alkali

concentration of alkali = 0.002 / 0.025 = 0.0800 mol / dm³

HX is a strong acid as it has a pH of 0.8.

Neutralisation occurs when there is a sharp change in the pH.

24 Acid reacts with metal carbonate or metal hydrogen carbonate to form a salt, CO₂ and water. Substance A has to be a metal carbonate or metal hydrogen carbonate and gas B has to be CO₂. Acid reacts with reactive metal to form salt and hydrogen gas. Substance C has to be magnesium, not copper. Acid reacts with a base to form salt and water. Substance D has to be a base which is a metal oxide or metal hydroxide.

25 Chlorine, gas X, turns damp blue litmus red, then bleached.



Chlorine reacts with iron(II) sulfate to form iron(III) sulfate and iron (III) chloride which form yellow solution.

Iodide ion from KI is oxidised by chlorine to form brown iodine solution.

26 Aqueous copper(II) sulfate contains water. Sodium reacts vigorously with water to form sodium hydroxide which reacts with copper(II) sulfate to form blue precipitate, copper(II) hydroxide. Sodium metal burns with a yellow flame as heat is produced during the reaction with water. Being less dense than water, it darts about on the surface of water.

27 copper, copper(II) oxide and lead(II) oxide has no reaction with steam. Zinc reacts with steam to form hydrogen gas.

28 Barium is a more reactive metal than magnesium. Like magnesium, it is extracted from its molten ore by electrolysis.

29 A decrease in % of carbon(low carbon steel) is malleable, not brittle.

An increase in % of carbon(high carbon steel) is strong and hard, not softer.

In an alloy of steel, different size of carbon and iron atoms disrupt the orderly arrangement of pure iron atoms, making it stronger.

30 Equation B – Oxidation state of carbon is reduced from +4 in CO₂ to +2 in CO.

Equation C – Oxidation state of iron is reduced from +3 in Fe₂O₃ to 0 in Fe.

31 Across the same period, the nature of oxides changes from basic oxides (metal oxides) to amphoteric oxides (metal oxides), then acidic oxides (non-metallic oxides).

X is either a Group IV, V or Group VI non-metal as it forms an acidic gas of formula, XO₂.

Amphoteric oxides react with both acids and bases. Z is a Group VII non-metal which has a charge of 1- as it forms an ionic compound with W, a metal, of formula, WZ.

- 33** Equation 3 represents combustion which is an exothermic reaction.
Equation 4 represents condensation whereby heat is released when gas condenses into a liquid.
- 34** Graph Y – no. of moles of solution = $0.02 \times 4 = 0.0800$ mol.
Graph Z – As initial reaction is faster than Y, concentration of solution should be higher than Y.
As volume of gas collected is half that of Y, no. of moles of solution should be half that of Y.
Option A - no. of ,moles of Z = $0.005 \times 8 = 0.0400$ mol.
- 35** A – air cannot be used as a raw material as iron would be oxidised by it and rendered ineffective as a catalyst. Optimal conditions for the process are 250 atm and 450 °C.
Iron catalyst helps to lower the activation energy for the reaction.
- 37** volume decreased = $50 - 40 = 10 \text{ cm}^3$
% volume decreased = $(10/50) \times 100\% = 20\% = \%$ of oxygen used up.
Combustion of methane uses up about 20% of oxygen.
MgO produced is a solid product and will not contribute to the volume in the vessel at the end of reaction. Reactions B and D do not require oxygen.
- 38** In a simple cell, more reactive metal (zinc) loses electrons and flow to copper electrode.
 H^+ from hydrochloric acid gains electrons to form hydrogen gas.
- 39** At anode, Cl^- ion is preferentially discharged to form chlorine gas.
At cathode, H^+ is preferentially discharged to form hydrogen gas.
Sodium and hydroxide ions are not discharged. As there is a higher concentration of hydroxide ions in solution, the electrolyte becomes more alkaline, thus pH increases.
Overall equation for the electrolysis : $2\text{HCl}(\text{aq}) \rightarrow \text{Cl}_2(\text{g}) + \text{H}_2(\text{g})$
Ratio of $\text{H}_2 : \text{Cl}_2 = 1 : 1$. Thus equal volume of both gases are produced.
- 40** At anode, OH^- is preferentially discharged to form oxygen gas.
At cathode, H^+ is preferentially discharged to form hydrogen gas.
Overall equation for electrolysis of dilute hydrochloric acid: $2\text{H}_2\text{O} \rightarrow 2\text{H}_2 + \text{O}_2$
Ratio of $\text{H}_2 : \text{O}_2 = 2 : 1$.
Thus volume of oxygen gas = half that of hydrogen = $9.6/2 = 4.8 \text{ cm}^3$

