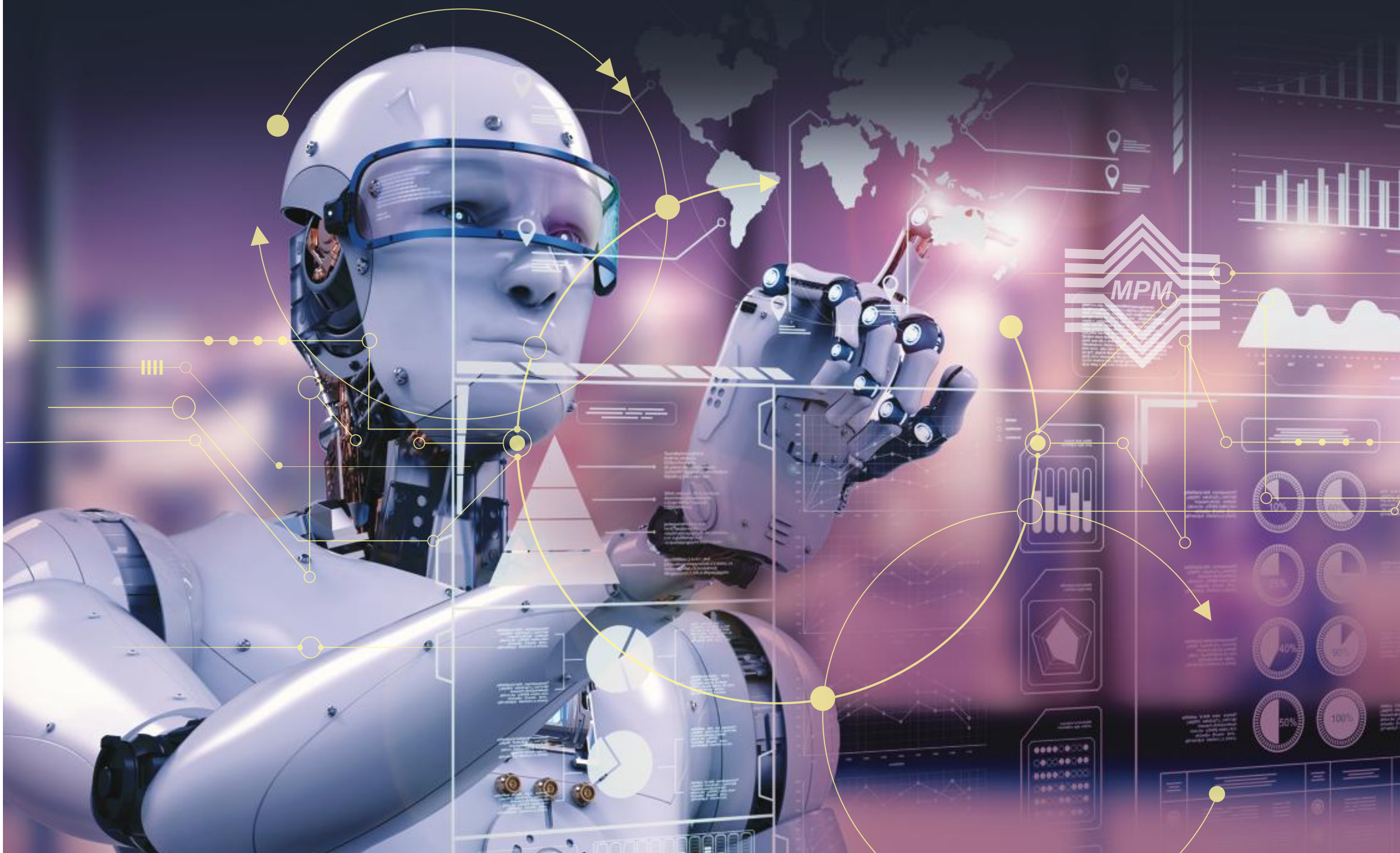
MAJLIS PEPERIKSAAN MALAYSIA

SASBADI

Laporan Peperiksaan STPM 2018

Chemistry (962)



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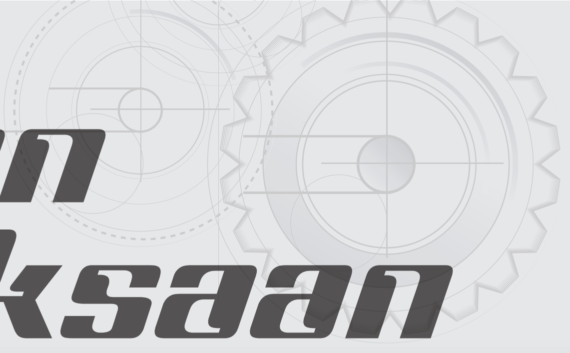

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(Anak syarikat milik penuh Sasbadi Holdings Berhad (1022660-T))
PETALING JAYA

MAJLIS PEPERIKSAAN MALAYSIA

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CONTENTS

CHEMISTRY (962/1)

OVERALL PERFORMANCE

For Semester 1 2018, 4 471 of candidates sat examination for this subject and 59.0% of them obtained a full pass.

