KEMENTERIAN PENDIDIKAN
JABATAN PENDIDIKAN NEGERI PERAK

MODUL DEFRA KIMIA

EDISI MURID

TINGKATAN 5

SEKTOR PEMBELAJARAN

JABATAN PENDIDIKAN NEGERI PERAK
We Deliver

SEKALUNG BUDI

SEKTOR PEMBELAJARAN, JPN PERAK

PN HJH BAINAH BINTI AB. DOLAH
KETUA PENOLONG PENGARAH KANAN
MATEMATIK DAN SAINS

PN MUSFIRAH SALMA BINTI MOHD RADZI
PENOLONG PENGARAH MATEMATIK DAN SAINS

PANEL PENULIS

PN NORIZA BINTI AWANG
SMK ANDERSON
PN KOMATHY A/P VEERASINGHAN
SMK AVE MARIA CONVENT
PN NOOR HAFIZAH BT HUSSAIN
SMK RAJA CHULAN
CIK WAN NORAZIEAN BT WAN ZAWAWI
SMK TARCISIAN CONVENT
PN AINI RASYIDAH BT AHMAD ZUHAIRI
SMK ANDERSON

BAB 1: KESEIMBANGAN REDOKS/ REDOX EQUILIBRIUM *FORM 5*

A. Definisi / *Definition*

Soalan / Question	Jawapan / Answer	Nota/ notes
1. Apakah yang dimaksudkan dengan tindak balas redoks? *What is meant by a redox reaction?* 2. Jelaskan maksud tindak balas pengoksidaan dan penurunan berdasarkan penambahan dan kehilangan oksigen. *Explain the meaning of oxidation and reduction reactions based on gain and loss of oxygen.* 3. Jelaskan maksud tindak balas pengoksidaan dan penurunan berdasarkan penambahan dan kehilangan hidrogen. *Explain the meaning of oxidation and reduction reactions based on gain and loss of hydrogen.* 4. Jelaskan maksud tindak balas pengoksidaan dan penurunan berdasarkan penambahan dan kehilangan elektron. *Explain the meaning of oxidation and reduction reactions based on gain and loss of electron.* 5. Jelaskan maksud tindak balas pengoksidaan dan penurunan berdasarkan nombor pengoksidaan. *Explain the meaning of oxidation and reduction reactions based on oxidation number*		

6. Apakah yang dimaksudkan dengan keupayaan elektrod piawai? *What is meant by the standard electrode potential ?* *7. Nyatakan maksud elektrolit.* *State the meaning of electrolite.* 8. Apakah elektrolisis? *What is electrolysis?* 9. Apakah yang dimaksudkan dengan kakisan logam? *What is meant by metal corrosion?*		

B. Rajah/ Diagram

Melukis gambar rajah yang **berfungsi** dan **berlabel** dengan **lengkap**
*Draw the **functional** diagram with a **complete label***

Soalan / Question	Jawapan / Answer	Nota/ notes
1. Lukis gambar rajah berlabel eksperimen sel ringkas. *Draw a labelled diagram for the experiment simple voltaic cell.* a. Larutan dilorekkan// solution is shaded b. Mengunakkan DUA logam yang berbeza// Use TWO different metals c. Litar dilengkapkan// the circiut is completed		

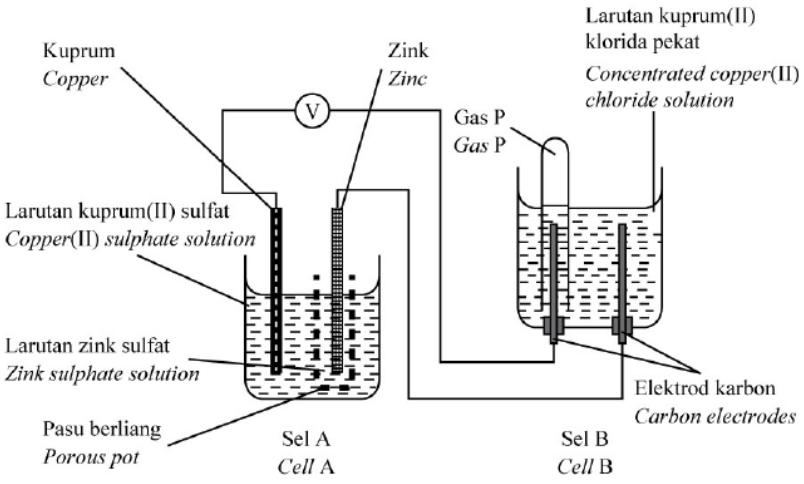
2. Lukis gambar rajah berlabel eksperimen elektrolisis asid hidroklorik pekat. *Draw a labelled diagram for the experiment electrolysis of concentrated hydrochloric acid* a. Larutan dilorekkan// solution is shaded b. Tabung uji ditelangkupkan untuk mengumpul gas terbebas// test tubes are inverted to collect the gases c. Litar dilengkapkan dengan sel / sumber elektrik// the circuit is completed with the cell// electric sources 3. Lukis gambar rajah berlabel eksperimen elektrolisis leburan plumbum (II) bromida *Draw a labelled diagram for the experiment electrolysis of molten lead (II) bromide* a. Leburan dipanaskan dengan melukis anak panah dan label panaskan//The melt is heated by drawing an arrow and a heat label b. Litar lengkap dengan sel/ sumber elekrik// b. Circuit complete with cell/electric source		

