

1. Antara berikut yang manakah definisi isotop?

Which of the following is the definition of an isotope?

- A** Atom-atom yang sama yang mempunyai bilangan neutron yang sama tetapi bilangan proton yang berbeza
The same atoms that have the same number of neutrons but different number of protons
- B** Atom-atom yang berbeza yang mempunyai bilangan neutron yang sama tetapi bilangan proton yang berbeza
Different atoms that have the same number of neutrons but different number of protons
- C** Atom-atom yang sama yang mempunyai bilangan proton yang sama tetapi bilangan neutron yang berbeza
The same atoms that have the same number of protons but different number of neutrons
- D** Atom-atom yang berbeza yang mempunyai bilangan proton yang sama tetapi bilangan neutron yang berbeza
Different atoms that have the same number of protons but different number of neutrons

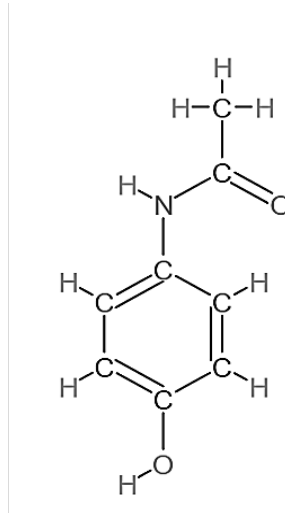
2. Formula kimia manakah yang dinamakan dengan betul berdasarkan sistem penamaan IUPAC?

Which chemical formula is correctly named according to the IUPAC nomenclature system?

	Formula kimia <i>Chemical formula</i>	Nama <i>Name</i>
A	SO ₂	Sulfur oksida <i>Sulphur oxide</i>
B	CCl ₃	Karbon tetraklorida <i>Carbon tetrachloride</i>
C	Al(NO ₃) ₃	Aluminium nitrat <i>Aluminium nitrate</i>
D	Fe ₂ O ₃	Ferum (II) oksida <i>Ferum (II) oxide</i>

3. Rajah 1 menunjukkan formula struktur bagi suatu bahan yang terdapat dalam ubat yang berfungsi melegakan rasa sakit.

Diagram 1 shows the structural formula for a substance found in a medicine that works to relieve pain.



Rajah 1 / Diagram 1

Berapakah jisim molekul relatif bagi bahan itu?

What is the relative molecular mass for the substance?

[Jisim atom relatif : H = 1, C = 12, N = 14, O = 16]

[Relative atomic mass : H = 1, C = 12, N = 14, O = 16]

- A 135
 B 139
 C 147
 D 151
4. Antara berikut, unsur peralihan manakah yang digunakan dalam proses pembuatan marjerin dan proses Ostwald?

Which of the following transition elements is used in the process of making margarine and the Ostwald process?

- A Nikel
Nickel
 B Ferum
Iron
 C Platinum
Platinum
 D Kromium
Chromium

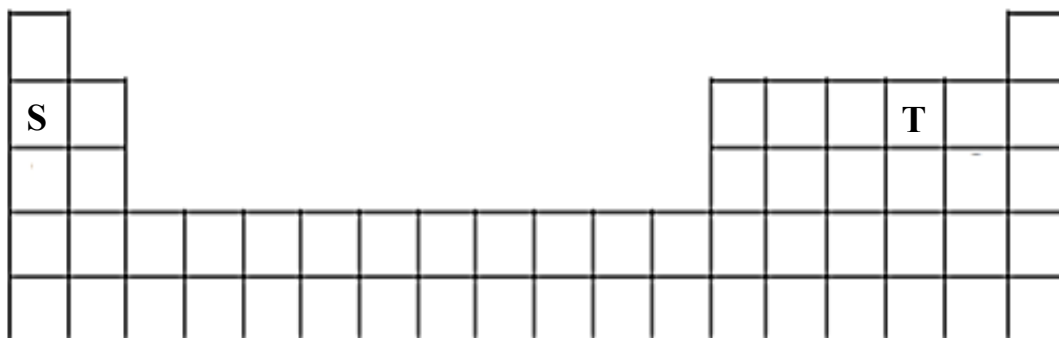
5. Bahan manakah adalah satu sebatian ion ?

Which substance is an ionic compound?

- A Etana, C_2H_6
Ethane, C_2H_6
- B Etanol, C_2H_5OH
Ethanol, C_2H_5OH
- C Etil etanoat, $CH_3COOC_2H_5$
Ethyl ethanoate, $CH_3COOC_2H_5$
- D Natrium etanoat, CH_3COONa
Sodium ethanoate, CH_3COONa

6. Rajah 2 menunjukkan kedudukan unsur S dan T dalam Jadual Berkala Unsur.

Diagram 2 shows the position of elements S and T in the Periodic Table of Elements.



