Structure {Paper02}

[SBPtrial04-05] {Translate}

(a) Heat change/released when 1 mol of precipitate (rujuk kepada Lead(II) sulphate) formed

(b) $Pb^{2+} + SO_4^{2-} \rightarrow PbSO_4$

(c) (i) Lead(II) ions

= MV /1000
= 0.5 x 25/ 1000
= 0.0125 mol

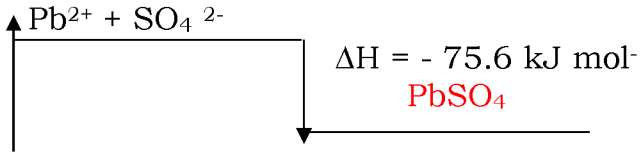
(II) Sulphate ions

= MV /1000
= 0.5 x 25/ 1000
= 0.0125 mol

(d) Heat change, Q = mcO
= (25+25) x 4.2 X [4.5 C] **= 945 J**

(e) ΔH = Q/ mole, n
= 945 / 0.0125
= 75 600 J/mol = - 75.6 kJ/mol

(f) Energy



[SPM04-04]

(a) To **reduce** the heat loss to the surroundings.

(b) (i) Exothermic reaction

(ii) Total energy of products is **less** than total energy of reactants

(c) Mix the solutions **quickly** and **stir** the reaction mixture.

(d) (i) Number of moles $Ag^+ = \frac{25}{1000} \times 0.5 = 0.0125$ mol

(ii) The heat change = mcθ = 50 x 4.2 x (31.5-29.0)
= 525 J

(iii) 0.0125 mol of Ag^+ ions that reacted with Cl^- ions released 525 J

1 mol of Ag^+ ions that reacted with Cl^- ions released $= \frac{525}{0.0125}$ J
= 42000 J

Heat of precipitation = -42 $kJmol^{-1}$

(e) Heat is **released** to surroundings.

[SBPtrial05-05] {Translate}

(a) Exothermic reaction ***[final temp is higher]***

(b) **Grey Mg powder dissolved// Blue $CuSO_4$ solution decolourised //Brown metal formed (Cu terhasil akibat displacement) //** Reading of thermometer increases // Cup of polystyrene feel hot

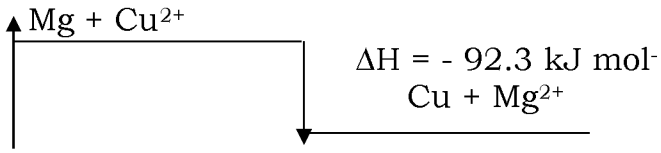
(c) $Mg + Cu^{2+} \rightarrow Cu + Mg^{2+}$

(d) (i) mol = MV/1000
= 1 X 50 / 1000
= 0.05 mol

(ii) Heat change, Q = mcθ
= 50 X 4.2 X 22
= 4620 J

(iii) Δ H = Q/ n
= 4620 /0.05
= - 92300 J/mol
= - 92.3 kJ/mol

(e) Energy



[SBPtrial11-06]

(a) Polystyrene cup don't absorb the heat released

(b) (i) Brown Cu dissolved // colourless solution change to blue (sbb Cu jadi ion Cu) // grey metal formed (Ag^+ ion jd metal)

(ii) Cu formed Cu ion // Present of Cu^{2+} ions // Ag ion formed Ag metal

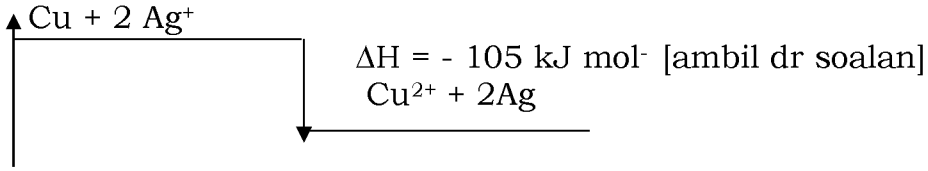
(iii) Cu powder. [Markah yang pertama]
Change of Oxidation no of Cu is 0 to +2

(c) (i) Q = ?
Kira dulu mol , MV /1000 = 0.5 X 100 /1000 = 0.05 mol **[1M]**

From formula ΔH = Q / n convert to Q = n X ΔH
Q = 105 000 (jdkan terus J) X 0.05
= 5250 J = 5.25 kJ **[2M]**

(ii) Q = mcθ convert to θ = Q/[mc]
θ = 5250/[100 x 4.2] = 12.5 °C

(d) Energy



[SBPtrial08-06]

(a) (i) Heat change/release when one mole of a metal is displaced from its salt solution by a more electropositive metal.