The percentage of the candidates for each grade is as follows:

Grade	**A**	**A–**	**B+**	**B**	**B–**	**C+**	**C**	**C–**	**D+**	**D**	**F**
Percentage	6.58	6.55	8.72	12.14	7.98	8.66	8.37	8.90	7.65	3.60	20.85

CANDIDATES' RESPONSES

SECTION A: *Multiple-Choice*

Answer Keys

Question number	Key	Question number	Key	Question number	Key
1	**C**	6	**A**	11	**B**
2	**D**	7	**C**	12	**B**
3	**C**	8	**B**	13	**C**
4	**D**	9	**D**	14	**B**
5	**A**	10	**D**	15	**A**

General comments

The performance of the candidates was just fine. It can be said that Question 1 was easy for the candidates to answer with 75% of the candidates managed to get the correct answer. However, Questions 4 and 14 were difficult to answer with 26% and 26% of the candidates obtained the correct answers respectively.

SECTIONS B AND C: *Structure and Essay*

General comments

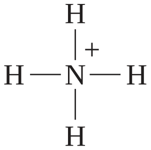
The performance of the candidates was varying between one centre to another. It was found that the candidates from big centres performed better than the candidates from small centres.

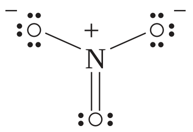
Comments on the individual question

Question 16

This question was on the chemical bonding in Lewis structures, shape of ions, covalent bond and ionic bonds. It was a popular question but not well answered.

In part (*a*), most of the candidates were able to state the shape of NH_4^+ ion as tetrahedral and the shape of NO_3^- ion as trigonal planar but they were unable to draw the correct Lewis structures for NH_4^+ ion and NO_3^- ion, mainly by not writing the charge of the ion on the correct atom, as shown below.





In part (*b*), most of the candidates stated correctly that Cl is bigger than F, or Cl is more polarizable than F, in explaining why aluminium chloride is a covalent compound while aluminium fluoride is an ionic compound. However, they did not state that aluminium has high charge density, that fluorine has high electronegativity and also mentioned incorrectly chloride and fluoride instead of chlorine and fluorine.

Question 17

This question was about the lattice structure and bonding of ice, and phase diagram of water.

In part (*a*), most of the candidates were unable to state the lattice structure of ice as either molecular structure or hexagonal structure. Their answer was face-centred cubic structure.

In part (*b*), majority of the candidates were able to state the covalent bond and the hydrogen bond in crystal lattice of ice.

In part (*c*), most of the candidates were able to sketch and to label the phase diagram of water. Some of them drew the solid-vapour boundary as a straight line.

In part (*d*), most of the candidates stated correctly that ice is less dense than water, and explained the answer as due to the open structure or large volume of ice. But, some of them stated incorrectly that bonding in ice is van der Waals forces and they also stated that the anomalous behaviour of water in terms of melting and boiling points.

Question 18

This question was on the concept of relative atomic mass, relative molecular mass and mass spectrum.

In part (*a*)(i), most of the candidates were able to give the correct answer for the relative atomic mass of atom *X* as 2 but, some candidates were unable to write the expression for the determination of relative atomic mass, as follows:

$$\text{Relative atomic mass} = \frac{12 \times \text{mass of an atom of } X}{\text{Mass of an atom of C-12}}$$

They were also unable to write the correct unit for the relative atomic mass which was 2 g or 2 g mol^{-1}. Most of the candidates were unable to write the chemical symbol of *X* and gave *X* as $^{2}_{1}H$ or identified incorrectly *X* as H.

In part (*a*)(ii), most candidates were able to state that the beam of X^+ and the beam of proton were deflected in the same direction. They also stated correctly that X^+ ion was heavier than proton. Some of them wrote incorrectly the symbol for X as ${}^2_1H$ or identified incorrectly X as He.

In part (*b*)(i), most of the candidates were able to calculate the simplest ratio of N:H as 1:3. Thus, they were able to determine the chemical formula of compound Y as NH_3. Some of them wrote the simplest ratio as 1.0:3.0 or 1.00:3.00 instead of the whole number integer.

In part (*b*)(ii), most of the candidates were able to identify the ion which caused the peak at m/e = 16 as NH_2^+ ion but they were unable to identify the ion which caused the peak at m/e = 18 as NH_4^+ ion or ${}^{15}NH_3^+$ instead of NDH_2^+ ion. Some of the candidates were unable to write the fragmentation equation for compound Y as follows:

$$NH_3^+ \rightarrow NH_2^+ + H \text{ or } NH_2D^+ \rightarrow NH_2^+ + D$$

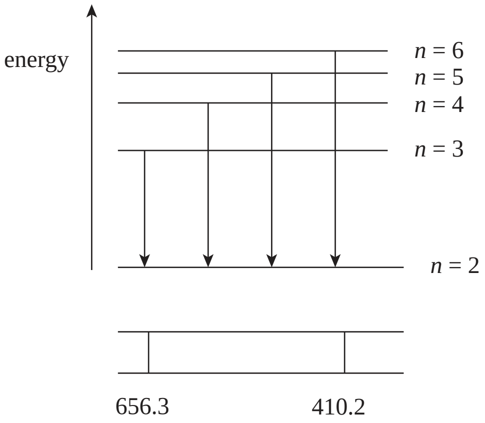
For the explanation, most candidates were unable to state that deuterium, D, is an isotope of hydrogen, H, and the peak at m/e = 18 was very weak because the percentage abundance of D was very low.