Rajah 2 / Diagram 2

Antara berikut yang manakah benar dari segi formula kimia dan jenis ikatan yang terbentuk antara S dan T.

Which of the following is true in terms of the chemical formula and the type of bond formed between S and T.

	Formula <i>Formula</i>	Jenis ikatan <i>Type of bond</i>
A	S_2T	Ion <i>Ionic</i>
B	ST_2	Kovalen <i>Covalent</i>
C	S_2T_3	Ion <i>Ionic</i>
D	S_2T_3	Kovalen <i>Covalent</i>

7. Seorang murid telah menambahkan 25 cm^3 air suling ke dalam sebuah bikar yang berisi 50 cm^3 0.5 mol dm^{-3} larutan kuprum (II) klorida, CuCl_2 . Hitungkan kemolaran larutan kuprum (II) klorida yang baharu.

A student has added 25 cm^3 of distilled water into a beaker containing 50 cm^3 of 0.5 mol dm^{-3} copper (II) chloride solution, CuCl_2 . Calculate the molarity of the new copper (II) chloride solution.

- A 0.25 mol dm^{-3}
- B 0.33 mol dm^{-3}
- C 0.03 mol dm^{-3}
- D 0.05 mol dm^{-3}

8. Antara yang berikut, bahan manakah adalah garam tak terlarutkan?

Which of the following substances are insoluble salts?

- I Barium sulfat
Barium sulphate
- II Magnesium klorida
Magnesium chloride
- III Argentum klorida
Silver chloride
- IV Zink sulfat
Zinc sulphate

- A I dan II
I and II
- B I dan III
I and III
- C I dan IV
I and IV
- D III dan IV
III and IV

9. Pernyataan berikut adalah satu pemerhatian bagi ujian pengesahan kation garam X.
The following statement is an observation for the confirmatory test of cation of salt X.

Mendakan putih larut apabila larutan ammonia ditambah ke dalam larutan garam X secara berlebihan.
White precipitate dissolves when ammonia solution is added into the salt solution of X in excess.

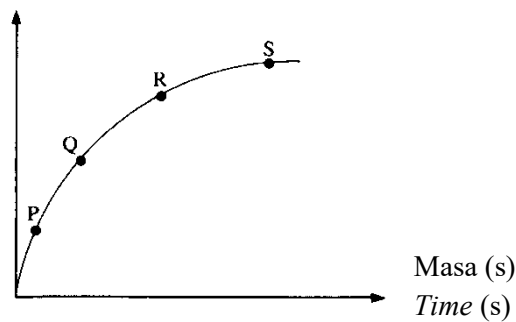
Apakah kation bagi garam X?

What is cation of salt X?

- A Pb^{2+}
 B Al^{3+}
 C Zn^{2+}
 D Ca^{2+}
10. Rajah 3 menunjukkan satu graf isipadu gas oksigen yang terkumpul melawan masa dalam tindak balas penguraian hidrogen peroksida apabila menggunakan mangkin mangan (IV) oksida.

Diagram 3 shows a graph of volume of oxygen gas collected against time in the decomposition reaction of hydrogen peroxide when using catalyst manganese (IV) oxide.

Isipadu gas oksigen terkumpul (cm^3)
Volume of oxygen gas collected (cm^3)



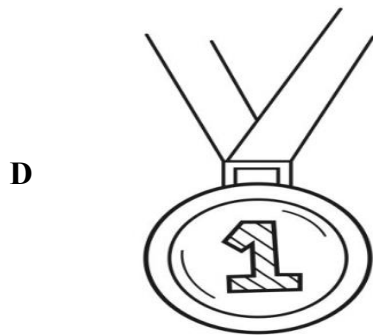
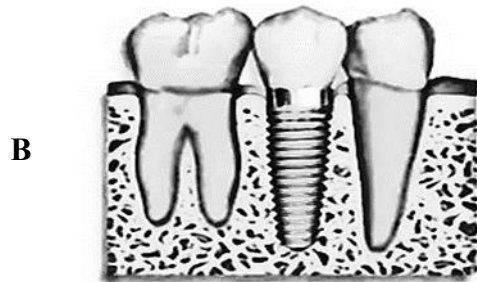
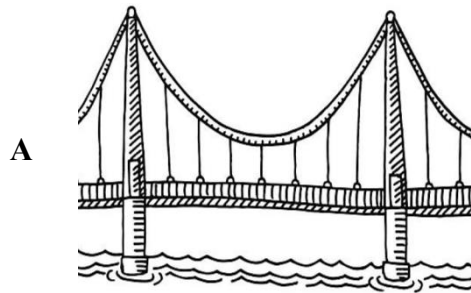
Rajah 3 / *Diagram 3*

Titik manakah yang menunjukkan kadar tindak balas paling tinggi?