(b) Brown solid is deposited/ formed//Blue solution becomes colourless// zinc powder dissolve // cup hot

(c) To reduce heat loss to the surrounding

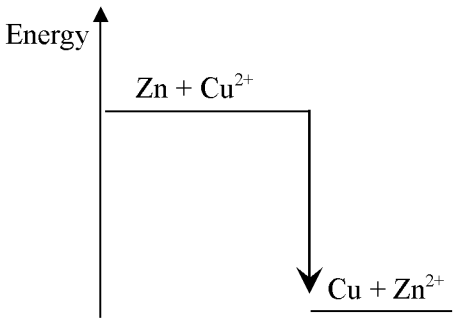
(d) $Zn + Cu^{2+} \rightarrow Zn^{2+} + Cu$

(e)(i) Q = (50)(4.2)(8)
= 1680 J

(ii) Mole of $CuSO_4 = \frac{50x0.2}{1000}$
= 0.01 mol

(ii) Heat of displacement of copper = $-\frac{1680}{0.01}$
= - 168 kJmol^{-1}

(iii)



Two different energy levels
Chemical / Ionic equation

[MRSM08-06]

(a) Used/ put the insulator around the polystyrene cup

(b) Heat change when 1 mol of Cu displace from CuSO4

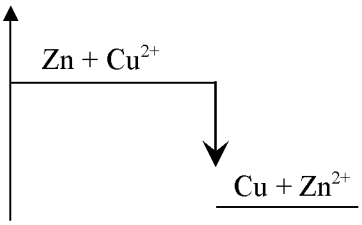
(c) Pb + Cu2+ -- > Pb2+ + Cu

(d) (i) Mol = 0.01 mol

(ii) Q= mc0 = 50 x 4.2 x [33 - 28] = 1050 J = 1.05 kJ

(iii) $\Delta H = Q / n = -105 \text{ kJ mol}^{-1}$

(e) enery



(f) Because distance between Mg – Cu is futher [2]than Pb – Cu [3] // Mg more electroposotive

[SPM05-03]

(a) Zn^{2+} + Cu

(b) (i) $\Delta H = 100 \times 4.2 \times 20 = 8400$ **J**

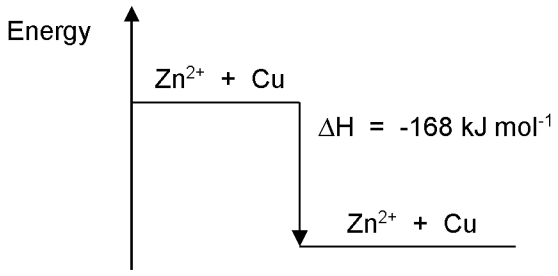
(ii) Number of moles $CuSO_4$ reacted $= \frac{0.5 \times 100}{1000} = 0.05$ mol

Heat of displacement $= \frac{mc\theta}{\text{Number of moles}}$

$= \frac{8400}{0.05}$

$= -168\,000 \text{ J mol}^{-1} = -168 \text{ kJ mol}^{-1}$

(c)



(d) 1. Use a **plastic** / **polystyrene** cup
2. add the zinc powder **quickly**.
3. **stir** the solution
(any **one**)

(e) The heat released when **1 mole of copper** is displaced from its solution.

(f) Tin (Sn)

[SPM03-06]

(a) Heat **released** when 1 mol of metal is displaced from its salt solution by a more electropositive metal.

(b) Initial temperature and highest temperature.

(c)
1. Stir the mixture.
2. Add the two solutions as quickly as possible.
3. Use polystyrene or plastic cup
(any **one**)

(d) (i)
1. Grey solid is deposited
2. Colourless solution turns blue
3. The thermometer reading rises or the container becomes hot or warm.
(any **one**)

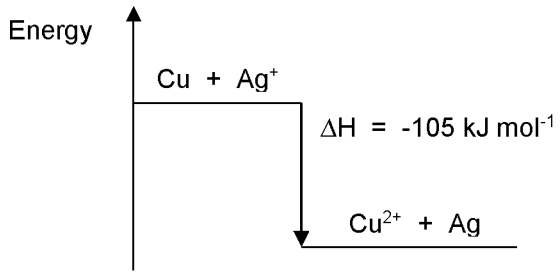
(ii)
1. Silver metal is produced
2. copper(II) ion is produced
3. exothermic reaction/ heat is released to the surroundings

(e) (i) $= \frac{0.5 \times 100}{1000} = 0.05$ mol

(ii) $= 0.05 \times 105$ kJ
$= 5250$ J

(iii) $\theta = \frac{5.25 \times 1000}{100 \times 4.2} = 12.5\ ^{o}C$

(f)