4. Lukis gambar rajah berlabel eksperimen penyaduran kunci dengan argentum *Draw a labelled diagram for the experiment of electroplating the key.with silver* a. Larutan dilorekkan // solution is shaded b. Kunci di terminal NEGATIF dan kepingan Argentum di terminal POSITIF// Iron key is placed at the NEGATIVE terminal and silver plate is placed at the POSITIVE terminal c. Kunci direndam sepenuhnya di dalam larutan argentum nitrat.// Iron key is fully immersed in the silver nitrate d. Litar dilengkapkan // circuit is completed. e. Labelkan kunci besi , kepingan argentum, larutan argentum nitrat,// Label the iron key, the silver plate, the silver nitrate solution		
5. Lukis gambar rajah berlabel eksperimen penulenan kuprum *Draw a labelled diagram for the experiment of purification of copper* a. Larutan dilorekkan // solution is shaded b. Kepingan kuprum tidak tulen di terminal NEGATIF dan kepingan kuprum tulen di terminal POSITIF// Impure copper pieces at the NEGATIVE terminal and pure copper		

pieces at the POSITIVE terminal c. Litar dilengkapkan // circuit is completed. d. Labelkan kuprum tidak tulen , kepingan kuprum tulen, larutan kuprum (II) nitrat,//Label impure copper, pure copper , copper (II) nitrate solution 6. Lukiskan gambar rajah berlabel bagi eksperimen pemindahan elektron pada suatu jarak. Draw a labeled diagram for an electron transfer experiment over a distance. a. Larutan dilorekkan // solution is shaded b. Dua elektrod karbon dicelupkan ke dalam larutan masing-masing tetapi tidak bersentuhan dengan asid sulfurik (titian garam)// Two carbon electrodes are dipped into their respective solutions but not in contact with the sulfuric acid (salt bridge) c. Litar dilengkapkan // circuit is completed. d. Labelkan klorin, larutan kalium iodida , asid sulfurik , elektrod karbon.//d. Label chlorine, potassium iodide solution, sulfuric acid, carbon electrode.		

7. Lukiskan gambar rajah berlabel proses pengaratan besi. *Draw a labeled diagram of the iron rusting process.* *a. Ada label katod (terminal positif) dan anod (terminal negatif)// There is a cathode (positive terminal) and anode (negative terminal) label* *b. Pengoksidaan dan penurunan ditunjukkan//An Oxidation and reduction are shown.* .		

C. Pengiraan / Calculation

Soalan / Question	Jawapan / Answer	Nota/ notes
1, Rajah 5 menunjukkan susunan radas bagi Sel A dan Sel B. Larutan zink sulfat, larutan kuprum(II) sulfat dan larutan kuprum(II) klorida pekat digunakan sebagai elektrolit dalam eksperimen ini. Diagram 5 shows apparatus set-up of Cell A and Cell B. Zinc sulphate solution, copper(II) sulphate solution and concentrated copper(II) chloride solution are used as electrolytes in this experiment.  		

Senarai nilai keupayaan elektrod piawai:
List of standard electrode potential values:

Tindak balas sel setengah Half-cell reaction	E° / V
$S_2O_8^{2-}$ (ak/aq) + 2e → $2SO_4^{2-}$ (ak/aq)	+ 2.01
Cl_2 (g) + 2e → $2C1^-$ (ak/aq)	+ 1.36
O_2 (g) + $2H_2O$ (ce/l) + 4e → $4OH^-$ (ak/aq)	+ 0.40
Cu^{2+} (ak/aq) + 2e → Cu (p/s)	+ 0.34
$2H^+$ (ak/aq) + 2e → H_2 (g)	0.00
Zn^{2+} (ak/ aq) + 2e → Zn (p/v)	-0.76

(a) Merujuk kepada Sel A,
Referring to Cell A,

(i) hitung voltan bagi sel, E°se|.
calculate the voltage of cell, E°sel.