Question 19

This question was on the Balmer series in the emission spectrum of hydrogen and the concepts of electronic configuration. It was a popular question and was moderately well answered.

In part (*a*)(i), most of the candidates were able to state that hydrogen atom or electron absorbs energy. They also stated correctly that the electron in the excited state was unstable and loss energy in the form of electromagnetic radiation when it falls down from a higher energy level to $n = 2$ for Balmer series. A few candidates were unable to state that the electron is excited and but mentioned incorrectly that the atom is excited. They also did not explain the formation of lines in the spectrum due to quantisation of energy. They also stated incorrectly that the energy level is quantised instead of the energy of electron is quantised.

In part (*a*)(ii), most of the candidates were able to draw the energy level diagram to show the electron transitions in the Balmer series, as shown below:



Some candidates were unable to draw five lines with the first electronic transition of $n = \infty$ to $n = 2$ corresponding to the line at $\lambda = 410$ and labelled incorrectly energy as energy level. The candidates also were unable to relate the two lines at 410.2 and 656.3 as due to electron transitions from $n = 6$ to $n = 2$ and $n = 3$ to $n = 2$, respectively.

In part (*b*), most of the candidates were able to write the electronic configuration of Se as $1s^22s^22p^63s^23p^63d^{10}4s^24p^4$. The candidates were able to explain that the arrangement of electrons in an atom follows the Aufbau principle, Pauli exclusion principle and Hund's rule. Some candidates were unable to state that based on the Aufbau principle, the electrons fill from the lower energy level instead of the lowest energy level. They also stated incorrectly that based on the Pauli exclusion principle, two electrons occupy an orbital with the opposite spin but, stated correctly that based on the Hund's rule, the degenerate orbitals are filled singly first with parallel spin.

Question 20

This question was on the chemical equilibrium and it was not a popular question.

In part (*a*), most of the candidates were able to write the expression for the equilibrium constant, K_p and calculate its value which was $K_p = 0.11$ atm. Some of the candidates were unable to use the square brackets ([P_{NO_2}] and [$P_{N_2O_4}$]) in the expression for K_p and gave the numerical value for K_p to two significant figures.

The candidates were also unable to calculate the degree of dissociation of N_2O_4 at 25°C and 10 atm, as shown below:

	N_2O_4	$\rightleftharpoons$	$2NO_2$
initial mol	1		0
mol at equilibrium	$1 - x$		$2x$
total mol at equilibrium	$1 + x$		$1 + x$
partial pressure at equilibrium	$\frac{(1 - x)10}{(1 + x)}$		$\frac{(2x)10}{(1 + x)}$

$$\frac{\left(\frac{(2x)10}{(1 + x)}\right)^2}{\left(\frac{(1 - x)10}{(1 + x)}\right)} = 0.11$$

$$x = 5\% \text{ (or } 0.05\text{) or } 5.2\% \text{ (or } 0.052\text{)}$$

In part (*b*), most of the candidates were able to use the Le Chatelier principle to explain the effect of increase in heat in an endothermic reaction and stated that the degree of dissociation and K_p value increased on heating. Some candidates were unable to state that the forward reaction was endothermic, the colour changed from colourless to brown instead of the mixture changed to darker brown, correlated the increase in pressure as to increase in the number of molecules and the average molar mass increased or decreased. The correct answer was either the species with the lower average molar mass increases or there was no change in the average molar mass.

CHEMISTRY (962/2)

OVERALL PERFORMANCE

For Semester 2 2018, 4 460 candidates sat the examination and 63.50% of them obtained a full pass.

The percentage of the candidates for each grade is as follows:

Grade	A	A–	B+	B	B–	C+	C	C–	D+	D	F
Percentage	3.36	4.37	8.16	9.82	13.12	10.54	14.13	3.48	3.90	3.79	25.34

CANDIDATES' RESPONSES

SECTION A: *Multiple-Choice*

Answer Keys

Question number	Key	Question number	Key	Question number	Key
1	**D**	6	**A**	11	**A**
2	**B**	7	**D**	12	**A**
3	**C**	8	**B**	13	**D**
4	**B**	9	**B**	14	**C**
5	**C**	10	**B**	15	**C**

General comments

The performance of the candidates was just fine. It can be said that Questions 4 and 8 were easy for the candidates to answer with 75.0% and 71.0% of the candidates managed to obtain the correct answers respectively. However, there was no difficult question.

