Penerangan soalan yang melibatkan pengiraan
Explanation of questions that involve calculations

Praktis 1

Praktis Formatif

5 D Andaikan nombor pengoksidaan S = x
Assume the oxidation number of S = x
$2(+3) + 3[x + 4(-2)] = 0$
$\therefore x = +6$

20 D $E°_{sel} = E°_{katod} - E°_{anod}$
$= +0.77 - (-0.14)$
$= +0.91$ V
$E°_{cell} = E°_{cathode} - E°_{anode}$
$= +0.77 - (-0.14)$
$= +0.91$ V

21 C
- Turutan menaik keelektropositifan logam-logam ialah *P*, *Q*, *R* dan *S*.
  Increasing electropositivity of the metals is P, Q, R and S.
- Pasangan logam *P* dan *S* menghasilkan voltan (0.7 + 1.8) V = 2.5 V.
  The pair of metals P and S produces a voltage of (0.7 + 1.8) V = 2.5 V.
- Elektron mengalir dari logam yang lebih elektropositif ke logam yang kurang elektropositif.
  Electrons flow from a more electropositive metal to a less electropositive metal.
- Logam yang lebih elektropositif ialah terminal negatif.
  The more electropositive metal is the negative terminal.

28 C Nisbah mol *Z* kepada mol Br ialah 1 : 3. Oleh itu, *Z* bromida mempunyai formula ZBr_3. *Z* membentuk ion Z^{3+} kerana ion bromida mempunyai formula Br^-.
The mole ratio of Z to Br is 1 : 3. Therefore, Z bromide has the formula of ZBr_3. Z forms Z^{3+} ion because bromide ion has the formula of Br^-.

Praktis 2

12 D Formula asid *Q* ialah C_2H_5COOH.
The formula of acid Q is C_2H_5COOH.
JMR/*RMM* = (2 × 12) + (1 × 5) + 12 + 16 + 16 + 1
= 74

19 D Bilangan mol C / *The number of moles of C*
= Bilangan mol CO_2 / *The number of moles of CO_2*
$= \frac{1.32}{44} = 0.03$ mol
Bilangan mol H / *The number of moles of H*
= 2 × Bilangan mol H_2O / *The number of moles of H_2O*
$= 2 \times \frac{0.72}{18} = 0.08$ mol
Nisbah bilangan mol C : bilangan mol H
Ratio of the number of moles of C : the number of moles of H
= 0.03 : 0.08
= 3 : 8

Praktis 3

1 D Jumlah haba / *Total heat*
$= mc\theta$
$= (200 + 20) \times c \times 8.0$
$= 1760c$ J

8 A CO ialah bahan tindak balas yang terhad.
Dari persamaan termokimia,
2 mol CO bertindak balas untuk membebaskan 567 kJ haba.
∴ 1.2 mol CO bertindak balas untuk membebaskan
$\frac{1.2}{2} \times 567$ kJ = 340.2 kJ haba
CO is the limiting reactant.
From the thermochemical equation,
2 moles of CO react to release 567 kJ heat.
∴ *1.2 moles of CO react to release* $\frac{1.2}{2} \times 567$ kJ
= 340.2 kJ *of heat*

12 D Haba yang diserap / *Heat absorbed*
$= (50 + 50) \times 4.2 \times 10.0$
= 4200 J
Bilangan mol $MgCO_3$ / *The number of moles of $MgCO_3$*
$= \frac{2.0 \times 50}{1000}$
= 0.1 mol

Haba pemendakan, ΔH / *Heat of precipitation,* ΔH
$= + \frac{4.2 \text{ kJ}}{0.1 \text{ mol}}$
$= +42$ kJ mol^{-1}

14 D Bilangan mol $CaSO_4$ / *The number of moles of $CaSO_4$*
$= \frac{16.8 \text{ kJ}}{48 \text{ kJ mol}^{-1}}$
= 0.35 mol

JFR $CaSO_4$ / *RFM of $CaSO_4$*
= 40 + 32 + (4 × 16)
= 136
Jisim/*Mass of* $CaSO_4$
= 0.35 × 136
= 47.6 g