Voltan sel, E^0 sel dapat ditentukan menggunakan rumus berikut:
The cell voltage, E^0 of the cell can be determined using the following formula:

E0 sel = E0 (terminal positif/ positive terminal) – E0 (terminal negatif/ negative terminal)

E0 sel = E0 (katod/ cathode) – E0 (anod/anode)

2. Berikut adalah formula bagi dua sebatian.
The following are the formulae of two compounds.

MgO **Cu_2O**

Berdasarkan kepada formula itu,
Based on the formulae,

(i) Nyatakan nombor pengoksidaan bagi magnesium dan kuprum.
State the oxidation numbers for magnesium and copper.

BAB 2: KIMIA ORGANIK / *ORGANIC CHEMISTRY*

A. Definisi / *Definition*

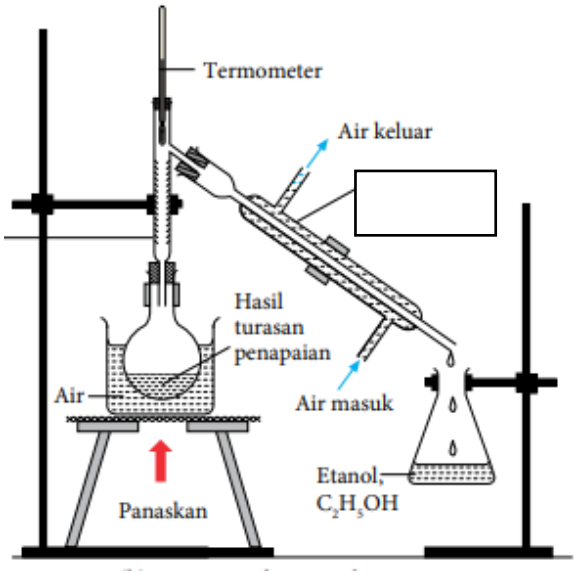
Soalan / Question	Jawapan / Answer	Nota/ notes
1. Nyatakan maksud sebatian karbon? *State the meaning of carbon compound?* 2. Nyatakan maksud hidrokarbon? *State the meaning of hydrocarbon?* *a.* Perkataan **sahaja** wajib ada / *the word of **only** is compulsory* 3. Nyatakan maksud isomer? *State the meaning of isomer?*		

B. Rajah/ Diagram

Melukis gambar rajah yang **berfungsi** dan **berlabel** dengan **lengkap**
*Draw the **functional** diagram with a **complete label***

Soalan / Question	Jawapan / Answer	Nota/ notes
1. Lukis gambar rajah berlabel proses penapaian glukosa untuk menghasilkan etanol dan gas karbon dioksida. *Draw a labelled diagram fermentation process of glucose to produce ethanol and carbon dioxide gas.* *a.* Perlu label air kapur dengan betul / *need to label the lime water correctly*		

2. Labelkan **alat radas** yang digunakan dalam proses penyulingan etanol dalam gambar rajah.
*Label **the apparatus** used for distillation process of ethanol in the diagram.*



   a. Hanya diguna untuk proses penyulingan alcohol/ *only use for distillation of alcohol*

3. Lukis gambar rajah berlabel tindakbalas pengoksidaan etanol.
Draw a labelled diagram of oxidation of ethanol

4. Lukis gambar rajah berlabel tindakbalas pendehidratan etanol menghasilkan gas etena.
Draw a labelled diagram of dehydration of ethanol to produce ethane gas.

   a. Perlu label **'panaskan'**/ need to label the word of **'heat'**
   b. Paras air dalam tabung uji berisi gas mesti **lebih tinggi** daripada paras air dalam bikar / *the water level in the test tube filled with gas must be **higher than** the water level in the beaker*.