(g)
1. Mol of $Ag^+ = \frac{1 \times 100}{1000} = 0.1$ mol

2. Heat change, $\theta = \frac{0.1 \times 10500}{100 \times 4.2} = 25\ ^{o}C$

3. Number of mol of Ag^+ is double or concentration of silver nitrate is double.

[SBPtrial07-06]

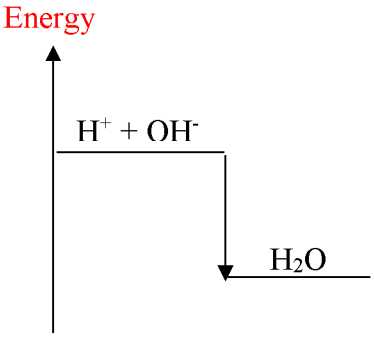
(a) Reduce heat released to the surrounding/ to prevent heat lose

(b)(i) Heat change = 200 x 4.2 x 13
= 10920 J

(b)(ii) Mole of H^+/OH^-/water = $\frac{100 \times 2.0}{1000}$ // 0.2 mol

Heat of displacement = - $\frac{10920\ J}{0.2\ mol}$ // -54.6 $kJmol^{-1}$

(c)



1. Label the energy axis & correct energy level of the reactants and product
2. Correct chemical equation// ionic equation

(d) Heat released/ produced when 1 mol of water is formed

(e)(i) decreases / less / lower

(ii)
1. Ethanoic acid is a weak acid
2. Some of the heat given out during the neutralization is used to ionize/dissociate the ethanoic acid // absorb back

[MRSM07-06]

(a) Heat released/ change when 1 mol H+ ion combine with 1 mol OH-, hydroxide ion To produce 1 mol of water

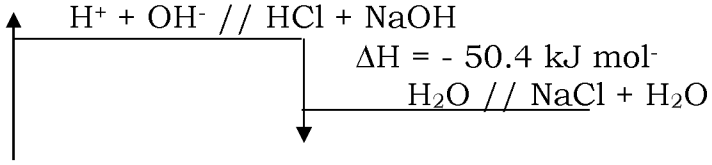
(b) $H^+ + OH^- \rightarrow H_2O$

(c) (i) Mol = MV/1000 = 1.0 X 25/1000 = 0.025 mol

(ii) Q = mcθ = (25 + 25) x 4.2 x 6 = 1260 J = 1.26 kJ

(iii) ΔH = Q/n = 1.26 / 0.025 = - 50.4 kJ/mol

(d) Energy



(e) (i) polystyrene cup // apparatus also absord heat // heat lost to sorrounding

(ii) Used insulator// used wind shield

(f) Same.

[MRSM06-03]

(a) Used insulator// quickly mix the solution, stir and take the highest temperature

(b) exothermic

(c) $HNO_3 + KOH \rightarrow KNO_3 + H_2O$

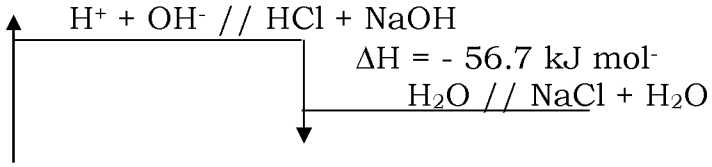
(d) (i) Mol = MV/1000 = 2.0 X 25 /1000 = 0.05 mol

(ii) Q = mcθ = (25 + 25) x 4.2 x 13.5 C = 2835 J

(iii) $\Delta H = Q/n = 2835 / 0.05 = - 56700$ J = - 56.7 kJ/mol

ΔH = - 56.7 kJ/mol [2M]

(e) Energy



(f) Less//smaller than 56.7 kJ/mol

[MRSM03-06]

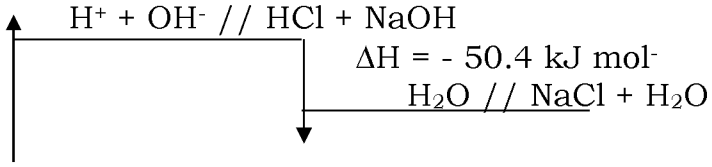
(a) $H^+ + OH^- \rightarrow H_2O$

(b) (i) Q=mc0 = (50 + 50) x 4.2 X 6 = 2520 J

(ii) Kira mol acid or alkali dulu, MV/1000 = 1.0 X 50/1000 = 0.05 mol [1]

$\Delta H = Q/n = 2.52 / 0.05 = - 50.4$ kJ/mol

(c) Energy



(d) (i) Apparatus/ polystyrene cup absorb heat // Heat lost to sorrounding

(ii) Used insulator// used wind shield

(e) 1. Water will diluted the acid or alkali solution
2. Neutralisation will produce/ released heat

[SPM08-06]

(a) **Heat released** when **1 mole of hydrogen ions** reacts with **1 mole of hydroxide ions** to form 1 mole of water.