The End

BBSS 2020 Prelim 4E Chemistry Paper 2

Answers with Markers' Feedback

- 1a krypton [1]
1b bromine [1]
1c arsenic [1]
1d calcium [1]

note: max [2] if student wrote chemical symbols, instead of names.

- 2a C [1]
2b E [1]
2c F [1]
2d A [1]
2e B [1]

3a The elements are arranged in order of increasing **atomic (proton) number**. [1]

3b Cobalt and nickel have the **same relative atomic masses / Ar**. [1]

3c Any two **comparisons**, [1] each

Transition elements

- have high melting/boiling points while halogens have low melting/boiling points
- have high density while halogens have low density
- conduct heat/electricity while halogens do not
- are malleable/ductile while halogens are not
- form positive ions by losing electrons while halogens form negative ions by gaining electrons
- are catalysts while halogens are not

3di Any one, [1]

- Hydrogen atom gains one electron (to form ion of 1- charge)
- Hydrogen atom form diatomic molecule (through sharing of electrons)
- Hydrogen has low melting/boiling point/is a gas (at room temperature and pressure)

3dii Hydrogen atom loses one electron (to form ion of 1+ charge) [1]

4a $\text{CH}_3\text{NH}_2 + \text{HCl} \rightarrow \text{CH}_3\text{NH}_3\text{Cl}$ [1]

4b blue, 9–11 [1]
red, 1 or 2 [1]

4c It does not form in the centre as CH_3NH_2 ($M_r = 31$) has **lower molecular mass** than HCl ($M_r = 36.5$), hence, CH_3NH_2 **diffuses at a faster rate** than HCl , and **travels further** across the tube compared to HCl .

[1] quote both M_r

[1] methyl amine has lower M_r and diffuses faster

[1] methyl amine travels further

5a $\text{MgSiO}_3 \rightarrow \text{MgO} + \text{SiO}_2$ [1]

5b MgO , SiO_2 , SO_2 [1]

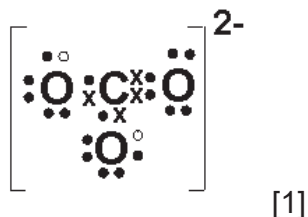
MgO is a **basic** oxide which forms a solution of **pH 10** [1] (accept pH 9–11), while SiO_2 and SO_2 are **acidic** oxides. SiO_2 does not dissolve in water, giving **pH 7** [1]*, while SO_2 forms a solution of **pH 5** [1] (accept pH 3–6).

*note: *bonus mark*

5c Add **excess hot concentrated sodium hydroxide** to the mixture. [1]

Filter the mixture and recover **MgO** as the **residue**. [1]

5d



6a Phosphoric acid **dissociates partially** in water **to form hydrogen ions**. [1]

6b Add a few drops of Universal Indicator to separate test tubes containing sulfuric acid and phosphorous acid.

In the test tube containing

- sulfuric acid, the Universal Indicator will turn from **green to red**. [1]
- phosphoric acid, the Universal Indicator will turn from **green to orange / yellow**. [1]

6c $\text{NH}_4\text{H}_2\text{PO}_4$ / $(\text{NH}_4)_2\text{HPO}_4$ [1]