5. Lukis gambar rajah berlabel tindakbalas pengesteran untuk menghasilkan etil etanoat. *Draw a labeled diagram of esterification to produce ethyl ethanoate.* *a.* Perlu ada asid sulfurik **'pekat'** / ***concentrated*** *sulphuric acid*		

C. Pengiraan / Calculation

Soalan / Question	Jawapan / Answer	Nota/ notes
1. Pembakaran alkena menghasilkan jelaga yang lebih banyak berbanding alkana. Hitung peratus jisim karbon per molekul dalam propana dan propena. *Combustion of alkane produce more soot compared to alkene. Calculate the percentage of carbon per molecule of propane and propene.* [C=12: H=1]		

BAB 3: TERMOKIMIA / *THERMOCHEMISTRY CHEMISTRY*

A. Definisi / *Definition*

Soalan / Question	Jawapan / Answer	Nota/ notes
1. Nyatakan maksud tindak balas eksotermik? *State the meaning of exothermic reaction?* 2. Nyatakan maksud tindak balas endotermik? *State the meaning of endothermic reaction?* 3. Nyatakan maksud haba pemendakan? *State the meaning of heat of precipitation?* 4. Nyatakan maksud haba penyesaran? *State the meaning of heat of displacement?* 5. Nyatakan maksud haba peneutralan? *State the meaning of heat of neutralisation?* 6. Nyatakan maksud haba pembakaran? *State the meaning of heat of combustion?* 7. Nyatakan maksud nilai bahan api? *State the meaning of fuel value?*		

B. Rajah/ *Diagram*

Melukis gambar rajah yang **berfungsi** dan **berlabel** dengan **lengkap**
*Draw the **functional** diagram with a **complete label***

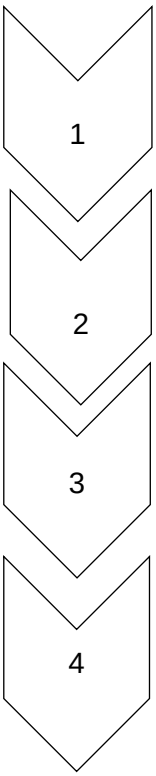
Soalan / Question	Jawapan / Answer	Nota/ notes
1. Lukis gambar rajah berlabel untuk eksperimen haba pembakaran. *Draw a labelled diagram for the experiment heat of combustion.* *a.* Segi tiga tanah liat digunakan supaya haba tidak diserap oleh tungku kaki tiga//*Clay triangles are used so that the heat is not absorbed by the tripod stand* *b.* Cecair dilorekkan// *liquid is shaded* **$CaCO_3$ → CaO + CO_2** $\Delta H = +540\ kJ\ mol^{-1}$ 2. Lukis gambar rajah aras tenaga bagi tindak balas diatas. *Draw an energy level diagram for the reaction above.* *a.* Lukis anak panah ke atas// *Draw an arrow up* b. Tulis label "**Tenaga**"// Write the label "Energy"		

c. Lukis dua aras tenaga//c. Draw two energy levels d. Tulis bahan tindak balas dan hasil tindak balas pada aras tenaga yang betul//Write the reactants and products of the reaction at the correct energy level e. Lukis arah anak panah dari aras tenaga bahan tindak balas ke aras tenaga hasil tindak balas//Draw the direction of the arrow from the energy level of the reactants to the energy level of the product of the reaction f. Tulis ΔH berserta nilai//Write ΔH along with the value **$Fe + Cu^{2+} \rightarrow Fe^{2+} + Cu$** $\Delta H = -250\ kJ\ mol^{-1}$ 3. Lukis gambar rajah aras tenaga bagi tindak balas diatas. *Draw an energy level diagram for the reaction above.* a. Lukis anak panah ke atas// *Draw an arrow up* b. Tulis label "**Tenaga**"// Write the label "Energy' c. Lukis dua aras tenaga// Draw two energy levels		

d. Tulis bahan tindak balas dan hasil tindak balas pada aras tenaga yang betul//Write the reactants and products of the reaction at the correct energy level e. Lukis arah anak panah dari aras tenaga bahan tindak balas ke aras tenaga hasil tindak balas//Draw the direction of the arrow from the energy level of the reactants to the energy level of the product of the reaction f. Tulis ΔH berserta nilai//Write ΔH along with the value		

C. Pengiraan / *Calculation*

(i) Haba tindak balas, ΔH
Heat of Reaction, ΔH



•Tentukan bilangan mol bahan tindak balas dan hasil terbentuk.
•*Determine the number of moles of the reactant and product formed*

•Hitungkan perubahan haba dalam tindak balas, Q=mc€
•*Calculate the heat change in the reaction: Q=mc€*

•Hitungkan perubahan haba untuk 1 mol bahan tindak balas atau 1 mol hasil terbentuk
•*Calculate the heat change for 1 mol of reactant or 1 mol of product formed*