Which point shows the highest rate of reaction?

- A P
 B Q
 C R
 D S

11. Antara berikut yang manakah aplikasi seramik termaju?
Which of the following is the application of advanced ceramics?



12. Antara yang berikut, yang manakah kegunaan minyak dan lemak dalam kehidupan harian?

Which of the following are the uses of oil and fat in daily life?

- I Sumber nutrisi
Source of nutrition
- II Bahan api bio
Bio fuel
- III Pakaian
Clothes
- IV Baja
Fertilisers

- A I dan II
I and II
- B I dan III
I and III
- C II dan III
II and III
- D II dan IV
II and IV

13. Antara berikut, tindak balas manakah yang merupakan tindak balas pengoksidaan?

Which of the following reactions is an oxidation reaction?

- A Menerima hidrogen
Accept hydrogen
- B Menerima elektron
Accept electron
- C Menerima oksigen
Accept oxygen
- D Nombor pengoksidaan berkurang
Oxidation number decreases

14. Kandungan cecair antiseptik mengandungi siri homolog Z. Siri homolog ini juga digunakan sebagai pelarut dalam ubat batuk. Apakah siri homolog Z?
The content of the antiseptic liquid contains homologous series Z. This homologous series is also used as a solvent in cough medicine. What is homologous series of Z?
- A Alkena
Alkene
 - B Alkohol
Alcohol
 - C Ester
Ester
 - D Asid karboksilik
Carboxylic acid
15. Antara berikut, yang manakah bukan hidrokarbon?
Which of the following is non hydrocarbon?
- A Alkana
Alkane
 - B Alkena
Alkene
 - C Alkohol
Alcohol
 - D Alkuna
Alkyne
16. Antara faktor berikut, yang manakah akan meningkatkan haba pembakaran bagi alkohol?
Which of the following factors will increase the heat of combustion for alcohol?
- A Saiz molekul alkohol bertambah
The molecular size of alcohol increases
 - B Bilangan ion OH^- bagi setiap molekul bertambah
The number of OH^- ions per molecule increases
 - C Daya tarikan antara molekul alkohol bertambah
The attraction between alcohol molecules increases
 - D Bilangan atom karbon per molekul bertambah
The number of carbon atoms per molecule increases

17. Atom Q mempunyai bilangan proton 11 dan bilangan neutron 12. Di manakah kedudukan atom Q di dalam Jadual Berkala Unsur?
Atom Q has the number of protons 11 and the number of neutrons 12. Where is the position of atom Q in the Periodic Table of Elements?

	Kumpulan Group	Kala Period
A	2	3
B	1	3
C	13	2
D	15	4

18. Antara berikut, yang manakah benar tentang sifat oksida unsur dalam kala 3?
Which of the following is true about the properties of oxide of elements in period 3?
- A** Na_2O mempunyai nilai pH 14
 Na_2O has a pH value of 14
- B** Al_2O_3 mempunyai nilai pH 3
 Al_2O_3 has a pH value of 3
- C** Cl_2O_7 mempunyai nilai pH 9
 Cl_2O_7 has a pH value of 9
- D** SO_2 mempunyai nilai pH 13
 SO_2 has a pH value of 13

21. Jadual 1 menunjukkan isipadu gas karbon dioksida yang terhasil dalam tindak balas antara ketulan kalsium karbonat dengan asid hidroklorik.

Table 1 shows the volume of carbon dioxide gas produced in the reaction between granule of calcium carbonate and hydrochloric acid.

Masa (s) Time (s)	0	60	120	180	240	300	360
Isipadu gas (cm³) Volume of gas (cm³)	0.00	25.90	33.00	37.00	<i>x</i>	42.00	42.00