SECTION B AND C: Structure and Essay

General comments

The performance of the candidates was varying between one centre to another. It was discovered that the candidates from big centres performed better than the candidates from small centres.

Comments on the individual questions

Question 16

In part (*a*), most of the candidates were able to label both of the anode and cathode on the diagram correctly. However, there were a few candidates labelled it somewhere else on the diagram instead of on the dotted lines given as the answer spaces. There were also candidates labelled '–' sign for the carbon lining and '+' sign for the carbon electrode.

In part (*b*), most of the candidates were able to write both half-equations at the cathode and the anode. However, many candidates were unable to state the physical states for both half-equations. Besides, many candidates gave wrong physical states especially for $2O^{2-}(aq)$, $Al^{3+}(aq)$ and $Al(s)$. There were also frequent imbalanced half-equations found such as $O^{2-}(g) \rightarrow O_2(g) + 2e^-$ and $O_2(g) \rightarrow 2H_2O(l) + 4H^+(aq) + 4e^-$.

In part (*c*), most of the candidates were able to state correctly the reason why the anode must be replaced frequently. A few candidates gave incorrect answer such as carbon oxidised and the most common answer given was the carbon corroded.

In part (*d*), most of the candidates were able to write the formula of cryolite and state the function of cryolite correctly. A few candidates could not get marks as they gave inaccurate answer such as Na_2AlF_6. Many candidates gave general function of cryolite as to lower down the temperature needed for the reaction to occur.

In part (*e*), most of the candidates were unable to give an accurate reason why recycling scrap aluminium requires only 5% of the energy used in the production of aluminium by electrolysis. The most common answer given was the energy required to decompose aluminium oxide was too high.

Question 17

The performance of the candidates in this question was satisfactory.

In part (*a*), very few candidates were able to give the correct definition of bond energy. Some candidates failed to mention the covalent bond while others did not mention the gaseous state or molecule.

In part (*b*), most of the candidates were able to state that the thermal stability of hydrogen halides decreases from HF to HI due to the H-*X* bond becomes longer, but they did not mention that the bond gets weaker when going down the group.

In part (*c*), most candidates were able to get the trend correctly but, some gave the ascending acidity as HI, HBr, HCl, HF. Instead, the sequence should be HF, HCl, HBr, HI.

In part (*d*), many candidates were able to state correctly that the intermolecular forces present in all of the hydrogen halides. However, the most common answers given by the candidates were covalent bond and van der Waals forces for all halides or van der Waals forces as many of them did not include the presence of hydrogen bond in H–F. A few of the candidates spelt the forces wrongly such as Van de Waals, Vaan de Waal, Van der Waals' and Ven der Waals forces instead of van der Waals forces.

Question 18

In part (*a*), most of the candidates were able to state the trends of the reactivity of Group 2 elements with water and the trends in the solubility of Group 2 sulphate when going down the group. However, some candidates failed to state the different reactivities for each element of Group 2 towards water.

Many candidates mixed up the answer between the element and the sulphate compound when explaining the trend. Most of the candidates were unable to state that each sulphate has a different solubility. The candidates were expected to state that the solubility of Group 2 sulphates decreases down the group. $MgSO_4$ is soluble, $CaSO_4$ is sparingly soluble while $SrSO_4$ and $BaSO_4$ are insoluble in water. Solubility depends on the lattice energy and hydration enthalpy. When going down the group, the cation size increases resulting in decreasing of the lattice energy. However, the decrease in lattice energy is small as the anion, SO_4^{2-} size is very big. Thus, the decrease in the hydration enthalpy is more significant than the decrease in the lattice energy. Then, when going down the group the enthalpy change of solution becomes more endothermic. Some candidates understood wrongly that if a sulphate is insoluble in water, it is more stable.

In part (*b*)(i), most of the candidates were unable to relate that the high temperature was required to break the strong triple bond of N_2. Instead, they explained that it was to break the strong metallic bonds in the magnesium metal.

Question 19

In part *(a)*, many candidates were able to state correctly the two factors that affect the magnitude of the enthalpy of hydration. Some candidates stated wrongly the size of atom instead of ionic radius or ionic size. The most common mistakes were the size of cation, charge of cation, lattice energy and hydration energy.

In part (*b*)(i), most of the candidates were able to calculate the standard enthalpy change of solution for NaCl and AgCl using the data given.

$$\begin{aligned}\Delta H^\circ_{\text{solution}} \text{ of NaCl} &= -\Delta H^\circ_{\text{lattice energy}} + (\Delta H^\circ_{\text{hydration}}\ \text{Na}^+ + \Delta H^\circ_{\text{hydration}}\ \text{Cl}^-)\\ &= -(-775) + [-400 + (-364)]\\ &= +11\ \text{kJ mol}^{-1}\end{aligned}$$

In the same way, $\Delta H^\circ_{\text{solution}}$ of AgCl = +81 kJ mol^{-1}

Some candidates did not add the '+' sign to show that the standard enthalpy of solution was endothermic.