•Nyatakan haba tindak balas dengan tanda dan unit yang betul, **ΔH = ∓ kJ mol^{-1}**
•*State the heat of reaction with signs and correct units,* ***ΔH =∓ kJ mol^{-1}***

ΔH = -ve, (suhu akhir > suhu awal)
(Highest temperature > initial temperature)
ΔH = +ve, (suhu akhir < suhu awal)
(Highest temperature < initial temperature)

Soalan / Question	Jawapan / Answer	Nota/ notes
Haba pemendakan ***Heat of precipitation*** 1. 100cm^3 larutan argentum nitrat,$AgNO_3$ 1.0 moldm^{-3} dicampurkan dengan 100cm^3 larutan natrium klorida,NaCl 1.0 moldm^{-3} .Suhu campuran tindak balas meningkat daripada 30.0°C kepada 33.0°C.Hitungkan haba pemendakan terbentuk.	**Tuliskan persamaan seimbang bagi tindak balas tersebut.** ***Write the balance Chemical equation for the reaction.*** …… **Langkah 1: Hitungkan bilangan mol mendakan terbentuk.** ***Step 1: Calculate the number of moles of precipitate formed****.* $n = MV$	

$100cm^3$ silver nitrat solution,$AgNO_3$ 1.0 $moldm^{-3}$ is added into $100cm^3$ sodium chloride solution,NaCl 1.0 $moldm^{-3}$ .Temperature of the mixture increases from 30.0°C to 33.0°C.Calculate the heat of precipitation.	Bilangan mol ion Ag^+ *Number of moles of Ag^+ ion* = ……... Bilangan mol ion Cl^- *Number of moles of Cl^- ion* = …… **Daripada Persamaan:** ***From equation:*** ……..mol ion Ag^+ bertindak balas dengan …….mol ion Cl^- membentuk ……..mol AgCl. *…….. mole Ag^+ reacts with ……. mole Cl^- ion to form ……..mole AgCl.* **Daripada hitungan:** ***From Calculation:*** Jadi, ……mol ion Ag^+ bertindak balas dengan …… mol ion Cl^- membentuk ……mol AgCl *Therefore, …… mole Ag^+ion reacts with …….. mole Cl^- ion to form ……mole AgCl* **Langkah 2: Hitungkan perubahan haba, Q=mc€** ***Step 2: Calculate the heat change, Q=mc€*** m=(jisim larutan campuran) (*mass of solution*) =……..g C=(Muatan Haba tentu larutan) Spesific = 4.2 $Jg^{-1}°C^{-1}$ € = (Perubahan suhu campuran), Suhu akhir- suhu awal *(Temperature Change of solution)* *Highest temperature-initial temperature*	

= …… $^{\circ}C$
= …… $^{\circ}C$

Q =

Langkah 3: Hitungkan perubahan haba bagi 1 mol mendakan terbentuk.
Step 3: Calculate the heat change for 1 mole of precipitate formed.

$$= \frac{Perubahan\ haba, kJ}{bilangan\ mol\ pemendakan\ terbentuk, mol}$$

$$= \frac{Heat\ change, kJ}{Number\ of\ moles\ of\ precipitate\ formed, mol}$$

=

=

Langkah 4: Tuliskan haba pemendakan.
Step 4: Write the heat of precipitation.

$$\Delta H\ =$$

Haba penyesaran ***Heat of displacement*** 2. Serbuk zink,Zn yang berlebihan ditambah kepada 50cm^3 larutan kuprum (II) sulfat,$CuSO_4$ 0.25 moldm^{-3}.Suhu campuran tinadak balas bertambah sebanyak 5°C.Hitungkan haba penyesaran kuprum daripada larutannya. *An excess zinc powder,Zn is added into 50cm^3 Copper (II) sulphate solution,$CuSO_4$ 0.25moldm^{-3}.The temperaute of the mixture increases by 5°C.Calculate the heat of displace of copper from its salt solution.*.	**Tuliskan persamaan seimbang bagi tindak balas tersebut.** ***Write the balance Chemical equation for the reaction.*** …… **Langkah 1: Hitungkan bilangan mol logam logam disesar.** ***Step 1: Calculate the number of moles of metal displaced****.* $n = MV$ Bilangan mol ion Cu^{2+} *Number of moles of Cu^{2+} ion* = …… mol **Daripada Persamaan:** ***From equation:*** ……mol kuprum disesarkan daripada …… mol larutan Kuprum(II) sulfat. *…… mole Cu displaced from …… mole of Copper(II) sulphate solution.* **Daripada hitungan:** ***From Calculation:*** …… mol kuprum disesarkan daripada …… mol larutan Kuprum(II) sulfat. *…….. mole Cu displaced ……. mole of Copper(II) sulphate solution* **Langkah 2: Hitungkan perubahan haba, Q=mc€** ***Step 2: Calculate the heat change, Q=mc€*** m=(jisim larutan campuran) (*mass of solution*) =……g C=(Muatan Haba tentu larutan) Spesific = 4.2 Jg^{-1}°C^{-1} € = (Perubahan suhu campuran) *(Temperature Change of solution)*	