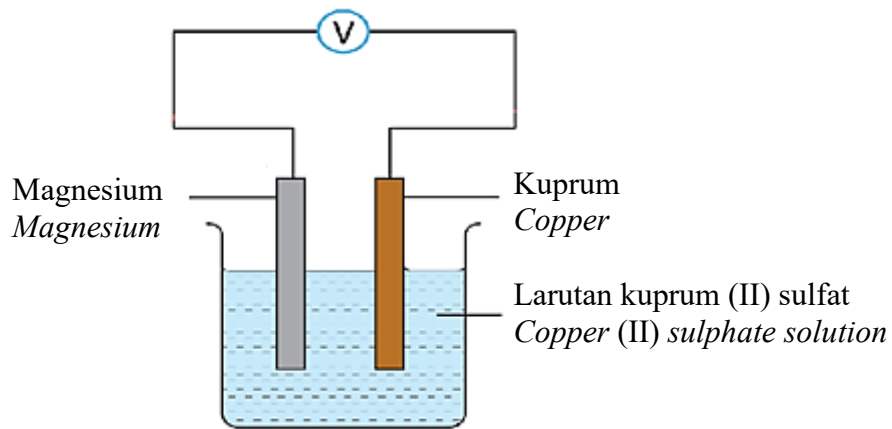
Jadual 1 / Table 1

Jika kadar tindak balas purata dalam minit keempat ialah $0.0625 \text{ cm}^3\text{s}^{-1}$. Hitung nilai *x*.

*If the average rate of reaction in the fourth minute is $0.0625 \text{ cm}^3\text{s}^{-1}$. Calculate the value of *x*.*

- A 39.50
 B 39.85
 C 40.10
 D 40.75
22. Apakah nombor pengoksidaan bagi sulfur dalam asid sulfurik, H₂SO₄?
What is the oxidation number of sulphur in sulphuric acid, H₂SO₄?
- A - 2
 B - 4
 C +4
 D +6

23. Rajah 5 menunjukkan susunan radas bagi satu sel kimia.
 Diagram 5 shows the set-up of apparatus of a chemical cell.



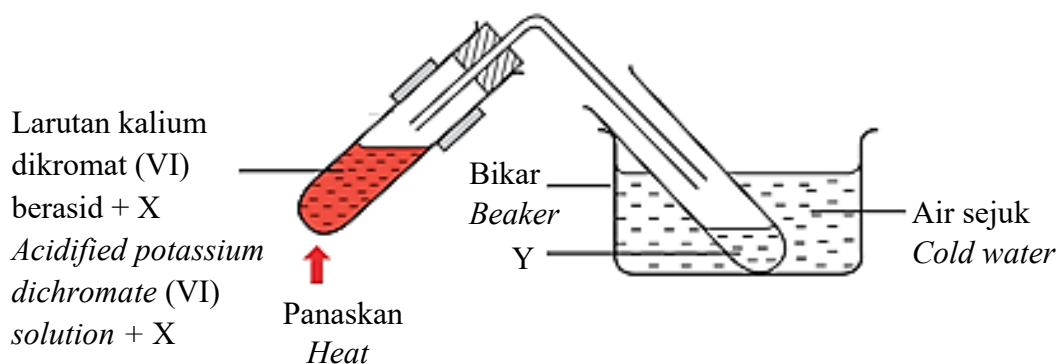
Rajah 5 / Diagram 5

$\text{Mg}^{2+} + 2\text{e} \rightleftharpoons \text{Mg}$	$E^\circ = - 2.38 \text{ V}$
$\text{Cu}^{2+} + 2\text{e} \rightleftharpoons \text{Cu}$	$E^\circ = + 0.34 \text{ V}$

Antara yang berikut, pernyataan manakah yang benar tentang sel itu?
 Which of the following statements are correct about the cell?

- I Elektrod magnesium sebagai terminal negatif
Magnesium electrode acts as negative terminal
 - II Elektrod kuprum sebagai terminal negatif
Copper electrode acts as negative terminal
 - III Ion kuprum (II) mengalami tindak balas pengoksidaan
Copper (II) ion undergoes oxidation reaction
 - IV Ion kuprum (II) mengalami tindak balas penurunan
Copper (II) ion undergoes reduction reaction
- A I dan II
I and II
 - B I dan IV
I and IV
 - C II dan III
II and III
 - D II dan IV
II and IV

24. Rajah 6 menunjukkan susunan radas bagi mengkaji sifat kimia X yang dijalankan oleh sekumpulan pelajar di dalam makmal.
Diagram 6 shows an apparatus set-up to study chemical properties of X carried out by a group of students in a laboratory.



Rajah 6 / Diagram 6

- Antara berikut, padanan manakah yang betul bagi X dan Y?
Which of the following is correct matches for X and Y?