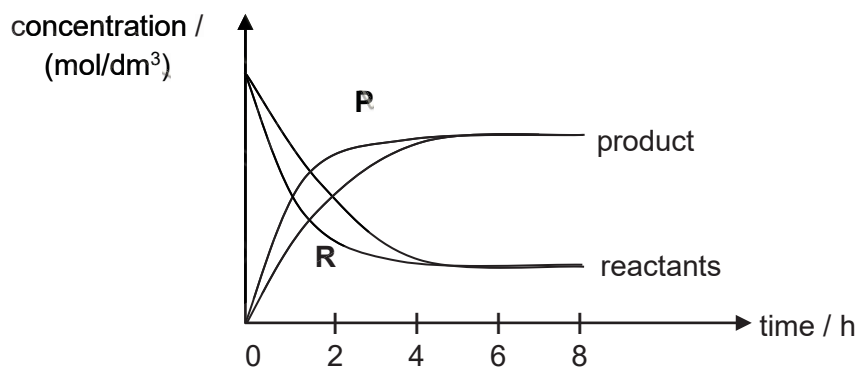
7a Greenhouse gases in the atmosphere help to **trap heat** [1] energy to heat up the earth. Without these gases, the atmosphere on **Earth will be too cold to support** any living organisms.

7b CFCs in the atmosphere **regenerates** or **CFCs leak out of old refrigerators / discarded foam plastic**. [1]

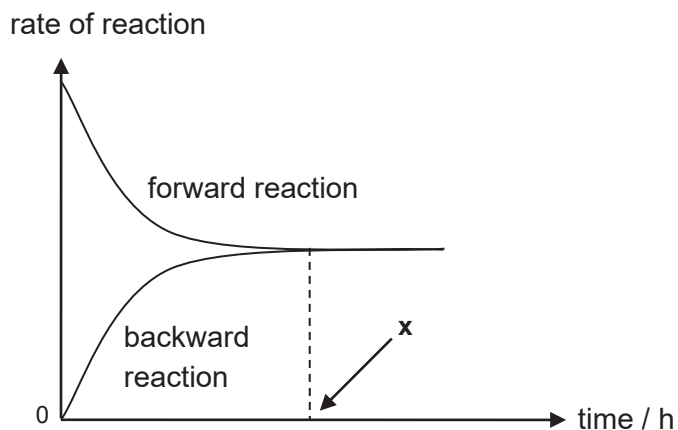
7c The contribution of carbon dioxide is the most significant, despite its low greenhouse factor because the amount of carbon dioxide in the atmosphere is significantly larger than that of the other gases or there is much **more CO₂** [1] in the atmosphere than other gases.

8a $3\text{H}_2 + \rightleftharpoons \text{N}_2 \rightleftharpoons 2\text{NH}_3$ [1]

8bi

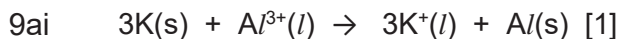


8bii



[1] graphs for forward and backward reactions

[1] graphs intersect + labelling of X



9aia Aluminium is reduced as Al^{3+} gains three electrons to form Al . [1]

Potassium is oxidised as K loses one electron to form K^+ . [1]

As both oxidation and reduction occurs in the reaction, it is a redox reaction.



M_r of $AlCl_3 = 27 + 3(35.5) = 133.5$

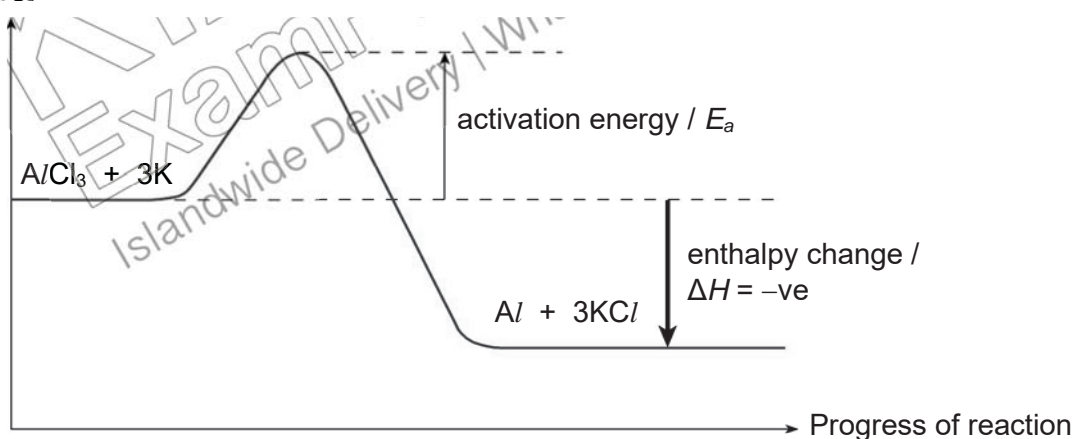
From equation, no. of moles of $AlCl_3 =$ no. of moles of Al

$$= \frac{540}{27} = \underline{20 \text{ mol}} \text{ [1]}$$

Mass of aluminium chloride = $20 \times 133.5 = \underline{2670 \text{ g}}$ [1]