As the standard enthalpy of solution of both salts are endothermic, many candidates stated that both salts are insoluble. They should have stated that NaCl is more soluble than AgCl because the standard enthalpy of solution of AgCl is more endothermic or more positive than that of NaCl. This is because the ionic radius of Ag^+ is smaller than Na^+. This is an anomaly for silver halides. Thus, Ag^+ has a higher charge density resulting in a stronger attraction to Cl^-. This results in Ag^+ and Cl^- being more difficult to dissociate causing AgCl to be less soluble in water.

In part (*b*)(ii), the theoretical and experimental values of lattice energy of NaCl are very similar. Thus, it can be concluded that NaCl is an ionic compound. However, there is a significant difference in the theoretical and experimental values of lattice energy of AgCl so it can be concluded that the bond in AgCl is ionic with covalent characteristics. A few candidates were able to relate correctly the type of ionic bonding and explain the big difference in values of the experimental and theoretical lattice energies of NaCl and the small difference in AgCl.

Question 20

In part (*a*), most of the candidates were able to write the electronic configuration of Cu(I) and Cu(II) ions correctly. Some candidates were unable to state *d* orbitals are full or completely filled for Cu(I) ion. They were also unable to mention the visible region as in the *d-d* electronic transition of Cu(II) ion and write electronic or electron as in *d-d* electronic transition.

In part (*b*)(i), most candidates were unable to name correctly the anionic complex according to IUPAC, due to the wrong spelling, for example diaquatetrachlorocupprate(II), and the spacing seen in the word, for example diaquatetrachlorocuprate (II). The candidates were unable to state that Cl^- and H_2O are monodentate ligands and failed to mention that each ligand donates a pair of electrons or two electrons.

In part (*b*)(ii), many candidates were able to state that ethylenediamine is a bidentate ligand. There were also a few candidates who mentioned that ethylenediamine is a stronger ligand. However, only few candidates were able to name, write the formula and draw the structure of the complex correctly.

CHEMISTRY (962/3)

OVERALL PERFORMANCE

For Semester 3 2018, 4 447 of candidates sat examination for this subject and 58.06% of them obtained a full pass.

The percentage of the candidates for this subject according to grades is as follows:

Grade	**A**	**A–**	**B+**	**B**	**B–**	**C+**	**C**	**C–**	**D+**	**D**	**F**
Percentage	9.15	6.90	4.88	4.63	10.68	11.54	10.28	6.03	4.50	4.23	27.19

CANDIDATES’ RESPONSES

SECTION A: *Multiple-Choice*

Answer Keys

Question number	**Key**	**Question number**	**Key**	**Question number**	**Key**
1	**D**	6	**B**	11	**A**
2	**C**	7	**A**	12	**B**
3	**C**	8	**C**	13	**A**
4	**A**	9	**D**	14	**D**
5	**B**	10	**C**	15	**D**

General comments

The performance of the candidates was good. There were no difficult and easy questions.

SECTION B AND C: *Structure and Essay*

General comments

The performance of the candidates was varying between one centre to another. It was found that the candidates from big centres performed better than the candidates from small centres.

Comments on the individual questions

Question 16

In part (*a*), most of the candidates were able to give the correct reagents for reaction schemes of converting benzene to 3-nitrobenzoic acid. Some of them wrote the wrong formula for nitric acid, HNO_2 instead of HNO_3.

In part (*b*)(i), most of the candidates were able to draw the structural formula of propanamide.

In part (*b*)(ii), most of the candidates were able to give propanoic acid and ammonia as the reagents to prepare propanamide. However, there were candidates that converted propanoic acid to propanoyl chloride followed by a reaction with ammonia as the answer.

In part (*b*)(iii), most of the candidates were able to give the IUPAC name for the most reactive derivatives of propanoic acid which is propanoyl chloride.

Question 17

In part (*a*)(i),most of the candidates were able to draw the structure of chiral primary amine of $C_4H_{11}N$.

In part (*a*)(ii), most of the candidates were able to identify amine as more basic than ammonia.

In part (*a*)(iii), most of the candidates were able to give nitrous acid as a chemical test but many failed to indicate the temperature of reagent as 0°C – 5°C. They also did not state the observation of the test is the formation of bubbles or effervescence, instead of mentioning that N_2 gas was produced.

In part (*a*)(iv), most of the candidates were able to give the observation to indicate the presence of amino group.

In part (*b*)(i), most of the candidates were able to give IUPAC name for amino acid.

In part (*b*)(ii), most of the candidates gave one physical property of amino acids. However, some candidates gave an amphoteric characteristic as one of the chemical property and physical property.

In part (*b*)(iii), most of the candidates were able to draw the structural formulae of dipeptides.