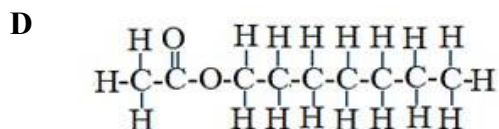
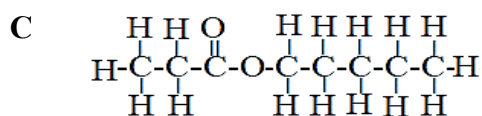
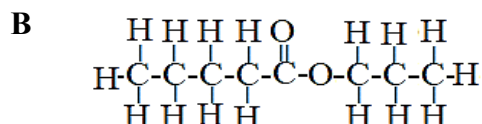
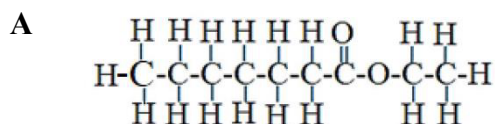
	X	Y
A	Etanol <i>Ethanol</i>	Asid etanoik <i>Ethanoic acid</i>
B	Etanol <i>Ethanol</i>	Etena <i>Ethene</i>
C	Etena <i>Ethene</i>	Etanol <i>Ethanol</i>
D	Etena <i>Ethene</i>	Asid etanoik <i>Ethanoic acid</i>

25. S ialah asid karboksilik yang mempunyai tiga atom karbon per molekul. Apakah jisim molekul relatif S?
S is a carboxylic acid that has three carbon atoms per molecule. What is the relative molecular mass of S?
 [Jisim atom relatif : H = 1, C = 12, O = 16]
 [Relative atomic mass : H = 1, C = 12, O = 16]

- A 44
 B 56
 C 60
 D 74

26. Apabila etanol ditindakbalaskan dengan asid heptanoik, suatu ester yang mempunyai aroma seperti anggur terhasil. Antara berikut yang manakah menunjukkan formula struktur bagi ester tersebut?

When ethanol is reacted with heptanoic acid, an ester with grape-like aroma is produced. Which of the following shows the structural formula for the ester?



27. Jadual 2 menunjukkan sebahagian siri keupayaan elektrod piawai bagi sel setengah bagi beberapa bahan kimia.

Table 2 shows a part of the standard electrode potential series of half-cells for several chemicals.

$\text{Cl}_2 + 2\text{e} \rightleftharpoons 2\text{Cl}^-$	$E^\circ = +1.36 \text{ V}$
$\text{Mg}^{2+} + 2\text{e} \rightleftharpoons \text{Mg}$	$E^\circ = -2.38 \text{ V}$
$\text{Cu}^{2+} + 2\text{e} \rightleftharpoons \text{Cu}$	$E^\circ = +0.34 \text{ V}$
$\text{Fe}^{2+} + 2\text{e} \rightleftharpoons \text{Fe}$	$E^\circ = -0.44 \text{ V}$

Jadual 2 / Table 2

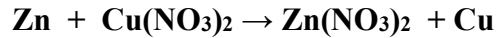
Yang manakah merupakan agen pengoksidaan yang paling kuat?

Which is the strongest oxidising agent?

- A Atom kuprum
Copper atom
- B Atom magnesium
Magnesium atom
- C Ion ferum (II)
Iron (II) ion
- D Molekul klorin
Chlorine molecule

28. Persamaan kimia berikut mewakili tindak balas penyesaran kuprum daripada larutan garamnya.

The following chemical equation represents the displacement reaction of copper from its salt solution.



Apabila serbuk zink berlebihan ditambahkan ke dalam 50 cm^3 larutan kuprum(II) nitrat 0.1 mol dm^{-3} , suhu campuran meningkat daripada 28.0°C kepada 40.0°C . Berapakah haba penyesaran bagi kuprum?

When excess zinc powder is added into 50 cm^3 of 0.1 mol dm^{-3} of copper (II) sulphate solution, the temperature of the mixture increases from 28.0°C to 40.0°C . What is the heat of displacement of copper?

[Muatan haba tentu larutan = $4.2 \text{ J g}^{-1}\text{C}^{-1}$, ketumpatan larutan = 1 g cm^{-3}]

[*Specific heat capacity of solution = $4.2 \text{ J g}^{-1}\text{C}^{-1}$, density of solution = 1 g cm^{-3}*]

- A -504 kJ mol⁻¹
 B -252 kJ mol⁻¹
 C -5.04 kJ mol⁻¹
 D -2.52 kJ mol⁻¹
29. Rajah 7 menunjukkan pembentukan titisan air pada dinding luar gelas yang mengandungi minuman sejuk.
Diagram 7 shows the formation of water droplets on the outer wall of the glass containing a cold drink.



Rajah 7 / Diagram 7

Antara berikut, pernyataan manakah yang benar tentang pemerhatian di dalam Rajah 7?

Which of the following statements is correct about observation in Diagram 7?