	= ……..$^{\circ}C$ Q = **Langkah 3: Hitungkan perubahan haba bagi 1 mol logam disesar.** ***Step 3: Calculate the heat change for 1 mole ofmetal displaced.*** $= \frac{Perubahan\ haba, kJ}{bilangan\ mol\ logam\ disesarkan, mol}$ $= \frac{Heat\ change, kJ}{Number\ of\ moles\ of\ metal\ displaced, mol}$ = = **Langkah 4: Tuliskan haba penyesaran.** ***Step 4: Write the heat of displacement.*** $\Delta H\ =$	

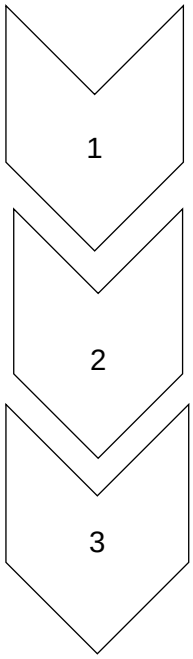
Haba peneutralan ***Heat of Neutralisation*** 3. 60cm^3 Larutan kalium hidroksida,KOH 2.0moldm^{-3} dicampurkan bersama dengan 60cm^3 asid hidroklorik, HCl 2.0moldm^{-3}.Suhu tertinggi larutan campuran ialah 40.5°C.Suhu awal bagi larutan kalium hidroksida,KOH ialah 28.0°C dan asid hidroklorik,HCl ialah 28.0°C.Hitungkan haba peneutralan tersebut. *60cm^3 potassium hydroxide solution,KOH 2.0moldm^{-3} is added to 60cm^3 hydrochloric acid, HCl 2.0moldm^{-3}.The highest temperature of the mixture is 40.5°C.The initial temperature of potassium hydroxide solution,KOH is 28.0°C and hydrochloric acid,HCl is 28.0°C.Calculate the heat of neutralization*.	**Tuliskan persamaan seimbang bagi tindak balas tersebut.** ***Write the balance Chemical equation for the reaction.*** …… **Langkah 1: Hitungkan bilangan mol air yang terbentuk.** ***Step 1: Calculate the number of moles of water formed***. $n = MV$ Bilangan mol ion H^+ *Number of moles of H^+ ion* = …… mol Bilangan mol ion OH^- *Number of moles of OH^- ion* = …… mol **Daripada Persamaan:** ***From equation:*** ……mol larutan kalium hidroksida bertindak balas dengan ……mol asid hidroklorik akan menghasilkan …….. mol air *……mole potassium hydroxide solution reacts with ……...mole hydrochloric acid and form…….. mole of water.* **Daripada hitungan:** ***From Calculation:*** …….. mol larutan kalium hidroksida bertindak balas dengan ……. mol asid hidroklorik akan menghasilkan …….. mol air *…… mole potassium hydroxide solution reacts with …….. mole hydrochloric acid and form ……. mole of water* **Langkah 2: Hitungkan perubahan haba, Q=mc€** ***Step 2: Calculate the heat change, Q=mc€***	

	m=(jisim larutan campuran) (*mass of solution*) = C=(Muatan Haba tentu larutan) Spesific = 4.2 $Jg^{-1}{}^{\circ}C^{-1}$ € = (Perubahan suhu campuran), Suhu akhir- suhu awal *(Temperature Change of solution)* *Highest temperature-initial temperature* = = Q = **Langkah 3: Hitungkan perubahan haba bagi 1 mol air terbentuk.** ***Step 3: Calculate the heat change for 1 mole of water formed.*** $= \frac{Perubahan\ haba, kJ}{bilangan\ mol\ lair\ terbentuk, mol}$ $= \frac{Heat\ change, kJ}{Number\ of\ moles\ of\ water\ formed, mol}$ = **Langkah 4: Tuliskan haba peneutralan.** ***Step 4: Write the heat of neutralisation.*** $\Delta H\ =$	