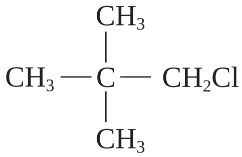
Question 18

In part (*a*), the candidates were required to give the structural formulae of *S* and *T*. Some candidates, identified *S* as cyclic structure, and gave cyclobutadiene as compound *S*. The candidates were also able to give the molecular shapes of *S* and *T* but some candidates gave the molecular shape of *T* as being trigonal planar rather than hexagonal planar. Most of the candidates were unable to explain the bonding of both compounds correctly. The most common mistakes made by the candidates were the correct number of sigma and pi bonds for the molecule not given. They also repeated the statement given in the question of *S* has two π bonds and *T* has three delocalized π bond. They also stated that *S* or *T* as being *sp* or sp^2 hybridised without mentioning carbon of *S* or *T*. Most of the candidates were unable to indicate H atoms used 1*s* orbitals in bonding for *S* and *T* molecules.

In part (*b*), most of the candidates were able to write the chemical equations correctly. Some of them were unable to recognise between reagents and the reaction condition, so that they failed to write the chemical equation correctly. Most of the candidates were able to write geometrical isomer of *X*. The most common mistake was the candidates failed to label *cis* and *trans* isomers.

Question 19

Most of the candidates were able to draw the structures of *P, Q* and *R*. The common mistake made by the candidates was giving the structure of primary alkyl halide for *P*, subsequently, the structure of *Q* was also wrong.

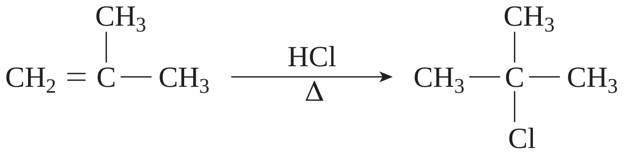


$$\mathrm{CH_3-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}-CH_2Cl}$$

Primary alkyl halide

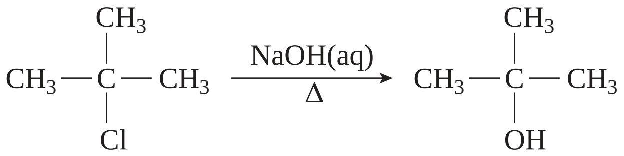
Most of the candidates were unable to write the equations correctly. Most candidates were unable to differentiate between reagents and reaction conditions when writing the chemical equation. For examples:

R with HCl



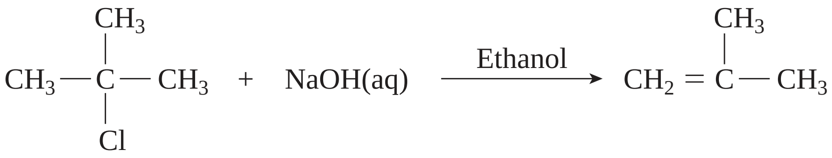
$$\mathrm{CH_2=\overset{\overset{CH_3}{|}}{C}-CH_3 \xrightarrow[\Delta]{HCl} CH_3-\underset{\underset{Cl}{|}}{\overset{\overset{CH_3}{|}}{C}}-CH_3}$$

P with H_2O



$$\mathrm{CH_3-\underset{\underset{Cl}{|}}{\overset{\overset{CH_3}{|}}{C}}-CH_3 \xrightarrow[\Delta]{NaOH(aq)} CH_3-\underset{\underset{OH}{|}}{\overset{\overset{CH_3}{|}}{C}}-CH_3}$$

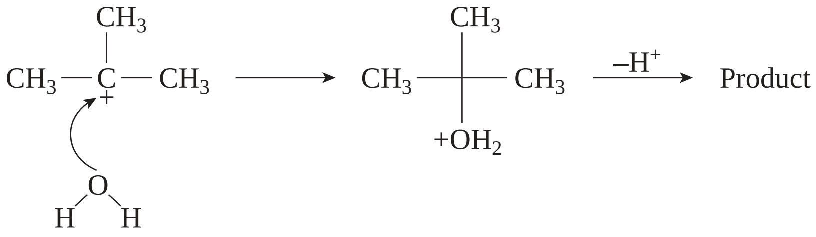
P to give *R*



$$\mathrm{CH_3-\underset{\underset{Cl}{|}}{\overset{\overset{CH_3}{|}}{C}}-CH_3 + NaOH(aq) \xrightarrow{Ethanol} CH_2=\overset{\overset{CH_3}{|}}{C}-CH_3}$$

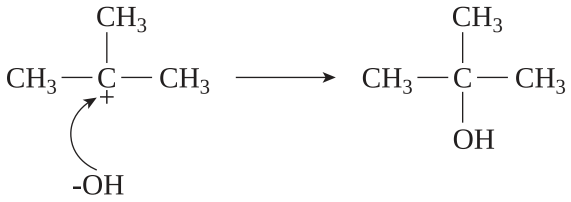
Most of the candidates were able to explain why *P* is the only product of electrophilic addition of 2-methylpropene but they failed to give the correct spelling for Markovnikov rule. Most of the candidates were able to give the functional group of *Q* is hydroxyl. Most of the candidates were able to write the mechanism until the formation of carbocation but failed to indicate water, as the nucleophile that attacks the electrophilic carbon. Majority of the candidates gave $^-$OH as the nucleophile, which is formed from dissociation of water. Unfortunately, this is a wrong concept.