15 D Bilangan mol Zn / *Number of moles of Zn*

$= \frac{1.3}{65}$

$= 0.02$ mol

Haba yang dibebaskan / *Heat released*

$= 168 \text{ kJ mol}^{-1} \times 0.02 \text{ mol}$

$= 3.36$ kJ

18 D Zink ialah bahan tindak balas terhad.
Zinc is the limiting reactant.

Bilangan mol Cu yang tersesar
The number of moles of Cu displaced
= Bilangan mol Zn / *The number of moles of Zn*

$= \frac{1.95}{65} = 0.03$ mol

Haba yang dibebaskan / *Heat released*

$= 50 \times 4.2 \times 25$

$= 5250$ J

Haba penyesaran, ΔH
Heat of displacement, ΔH

$= -\frac{5.25 \text{ kJ}}{0.03 \text{ mol}}$

$= -175 \text{ kJ mol}^{-1}$

19 A Bilangan mol *X* yang tersesar
The number of moles of X displaced

$= \frac{0.2 \times 25}{1000}$

$= 0.005$ mol

Haba yang dibebaskan / *Heat released*

$= 126\,000 \text{ J mol}^{-1} \times 0.005 \text{ mol}$

$= 630$ J

$mc\theta = 630$

$25 \times 4.2 \times \theta = 420$

$\therefore \theta = 6.0^{\circ}\text{C}$

22 D Haba yang dibebaskan / *Heat released*

$= (50 + 50) \times 4.2 \times 6.0$

$= 2520$ J

23 D Haba yang dibebaskan/*Heat released*

$= mc\theta = 1680$ J

$(25.0 + 25.0) \times 4.2 \times \theta = 1680$ J

$\therefore \theta = 8.0^{\circ}\text{C}$

24 D Perubahan haba, *Q*
Heat change, Q

$= mc\theta$

$= 250 \times 4.2 \times 11$ J

$= \frac{250 \times 4.2 \times 11}{1000}$ kJ

Bilangan mol etanol
The number of moles of ethanol

$= \frac{0.50}{46}$ mol

Haba pembakaran, ΔH
Heat of combustion, ΔH

$= -\frac{\left(\frac{250 \times 4.2 \times 11}{1000}\right) \text{kJ}}{\left(\frac{0.50}{46}\right) \text{mol}}$

$= -\frac{250 \times 4.2 \times 11}{1000} \times \frac{46}{0.50}$

$= -\frac{250 \times 4.2 \times 11 \times 46}{1000 \times 0.50} \text{ kJ mol}^{-1}$