- A Haba diserap dari persekitaran
Heat is absorbed from the surrounding
 B Udara persekitaran yang panas terkondensasi
Hot surrounding air condenses
 C Daya tarikan antara zarah semakin lemah
The attraction force between particles become weaker
 D Proses pengendapan berlaku
The deposition process takes place

30. Bahan yang manakah mengandungi 6.02×10^{23} atom?
Which substance contains 6.02×10^{23} atoms?

- A 0.25 mol gas klorin
0.25 mol of chlorine gas
- B 0.5 mol gas ammonia
0.5 mol of ammonia gas
- C 0.5 mol gas oksigen
0.5 mol of oxygen gas
- D 0.5 mol gas karbon dioksida
0.5 mol of carbon dioxide gas

31. 4.34 g kalsium karbonat bertindak balas dengan 0.025 mol asid sulfurik untuk membentuk kalsium sulfat sebagai salah satu hasil tindak balas. Tentukan jisim kalsium karbonat yang tinggal selepas tindak balas.

[Jisim atom relatif : H = 1, C = 12, O = 16, S = 32, Ca = 40]

4.34 g of calcium carbonate reacts with 0.025 mol of sulphuric acid to form calcium sulphate as one of the reaction products. Determine the mass of calcium carbonate remaining after the reaction.

[Relative atomic mass : H = 1, C = 12, O = 16, S = 32, Ca = 40]

- A 1.84 g
- B 2.48 g
- C 3.43 g
- D 4.24 g

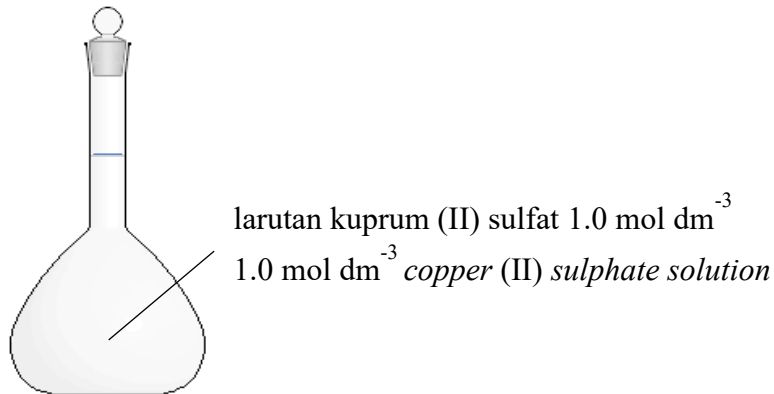
32. Maklumat berikut adalah mengenai atom P dan atom Q.
The following information is about P atom and Q atom.

- Unsur P adalah suatu logam.
Element P is a metal.
- Nombor proton atom Q ialah 12.
The proton number of the Q atom is 12.
- Unsur P berada di atas unsur Q dalam kumpulan yang sama dalam Jadual Berkala Unsur.
Element P is above element Q in the same group in the Periodic Table of Elements.

Antara berikut, yang manakah menunjukkan susunan elektron bagi atom P?
Which of the following shows the electron arrangement of the P atom?

- A 2.2
- B 2.3
- C 2.8.1
- D 2.8.2

33. Rajah 8 menunjukkan larutan stok kuprum (II) sulfat.
Diagram 8 shows a stock solution of copper(II) sulphate.



Rajah 8 / Diagram 8

Jika Amsyar hendak menyediakan 250 cm^3 larutan kuprum (II) sulfat 0.5 mol dm^{-3} daripada larutan stok larutan, berapakah isipadu larutan stok yang diperlukan?
If Amsyar wants to prepare 250 cm^3 of 0.5 mol dm^{-3} copper (II) sulphate solution from a stock solution, what is the volume of stock solution needed?

- A 25 cm^3
- B 50 cm^3
- C 125 cm^3
- D 150 cm^3

34. Sekumpulan pekerja pembinaan menggunakan konkrit untuk membina sebuah bangunan. Mereka dapati dinding bangunan itu mudah pecah apabila dikenakan daya regangan yang tinggi. Antara berikut, kaedah manakah yang sesuai digunakan untuk meningkatkan kebolehan konkrit menahan daya itu?

A group of construction workers use concrete to build a building. They found that the wall of the building easily broken when exert high tensile forces. Which of the following is the suitable method to increase the ability of the concrete to withstand the force?