Correct answer:



Wrong answer:

$$H_2O \rightleftharpoons H^+ + {}^-OH$$



Question 20

In part (*a*), most of the candidates were able to give the structural formulae of *K*, *L* and *M* correctly. Some of the candidates wrote $–C_3H_7$ instead of $–CH_2CH_2CH_3$ in the structures of *K* and *M*. The candidates gave incorrect reagent for ozonolysis O_3 in CCl_4 instead of O_3 followed by Zn/HCl or Zn/H_2O or $S(CH_3)_2$. The candidates wrote Br_2 in CCl_4 for the chemical equation that involved bromine water or aqueous bromine. For the reaction of alkene with bromine water, some candidates gave dibromoalkane as the major product but the correct product is halohydrin. Dibromoalkane is a minor product. Some candidates were unable to write the structural formula of 2,4-dinitrophenylhydrazine correctly. For the oxidation reaction, the candidates tended to add symbol of oxygen in the oxidation equation as follows:

$$CH_3CH_2CH_2CHO + [O] \xrightarrow{KMnO_4/H^+} CH_3CH_2CH_2COOH$$

In part (*b*), most of the candidates were able to give an alternative reagent to differentiate a ketone from an aldehyde. Some of the candidates were unable to write the equations correctly, due to not being able to differentiate between reagents and reaction conditions. The candidates also spelt wrongly Tollens' reagent as Tollen's reagent.

PAPER 962/5 *(Written Practical Test)*

General comments

The questions in general, were of a good quality.

Comments on the individual questions

Question 1

In part (*a*)(i), majority of the candidates were able to complete the table that involves simple subtraction of the two given values.

In part (*a*)(ii) a few of the candidates were able to suggest a suitable apparatus that was a filter funnel.

In part (*a*)(iii), a few of the candidates were able to ensure all the contents of the beaker were transferred into a volumetric flask by rinsing the beaker, glass rod and filter funnel with distilled water for several times. Then, all washing liquids were transferred into the volumetric flask.

In part (*b*)(i), most of the candidates were able to complete the table by giving the correct burette readings.

In part (*b*)(ii), most of the candidates were able to calculate the average titre by using two closest values.

In part (*b*)(iii), a few of the candidates were able to state the change in colour at the end point of the titration which was colourless to pink.

In part (*b*)(iv), most of the candidates were able to calculate the concentration of MnO_4^- ions in the solution.

In part (*b*)(v), the majority of the candidates were unable to write a balance ionic equation for the reaction between $C_2O_4^{2-}$ and MnO_4^-. The correct balance ionic equation was:

$2MnO_4^- + 5C_2O_4^{2-} + 16H^+ \rightarrow 2Mn^{2+} + 10CO_2 + 8H_2O$.

In part (*b*)(vi), a few of the candidates were able to calculate the molarity of $C_2O_4^{2-}$ in 25.0 cm^3 of $Na_2C_2O_4$ solution.

In part (*b*)(vii), most of the candidates failed to calculate the number of moles of $C_2O_4^{2-}$ in 250 cm^3 of $Na_2C_2O_4$ solution.

In part (*b*)(viii), most of the candidates were able to calculate the mass of $Na_2C_2O_4$.

In part (*b*)(ix), most of the candidates were unable to calculate the percentage purity of $Na_2C_2O_4$ which was used in the experiment, that was about 50%.

Question 2

In part (*a*), the majority of the candidates were able to complete the table.

In part (*b*), a few of the candidates were able to suggest a suitable apparatus to measure the volume of I_2(aq), that was a 10.0 cm^3 pipette or a burette.

In part (*c*), a few of the candidates were able to give that I_2 will not be trapped in the complex and can be fully released to react with propanone as a reason why a very dilute starch solution was used in the experiment.

In part (*d*), the majority of the candidates were able to give the volume of water varied in the experiment to ensure that the total volume of the reaction mixture was constant.

In part (*e*), most of the candidates were able to present $\frac{1}{t}$ as the rate of reaction.

In part (*f*), a few of the candidates were able to plot a graph of $\frac{1}{t}$ against volume of acid.

In part (*g*)(i), most of the candidates were able to determine the order of the reaction with respect to acid as first order.

In part (*g*)(ii), a few of the candidates were able to calculate the rate constant.

In part (*h*)(i), most of the candidates were able to give the correct answer which was the time taken would be much longer for the blue colour change if acid was not present in the mixture.

In part (*h*)(ii), a few of the candidates were able to state the the role of acid in the reaction was as a catalyst.

In part (*h*)(iii), none of the candidates were able to modify the experiment to determine the order of reaction with respect to iodine.