25 B Perubahan haba, *Q*
Heat change, Q

$= mc\theta$

$= 50 \times 4.2 \times (38.0 - 28.0)$ J

$= 2100$ J $= 2.1$ kJ

Bilangan mol Cu tersesar
The number of moles of Cu displaced

$= \frac{0.2 \times 50}{1000}$

$= 0.01$ mol

Haba penyesaran, ΔH
Heat of displacement, ΔH

$= -\frac{2.1}{0.01 \text{ mol}}$

$= -210 \text{ kJ mol}^{-1}$

26 C Bilangan mol metana
The number of moles of methane

$= \frac{534}{890} = 0.6$ mol

Isi padu metana
Volume of methane

$= 0.6 \times 24.0 \text{ dm}^3$

$= 14.4 \text{ dm}^3$

27 B Haba yang dibebaskan / *Heat released*

$= 200 \times 4.2 \times (60.0 - 28.5)$

$= 26\,460$ J

$\therefore 26.5$ kJ

29 A JMR C_2H_6 / *RMM of* C_2H_6

$= (2 \times 12) + (6 \times 1)$

$= 30$

Nilai bahan api / *Fuel value*

$= \frac{1561}{30}$

$= 52.03 \text{ kJ g}^{-1}$

30 C Nilai bahan api *K*/*Fuel value of K*

$= \frac{520}{16}$

$= 32.5 \text{ kJ g}^{-1}$

Nilai bahan api *L*/*Fuel value for L*

$= \frac{940}{28}$

$= 33.57 \text{ kJ g}^{-1}$

Nilai bahan api *M*/*Fuel value of M*

$= \frac{1680}{46}$

$= 36.52 \text{ kJ g}^{-1}$

Nilai bahan api *N*/*Fuel value of N*

$= \frac{2250}{72}$

$= 31.25 \text{ kJ g}^{-1}$

Kertas Model SPM

8 C

I	Jisim molar atom *X*/*Molar mass of atom X* = Nombor nukleon/*Nucleon number* = Nombor proton/*Proton number* × 2 = 13 × 2 = 26 g mol^{-1}	Salah *Wrong*
II	Nombor proton/*Proton number* = Bilangan elektron bagi atom *The number of electrons in an atom* = 13	Betul *Correct*
III	Atom *X* menerima lima elektron untuk mencapai susunan elektron oktet yang stabil. *Atom X receives five electrons to achieve a stable octet electron arrangement.*	Salah *Wrong*
IV	Atom *X* menderma 3 elektron untuk mencapai susunan elektron oktet yang stabil. *Atom X donates 3 electrons to achieve a stable octet electron arrangement.*	Betul *Correct*

11 B Jisim atom relatif ferum/*Relative atomic mass of iron*

$= \frac{\Sigma\% \text{ isotop/}isotope \times \text{jisim/}mass}{100}$

$= \frac{[(5.85 \times 54) + (91.75 \times 56) + (2.40 \times 57)]}{100}$

$= 55.907$

$= 55.91$

14 D Jisim formula relatif/*Relative formula mass*

$= 64 + 32 + 16(4) + 5[1(2) + 16]$

$= 250$

23 C 1 molekul hidrogen → 2 atom hidrogen

1 *hydrogen molecule* → 2 *hydrogen atoms*

Bilangan molekul hidrogen

The number of hydrogen molecules

$= \frac{9.632 \times 10^{23}}{2}$

$= 4.816 \times 10^{24}$

Bilangan mol hidrogen

The number of moles of hydrogen

$= \frac{4.816 \times 10^{24}}{6.02 \times 10^{23}}$

$= 8 \text{ mol}$

Isi padu/*Volume* $= 8 \times 24 = 192 \text{ dm}^3$

25 B $HNO_3 + KOH \rightarrow KNO_3 + H_2O$

$n = \frac{2 \times 150}{1000}$ $= 0.3 \text{ mol}$ $= n_{H^+}$

$n = \frac{2 \times 300}{1000}$ $= 0.6 \text{ mol}$ $= n_{OH^-}$

$1 \text{ mol } H^+ + 1 \text{ mol } OH^- \rightarrow 1 \text{ mol } H_2O$

$0.3 \text{ mol } H^+ + 0.6 \text{ mol } OH^- \rightarrow 0.3 \text{ mol } H_2O$

$1 \text{ mol } H_2O \rightarrow 57 \text{ kJ}$

$0.3 \text{ mol } H_2O \rightarrow 57(0.3) = 17.1 \text{ kJ}$

26 C Tenaga pengaktifan = 250 – 85 = 165 kJ

Activation energy

27 A $Zn + 2MnO_2 \rightarrow ZnO + Mn_2O_3$

0 +4 −2 +2 −2 +3 −2

Nombor pengoksidaan unsur

Oxidation numbers of the elements

Zink/*Zinc* = 0 → +2

Mangan/*Manganese* = +4 → +3

30 C Bilangan mol/*The number of moles*

$CuCO_3 + 2HCl \rightarrow CuCl_2 + H_2O + CO_2$

$n = \frac{18.6}{124}$ $= 0.15 \text{ mol}$

$n = \frac{2.0 \times 50}{1000}$ $= 0.1 \text{ mol}$

Nisbah mol/*Mole ratio*

1 mol $CuCO_3$: 2 mol HCl

0.05 mol $CuCO_3$: 0.1 mol HCl

Bilangan mol $CuCO_3$ yang tidak bertindak balas

The number of moles of unreacted $CuCO_3$

= 0.15 – 0.05 = 0.1 mol

Jisim $CuCO_3$ yang tidak bertindak balas

The mass of unreacted $CuCO_3$

= 0.1(24) = 12.4 g

31 D $HBr \rightarrow H^+ + Br^-$

$pH = -\log [0.01] = 2$

$pH + pOH = 14$

$pOH = 14 - 2$

$= 12$

37 A Voltan: $E^0_{sel} = E^0_{katod} - E^0_{anod}$

Voltage: $E^0_{cell} = E^0_{cathode} - E^0_{anode}$

$= (-0.14) - (-2.38)$

$= +2.24 \text{ V}$