(b) Observation : the mixture becomes hot or temperature increase

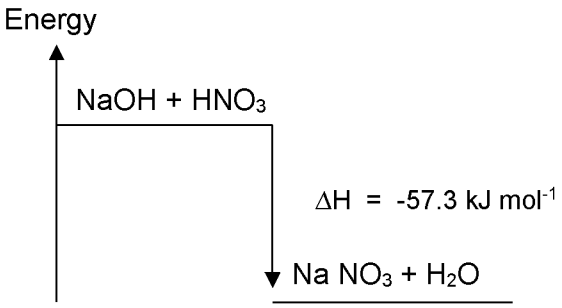
Explanation : the reaction is **exothermic**

(c) (i) No. of moles of NaOH = $\frac{100}{1000}$ x 2 = 0.2 mol

Energy released = 0.2 x 57.3 = 11.46 kJ

(ii) Temperature change = $\frac{11.46 \times 1000}{200 \times 4.2}$ = 13.6 °C

(d)



(e) 1. Ethanoic acid is a weak acid which partially ionize in water, nitric acid is strong acid that ionize completely in water.
2. energy is used to ionize/dissociate weak acid.

[SPM09-06]

(a) Heat change when 1 mol of H+ ion react with 1 mol of OH- ion to formed 1 mol of water

(b) (i) Q = mcO = [25+25]x4.2 x 6.8 = 1428 J = 1.428 kJ

(ii) mol = MV/1000 = 1.0 X 25/1000 = 0.025 mol

(iii) ΔH = Q/mol = 1.428/0.025 = 57.12 kJ mol^{-1}

(c) Energy

$H^+ + OH^- \,//\, HNO_3 + NaOH$

$\Delta H = -57.12$ kJ mol$^-$

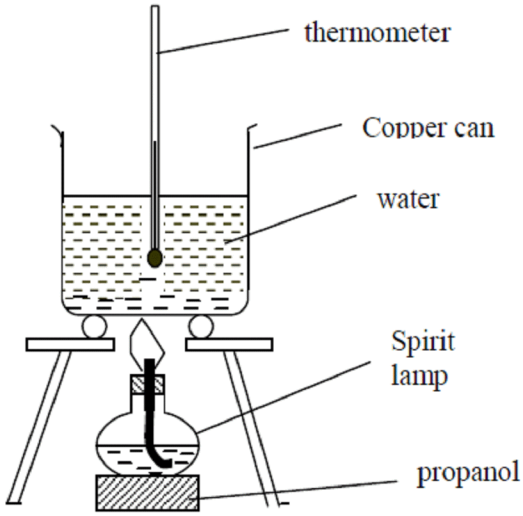
$H_2O \,//\, NaNO_3 + H_2O$

(d) 1. Nitric acid is strong acid and ethanoic acid is weak acid.
2. Ethanoic acid ionise partially in water and some is not ionise
2. Heat energy is released by ethanoic acid was absorb back to completely ionise of ethanoic acid

(e) Copper container also absorb the heat released and the reading of thermometer will be not accurate

[SBPTrial2010-06]

(a)
1. Functional apparatus
2. Label



(b) 2C3H7OH + 9O2 → 6CO2 + 8H2O

(c) (i) Heat release = 200 X 4.2 X 31 = 26040 J

(ii) Mole = 0.84/60 = 0.014

(iii) H =26040 /0.014 = - 1860 kJmol-1

(iv)
Energy

$2\ C_3H_7OH + 9O_2$

$\Delta H = -50.4$ kJ mol$^-$

$6CO_2 + 8H_2O$

(d) Use wind shield // weight the spirit lamp right after the flame is put off // stir the water continuously

[SPM05-05]

(a) The heat released when 1 mole of alcohol is **completely burnt** in excess oxygen.

(b) (i) 1. **all points** are transferred correctly
2. draw a **straight line**

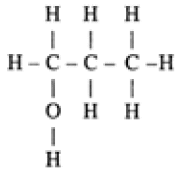
(ii) The greater the number of carbon dioxide molecules, more products are formed which causes more heat to be released during the formation of bonds.

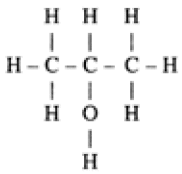
(iii) Relative molecular mass of ethanol
= (12 x 2) + (1 x 6) + 16 = 46

Number of moles ethanol = $\frac{2.3}{46}$ = 0.05 mol

Heat released = 0.05 x 1376
= 68.8 kJ
= 68 800 J

(c)





(d) - Ethanol
- The freezing point of ethanol is -117 °C, which is lower than -100 °C.

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