Haba pembakaran ***Heat of combustion*** 4. Haba yang terbebas daripada pembakaran lengkap 1.6 g etanol digunakan untuk memanaskan 200 cm^3 air.Suhu air meningkat sebanyak 30°*C* .Hitungkan haba pembakaran bagi etanol. *Heat energy released from the complete combustion of 1.6 g ethanol is used to heat 200 cm^3 of water.Temperature of water increased by 30°C.Calculate the heat of combustion of ethanol.*	**Tuliskan persamaan seimbang bagi tindak balas tersebut.** ***Write the balance chemical equation for the reaction.*** …….. **Langkah 1: Hitungkan bilangan mol bahan dibakar** ***Step 1: Calculate the number of moles of substance burnt.*** $$n = \frac{mass}{molar\ mass}$$ Jisim molar etanol, *Molar mass of ethanol* = *Bilangan mol* etanol, *Number of moles ethanol,* = **Langkah 2: Hitungkan perubahan haba, Q=mc€** ***Step 2: Calculate the heat change, Q=mc€*** m=(jisim air) (*mass of water*) =……..g C=(Muatan Haba tentu larutan) Spesific = 4.2 $Jg^{-1}°C^{-1}$ € = (Perubahan suhu campuran), *(Temperature Change of solution)* = ……°*C* Q =	

	Langkah 3: Hitungkan perubahan haba bagi 1 mol bahan terbakar. ***Step 3: Calculate the heat change for 1 mole of substance burnt.*** $= \frac{Perubahan\ haba, kJ}{bilangan\ mol\ lbahan\ terbakar, mol}$ $= \frac{Heat\ change, kJ}{Number\ of\ moles\ of\ substance\ burnt, mol}$ = **Langkah 4: Tuliskan haba pembakaran.** ***Step 4: Write the heat of combustion.*** $\Delta H\ =$	

(ii) Suhu,€
Temperature, €



•Tentukan bilangan mol bahan tindak balas dan hasil terbentuk.
•*Determine the number of moles of the reactant and product formed*

•Hitungkan perubahan haba dalam tindak balas, Q=ΔH x number of moles
•Calculate the heat change in the reaction: Q=ΔH x number of moles

•Hitungkan perubahan suhu, € = H/mc
•*Calculate the heat change in temnperature,*€ = H/mc

Soalan / Question	Jawapan / Answer	Nota/ notes
1. Persamaan termokimia di bawah mewakili tindak balas penyesaran yang berlaku apabila serbuk zink,Zn yang berlebihan ditambah kepada 50cm^3 larutan kuprum (II) sulfat,$CuSO_4$ 0.25 moldm^{-3}. Kirakan Perubahan suhu dalam eksperimen ini **Zn+ Cu^{2+} → Zn^{2+} + Cu** $\Delta H = -84\ kJ\ mol^{-1}$ *The thermochemical equation below represents the displacement reaction occurs when an excess zinc,Zn powder is added into 50cm^3 copper(II) sulphate solution,$CuSO_4$ 0.25 moldm^{-3}. Calculate the changes of temperature in the experiment.* ***Zn+ Cu^{2+} → Zn^{2+} + Cu*** $\Delta H = -84\ kJ\ mol^{-1}$	**Tuliskan persamaan seimbang bagi tindak balas tersebut.** ***Write the balance Chemical equation for the reaction.*** ……. **Langkah 1: Hitungkan bilangan mol logam logam disesar.** ***Step 1: Calculate the number of moles of metal displaced****.* $n = MV$ Bilangan mol ion Cu^{2+} *Number of moles of Cu^{2+} ion* = **Daripada Persamaan:** ***From equation:*** ……. mol kuprum disesarkan daripada ……..mol larutan Kuprum(II) sulfat. *…….. mole Cu displaced from …… mole of Copper(II) sulphate solution.* **Daripada hitungan:** ***From Calculation:*** …… mol kuprum disesarkan daripada …….. mol larutan Kuprum(II) sulfat. *……. mole Cu displaced from ……..mole of Copper(II) sulphate solution*	

	Langkah 2: Hitungkan perubahan haba, Q= bilangan mol logam disesar X haba penyesaran ***Step 2: Calculate the heat change, Q= number of moles of metal displaced X heat of displacement*** Q = **Langkah 3: Hitungkan perubahan suhu, €=Q/mc** ***Step 2: Calculate the temperature change, €=Q/mc*** m=(jisim larutan) (*mass of solution*) =……..g C=(Muatan Haba tentu larutan) (*Spesific Heat capacity)* = 4.2 $Jg^{-1}{}^{\circ}C^{-1}$ Perubahan suhu Temperature Change = ……$^{\circ}C$	