Question 3

In part (*a*), some candidates were able to identify gases *P* as hydrogen chloride, *Q* as propene and *R* as hydrogen.

In part (*b*), a few candidates were able to state the observations at *S* and mixture *T*.

In part (*c*), only a few candidates could give the correct answer which was acidified potassium dichromate.

In part (*d*), only a few candidates were able to give the functional group of *X* was hydroxyl group.

In part (*e*), none of the candidates were able to give the correct answer.

In part (*f*), a few of the candidates were able to write the structural formula of *X*, $CH_3CH(OH)CH_3$, correctly.

In part (*g*), a few of the candidates were able to write the structural formula of liquid *Y*, $CH_3C(O)CH_3$, correctly.

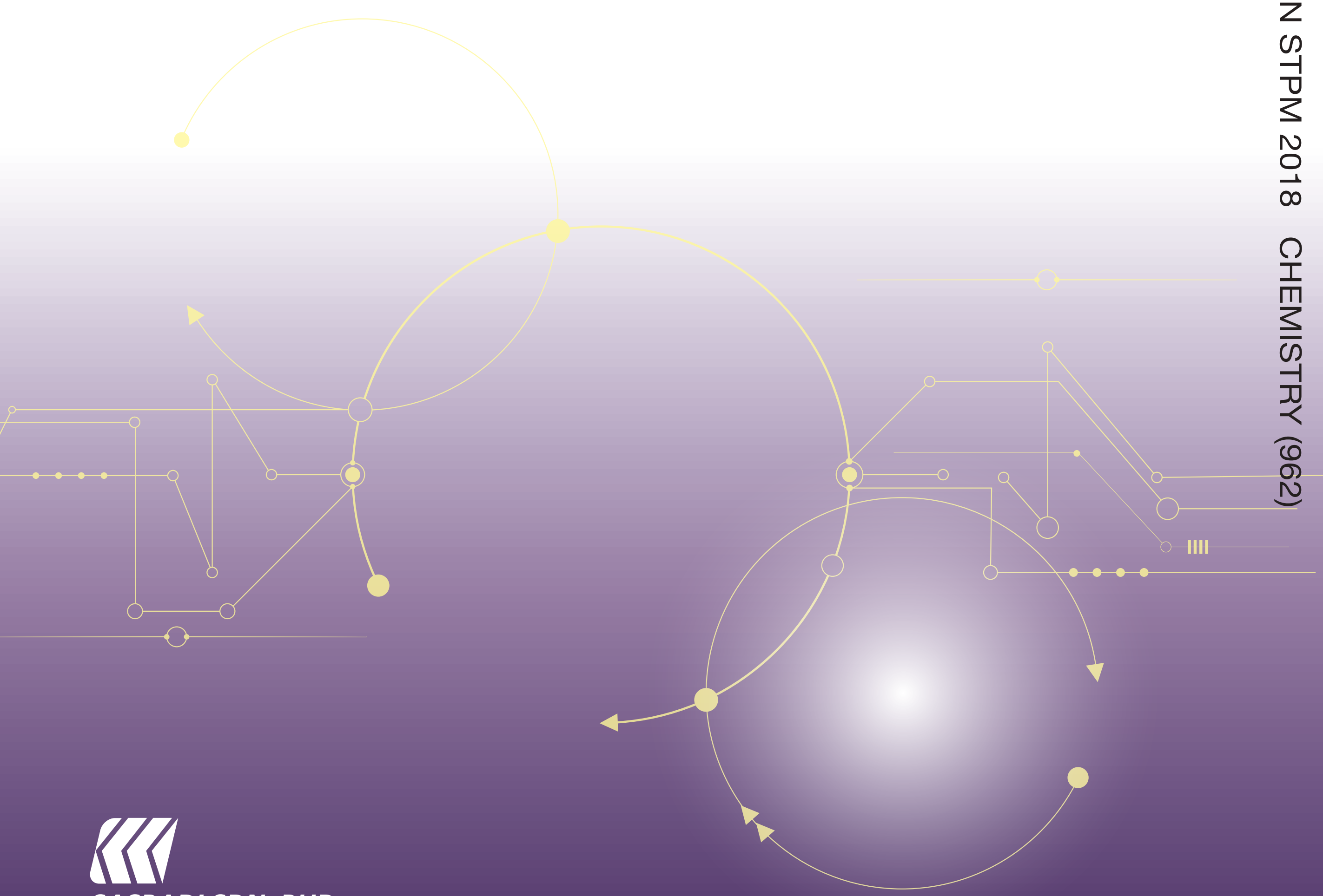
In part (*h*), only a few candidates were able to write the structural formula of *Z*, CH_3CH_2CHO, correctly.

In part (*i*), only a few candidates were able to suggest a simple chemical test to distinguish between *V* and *Z* correctly.

In part (*j*), only a few candidates were able to complete and label the diagram.

Laporan Peperiksaan STPM 2018

LAPORAN PEPERIKSAAN STPM 2018 CHEMISTRY (962)



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