- A Tambahkan keluli nirkarat ke dalam konkrit
Add stainless steel to the concrete
- B Tambahkan kaolin ke dalam konkrit
Add kaolin to the concrete
- C Benamkan tetulang keluli ke dalam konkrit
Immersed steel bars into the concrete
- D Benamkan silikon dioksida ke dalam konkrit
Immersed silicone dioxide into the concrete

35. Antara pernyataan berikut, yang manakah benar?

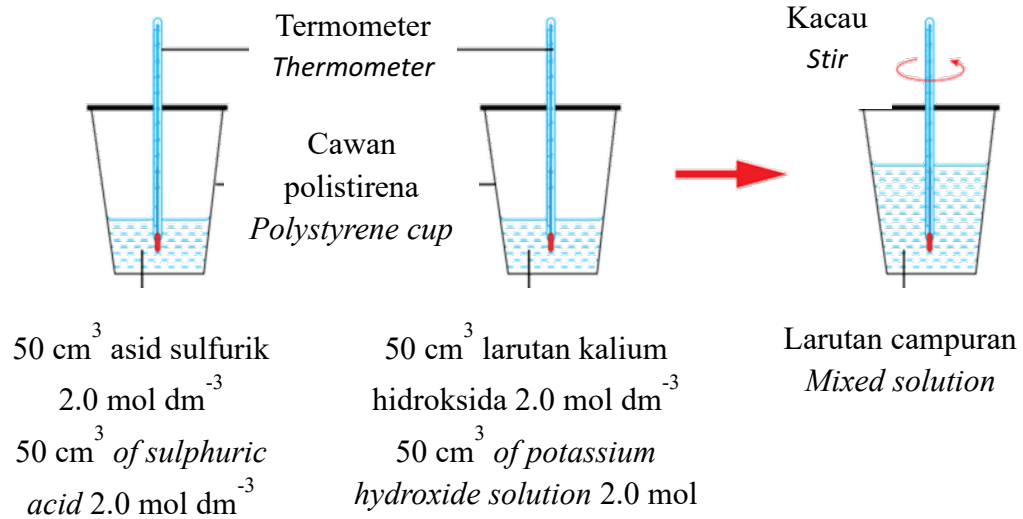
Which of the following statements are true?

- I Setengah sel yang mempunyai E° bernilai positif lebih mudah mengalami pengoksidaan
Half of the cells that have a positive E° value are more easily undergo oxidation
- II Setengah sel yang mempunyai E° yang bernilai negatif lebih mudah mengalami penurunan
Half of the cells with a negative E° value more easily undergo reduction
- III Setengah sel yang mempunyai nilai E° yang bernilai positif lebih mudah mengalami penurunan
Half of the cells with a positive E° value are more easily undergo reduction
- IV Setengah sel yang mempunyai E° yang bernilai negatif lebih mudah mengalami pengoksidaan
Half of the cells that have a negative E° value are more easily undergo oxidation

- A I dan II
I and II
- B I dan III
I and III
- C II dan IV
II and IV
- D III dan IV
III and IV

36. Rajah 9 menunjukkan tindak balas peneutralan di antara asid sulfurik dan larutan kalium hidroksida.

Diagram 9 shows the neutralisation reaction between sulphuric acid and potassium hydroxide solution.



Rajah 9 / Diagram 9

Haba peneutralan bagi tindak balas tersebut ialah -57 kJ mol^{-1} . Hitungkan suhu tertinggi campuran jika purata suhu awal campuran ialah $29.0 \text{ }^\circ\text{C}$.

The heat of neutralisation for the reaction is -57 kJ mol^{-1} . Calculate the highest temperature of the mixture if the average initial temperature of the mixture is $29.0 \text{ }^\circ\text{C}$.

- A 16.2 $^\circ\text{C}$
- B 32.5 $^\circ\text{C}$
- C 40.3 $^\circ\text{C}$
- D 42.6 $^\circ\text{C}$

37. Rajah 10 menunjukkan kegunaan sejenis polimer yang terhasil melalui tindak balas pempolimeran.

Diagram 10 shows the uses of a type of polymer produced through polymerisation reaction.



Rajah 10 / Diagram 10

Antara yang berikut, pernyataan manakah adalah betul tentang pempolimeran itu?

Which of the following statements is true about the polymerisation?