(iii) Nilai bahan api
Fuel Value

$$Nilai\ Bahan\ api = \frac{haba\ pembakaran}{jisim\ molar\ bahan\ terbakar}$$

$$Fuel\ Value = \frac{heat\ of\ combustion}{molar\ mass\ of\ substance\ burnt}$$

Soalan / Question	Jawapan / Answer	Nota/ notes
1. Haba pembakaran etanol,C_2H_5OH ialah -394kJmol^{-1}.Hitungkan nilai bahan api bagi etanol.	**Langkah 1: Kirakan jisim molar bahan terbakar** ***Step 1: Calculate the molar mass of substance burnt.*** Jisim molar etanol, C_2H_5OH *Molar mass of ethanol, C_2H_5OH*	

	= = **Langkah 2: Hitungkan nilai bahan api** $= \frac{haba\ pembakaran}{jisim\ molar\ bahan\ terbakar}$ ***Step 2: Calculate the fuel value*** $= \frac{heat\ of\ combustion}{molar\ mass\ of\ substance\ burnt}$ = =	

BAB 4: POLIMER / *POLYMER FORM 5*

1. Definisi / *Definition*

Soalan / Question	Jawapan / Answer	Nota/ notes
1. Nyatakan maksud polimer? *State the meaning of polymer?* *a.* Molekul **berantai panjang**/ *a* ***long chain*** *molecule* 2. Nyatakan maksud pempolimeran? *State the meaning of polymerization?* 3. Nyatakan maksud pemvulkanan? *State the meaning of vulcanization?* **a. Rangkai silang / *cross-links*** 4. Nyatakan maksud getah sintetik? *State the meaning of synthetic rubber?*		

2. Rajah/ Diagram

Melukis gambar rajah yang **berfungsi** dan **berlabel** dengan **lengkap**
*Draw the **functional** diagram with a **complete label***

Soalan / Question	Jawapan / Answer	Nota/ notes
1. Lukis gambar rajah berlabel eksperimen untuk mengkaji kekenyalan getah tervulkan dan getah tak tervulkan. *Draw a labeled diagram of experiment to investigate the elasticity of vulcanised rubber and unvulcanised rubber.* *2.* Melukis formula struktur monomer dan polimernya*.* *Draw the structural formula of monomer and polymer.* a. Ikatan ganda dua pada monomer dipecahkan menjadi ikatan tunggal pada polimer*.//Double bonds in monomers are broken into single bonds in polymers* b. Karbon mesti cukup 4 ikatan //*Carbon must have enough 4 bonds* *c.* n menunjukkan ulangan untuk monomer .//*n indicates repeats for monomers.*		

BAB 5: KIMIA KONSUMER DAN INDUSTRI / ***CONSUMER AND INDUSTRIAL CHEMISTRY FORM 5***

A. Definisi / ***Definition***

Soalan / Question	Jawapan / Answer	Nota/ notes
1. Apakah yang dimaksudkan dengan minyak dan lemak? *What is meant by oil and fat?* *2.* Apakah sabun? *What is soap?* 3. Apakah detergen? *What is detergent?* 4. Apakah air liat? *What is hard water?* 5. Apakah bahan tambah makanan? What is food additive? 6. Apakah ubat? What is medicine? 7. Nyatakan maksud kosmetik. State the meaning of cosmetic. 8. Nyatakan maksud nanoteknogi. State the meaning of nanotechnology. 9. Nyatakan maksud teknologi hijau. State the meaning of green technology.		

B. Rajah/ Diagram

Melukis gambar rajah yang **berfungsi** dan **berlabel** dengan **lengkap**
*Draw the **functional** diagram with a **complete label***

Soalan / Question	Jawapan / Answer	Nota/ notes
1. Lukiskan gambarajah berlabel bagi tindakan sabun pencucian. *Draw a labeled diagram of the action of soap.* *a.* Air dilorekkan // *water is shaded* b. Kepala (bahagian hidrofilik) sepenuhnya di adalam air adan ekor (bahagian hidrofobik) sepenuhnya di dalam kotoran. *The head (hydrophilic part) is completely in water and the tail (hydrophobic part) is completely in dirt*.		

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Tahun 2022