9b sodium can be used, as it is **more reactive** than aluminium. Hence sodium can **displace aluminium from aluminium chloride**. [1]

9c Energy



[1] correct axes

[1] correct labels for activation energy and enthalpy change

[1] correct formulae for reactants and products

9d aluminium < beryllium < sodium < potassium [1]

note: the order of Al and Be can be switched around

- 10a Above 100 °C, the solvent which is **water would have boiled** off. [1]
reject evaporation of water
- 10b cerium(III) sulfate [1]
- 10c At 50 °C, a 100 g saturated solution of sodium nitrate will contain 115 g of solute. [1]
 For 200 g saturated solution, mass of KNO₃ crystals at 50 °C = 115 x 2 g = 230 g [1]
- 10d The **forces of attraction** between the water molecules and sodium and chloride ions of the solid are **stronger** than that between the water molecules and silver and chloride ions. [1] While the forces of attraction between the sodium and chloride ions are **weaker** than the forces of attraction between silver ions and chloride ions. [1]

10e Temperature increases the solubility of a salt. **Higher the temperature, higher the K_{sp}**. [1]

10f silver chloride [1]

10gi calcium sulfate [1]

10gii Ionic product

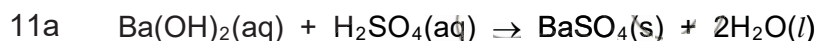
$$= [\text{conc of Ca}^{2+}(\text{aq})] \times [\text{conc of SO}_4^{2-}(\text{aq})]$$

$$= \left(\frac{0.02}{2}\right) \times \left(\frac{0.005}{2}\right) [1]$$

$$= 2.5 \times 10^{-5} > 2.0 \times 10^{-5} \text{ mol}^2/\text{dm}^3$$

Since **IP > K_{sp}**, **precipitation would be observed**. [1] (*this mark can be awarded even if the previous substitution is incorrect*)

10h evaporate the solvent / cool the solution [1]



[1] state symbols

[1] balanced equation

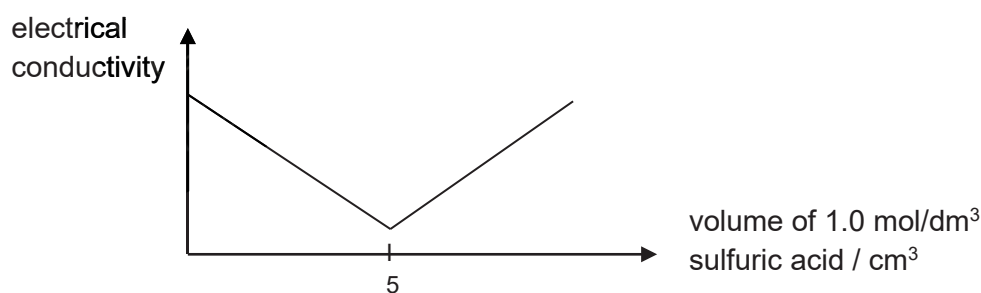
11bi Filter the mixture [1]

Barium sulfate will be collected as **residue**, while **water** will be collected as **filtrate**. [1]

11bii Moles of barium sulfate formed = $(10 / 1000) \times 0.5 = 0.005 \text{ mol}$ [1]

Mass of barium sulfate formed = $0.005 \times 233 = 1.17 \text{ g}$ (3sf) [1]

11c



[1] zero/low conductivity when volume of sulfuric acid is 5 cm³

[1] conductivity decreases and increases (when sulfuric acid in excess)