- A Terbentuk daripada gabungan monomer yang sama jenis
Formed from a combination of the same type of monomers
- B Terbentuk daripada gabungan monomer yang berlainan jenis
Formed from a combination of different types of monomers
- C Pempolimeran ini menghasilkan polimer terbiodegradasi
This polymerisation produces a biodegradable polymer
- D Terbentuk daripada monomer yang mempunyai ikatan kovalen ganda dua
Formed from monomers that have double covalent bonds
38. Larutan garam X bertindak balas dengan larutan zink nitrat, $Zn(NO_3)_2$ menghasilkan pepejal berwarna putih. Antara berikut, manakah yang betul bagi menguji kehadiran anion bagi garam X?
Salt solution X reacts with zinc nitrate, $Zn(NO_3)_2$ solution to produce a white solid.
Which of the following is correct to test the presence of anion for salt X?
- A Tambah 2 cm^3 HCl diikuti dengan 2 cm^3 $BaCl_2$ ke dalam larutan X
Add 2 cm^3 HCl followed by 2 cm^3 $BaCl_2$ into X solution
- B Tambah 2 cm^3 HCl ke dalam larutan X dan alirkan gas terbebas dlm air kapur
Add 2 cm^3 HCl into X solution and flow the liberated gas into lime water
- C Tambah 2 cm^3 H_2SO_4 cair, 2 cm^3 larutan $FeSO_4$ dan beberapa titis H_2SO_4 pekat ke dalam larutan X
Add 2 cm^3 dilute H_2SO_4 , 2 cm^3 $FeSO_4$ solution and a few drops concentrated H_2SO_4 into X solution
- D Tambah 2 cm^3 H_2SO_4 dan 2 cm^3 $MgSO_4$ ke dalam larutan X
Add 2 cm^3 H_2SO_4 and 2 cm^3 $MgSO_4$ into X solution

39. Rajah 11 menunjukkan satu situasi yang memerlukan penggunaan ubat moden.
Diagram 11 shows a situation that requires the use of modern medicine.



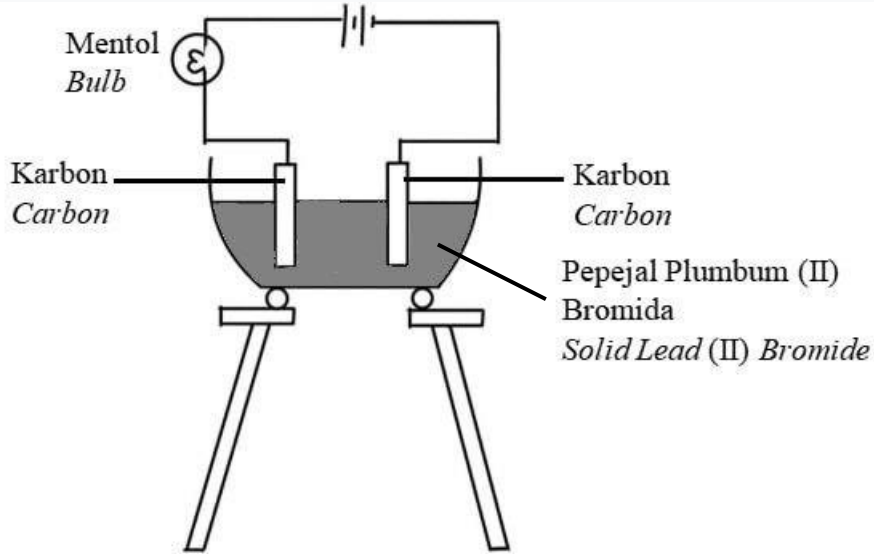
Rajah 11 / *Diagram 11*

Antara yang berikut, ubat manakah yang sesuai untuk digunakan dalam situasi itu?
Which of the following medicine is suitable to use in that situation?

- A Streptomisin
Streptomycin
- B Hidrogen peroksida
Hydrogen peroxide
- C Etanol
Ethanol
- D Klozapin
Chlozapine

40. Rajah 12 menunjukkan susunan radas satu eksperimen yang dijalankan oleh sekumpulan pelajar di dalam makmal.

Diagram 12 shows an apparatus set-up carried out by a group of students in laboratory.



Rajah 12 / Diagram 12

Selepas 5 minit, didapati mentol masih tidak menyala.

Apakah langkah yang perlu diambil oleh kumpulan pelajar itu untuk mengatasi masalah tersebut?

After 5 minutes, it was found that the bulb still did not light up.

What step should be taken by the students to overcome the problem?

- A Gantikan pepejal plumbum(II) bromida dengan pepejal natrium klorida
Replace solid lead (II) bromide with solid sodium chloride
- B Larutkan pepejal plumbum(II) bromida dalam air
Dissolve solid lead (II) bromide in water
- C Larutkan pepejal plumbum(II) bromida dalam etanol
Dissolve solid lead (II) bromide in ethanol
- D Panaskan pepejal plumbum(II) bromida sehingga lebur
Heat solid lead (II) bromide until it melts