EITHER

- 12ai movement of electrons in anti-clockwise direction. [1]
- 12aii electrode X: cathode; electrode Y: anode [1]
- 12b iron electrode: $2\text{H}^+(\text{aq}) + 2\text{e}^- \rightarrow \text{H}_2(\text{g})$ [1]
zinc electrode: $\text{Zn}(\text{s}) \rightarrow \text{Zn}^{2+}(\text{aq}) + 2\text{e}^-$ [1]
- 12ci CuO [1]
- 12cii $2\text{O}^{2-} \rightarrow \text{O}_2 + 4\text{e}^-$
No. of moles of oxygen gas = $48 / 24000 = 0.002$ mol [1]
No. of moles of electrons = $0.002 \times 4 = 0.008$ mol
 $\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}$
No. of moles of copper = $0.008 / 2 = 0.004$ mol
Mass of copper formed = $0.004 \times 64 = 0.256$ g [1]
- 12d **Magnesium is more reactive than zinc** [1], causing the flow of electrons to be reversed, causing **electrode Y to be the cathode and electrode X to be the anode**. [1]
Pinkish-brown solid will be formed at **electrode Y** and **effervescence** will be seen at **electrode X**. [1]

OR

- 12a anode; cathode [1]
- 12b Y is hydrogen [1]
hydrogen ion will be discharged/reduced/gain electron to form hydrogen gas [1]
- 12c As **sodium ions and hydroxide ions are not discharged** [1], they remained in the solution to form sodium hydroxide / As hydrogen ions and chloride ions are discharged, **sodium ions and hydroxide ions remained** in the solution formed sodium hydroxide.
- 12d Place a damp blue litmus paper near the gas, chlorine gas turned **damp blue litmus paper red and bleached** it. [1]
- 12e The size of the **pore is not big enough for chloride ions to pass through**. [1]
Hence, chloride ion cannot pass through the membrane and **chloride ion is separated from hydroxide ion** [1] and sodium hydroxide is collected as the only product.
- 12f Oxygen gas instead of chlorine gas will form at the positive electrode/anode. [1]
Hydroxide ion is discharged/oxidised/lost electrons to form oxygen gas. [1]
Sodium chloride solution becomes more concentrated as water is decomposed / sodium ions and chloride ions are not discharged. [1]

Markers' Feedback

Qns	Challenges	Feedforward feedback
1	listed elements from other period, and/or write the chemical formula	understand the requirements of the question: element from Period 4, and write the NAME
1d	listed potassium as the wrong answer.	while potassium reacts readily with cold water, it forms compound of the type MOH.
2s	don't know what is brine.	brine is concentrated sodium chloride. when brine is electrolysed, chloride ions are preferentially discharged compared to hydroxide ions, to give chlorine gas.
3c	did not compare the properties of both substances mentioned that the halogen only shows oxidation state of -1 in its compounds which is not true.	the command word 'compare' requires a clear comparison of the substances. the compounds of halogens can show a variety of oxidation states: -1 in HX, +1 in NaClO, +5 in NaClO ₃ etc
4a	could not give the correct equation and formula of methylammonium chloride	link methyl amine to ammonia which is familiar to all. think about how ammonia and hydrogen chloride gas reacts via acid-base reaction to give a salt.
4b	unsure about the colours of Universal Indicator	link the acidity and basicity of the substances to the colour chart.
4c	used the wrong terms 'relative atomic mass' instead of 'relative molecular mass'. Omit M_r in their answers	relative atomic mass or A_r is used for atoms, while relative molecular mass or M_r is used for molecules.
5b	did not list the nature (neutral/acidic/basic) of the oxides and the pH values.	metal oxides are basic, non-metal oxides are acidic. These oxides forms solutions that are either basic, acidic or neutral. SiO ₂ is an acidic oxide which does not react nor dissolve in water. Hence it remains neutral.
5c	cannot find a method to separate the substances.	MgO is basic oxide, while SiO ₂ is acidic oxide. Water is not suitable as MgO is not very soluble in water. SiO ₂ being acidic, reacts with conc hot NaOH (link to formation of slag in blast furnace), to form a soluble salt. Upon filtration, this salt forms the filtrate, while MgO forms the residue.
5d	cannot deduce the dot-and-cross, given the structure	remember to include the charges for ions, and check that all atoms have 8 valence electrons after bonding.
6a	cannot tell that phosphoric acid is weak acid.	The extent of ionisation of an acid/base will tell us whether the substance is strong/weak, not by the amount of H ⁺ (aq) formed.

Markers' Feedback

Qns	Challenges	Feedforward feedback
6b	many complex solutions were given.	'simple' means a physical test would suffice. Usage of other chemicals are not needed.
6c	cannot deduce the formula of the salt	$\text{H}_3\text{PO}_4 \rightleftharpoons \text{H}^+ + \mathbf{H}_2\text{PO}_4^-$ $\text{H}_2\text{PO}_4^- \rightleftharpoons \text{H}^+ + \mathbf{HPO}_4^{2-}$ $\text{HPO}_4^{2-} \rightleftharpoons \text{H}^+ + \mathbf{PO}_4^{3-}$ <p>The anions that are bolded can bond with NH_4^+ to form the salts.</p>
7b	did not address the word 'increasing'	many answers mentioned about CFCs lingering or staying in the atmosphere, but did not address the word 'increasing'.
7c	did not compare to other gases	answers need to compare the abundance of carbon dioxide, relative to other gases, as required by qns.
8a	could not recall the equation for the manufacture of ammonia	recall that the Haber process is a reversible process
8bii	could not sketch the rate vs time graph for forward and backward reaction	rate of the forward reaction decreases at a decreasing rate over time, and rate of the backward reaction increases at decreasing rate over time. This is because the concentration of reactants decrease over time, hence the rate will decrease at a decreasing rate over time.
9ai	could not come up with the correct state symbols for Al^{3+}	many listed the aluminium ion as (aq). This is incorrect as water will react with potassium. Hence aluminium ion is (l).
9aii	did not answer to the question did not specify the form of aluminum	<p>while the qns wanted the answer to be in terms of electron transfer, some scoped their answer in terms of oxidation states.</p> <p>in the qns, aluminium can be $\text{Al}(s)$ or Al^{3+}. need to make the distinction.</p>
9aiii	did not convert the mass to g	for calculation of no. of moles, the mass needs to be converted to g.
10b	missing oxidation number for transition element in chemical name.	for any compounds containing transition element, the oxidation number of that element must be stated in the chemical name.
10d	cannot link the data to the requirement of the qns	<p>need to identify the relevant data needed in order to craft a response that address the question. Since the question is on solubility, search for data which talks about solubility.</p> <p>need to compare the differences between sodium chloride</p>

Markers' Feedback

Qns	Challenges	Feedforward feedback
	did not compare the two ionic compounds	and silver chloride.
10gii	not able to determine the ionic product correctly	when the same volume of another solution is mixed, the concentration of both solutions is halved.
11bi	did not state clearly how to separate the products	need to state how the products (water and BaSO ₄) can be separated and found after filtration.
11c	<p>did not appreciate the concept of limiting reagent, precipitate formation and how these links to electrical conductivity</p> <p>Did not label the volume of acid</p>	<p>In the first instance when sulfuric acid is added to barium hydroxide, insoluble barium sulfate is formed. Hence concentration of ions and hence conductivity decreases. The conductivity decreases and reaches a minimum when all barium hydroxide is reacted. Thereafter, sulfuric acid is in excess, and conductivity increases as concentration of ions increase.</p> <p>consider when the acid is in excess, to determine the volume of acid used.</p>
E12 a&b	cannot determine which is the anode and cathode and hence the reactions at the respective terminals	zinc is more reactive than iron. Hence zinc will be oxidised to Zn ²⁺ , electrons are lost, with Zn being the anode. Hence iron is the cathode. Iron cannot be reduced further. H ⁺ is reduced to form H ₂ . Overall, the direction of movement of electrons is anti-clockwise.
12ci	cannot determine the molten binary compound	pinkish-brown solid is copper, while the gas is oxygen. Since the compound is molten, we have Cu ²⁺ (l) and O ²⁻ (l).
12cii	did not substitute the correct values	need to convert volume to dm ³ to use the formula: no. of moles of gas = volume of gas in dm ³ / 24
12d	could not apply the difference in reactivities to the observations	<p>the change is applied in cell A, but question asked for observations in cell B.</p> <p>A larger difference in reactivity between iron and zinc and magnesium in zinc does not give a larger yield of substance. The process is faster due to larger current, but the amount of products remained the same.</p>
O12e	did not fully address the question	question asked how the chloride ion prevent contamination. Hence there are two parts: (1) why does chloride ion not pass through the membrane? (2) How does this prevent contamination?
O12f	did not compare the differences	response need to make clear comparison when a new change is applied.

