



JABATAN PELAJARAN KELANTAN

**TRIAL EXAMINATION
2012**

CHEMISTRY (KIMIA)

**SIJIL TINGGI PERSEKOLAHAN MALAYSIA
(MALAYSIA HIGHER SCHOOL EDUCATION)**

**PAPER 1 (KERTAS 1)
MULTIPLE-CHOICE (ANEKA PILIHAN)**

One hour and forty-five minutes (Satu jam empat puluh lima minit)

Instructions to candidates :

DO NOT OPEN THIS BOOKLET UNTIL YOU TOLD TO DO SO

*There are **fifty** questions in this paper. For each question, four suggested answers are given. Choose **one** correct answer and indicate it on the multiple-choice answer sheet provided.*

*Read the instructions on the multiple-choice answer sheet very carefully.
Answer **all** questions. Marks will not be deducted for wrong answers.*

Arahan kepada calon :

**JANGAN BUKA BUKU SOALAN INI SEHINGGA ANDA DIBENARKAN
BERBUAT DEMIKIAN**

*Ada **lima puluh** soalan dalam kertas ini. Bagi setiap soalan, empat cadangan jawapan diberikan. Pilih **satu** jawapan yang betul dan tandakan jawapan itu pada helaian jawapan aneka pilihan yang dibekalkan.*

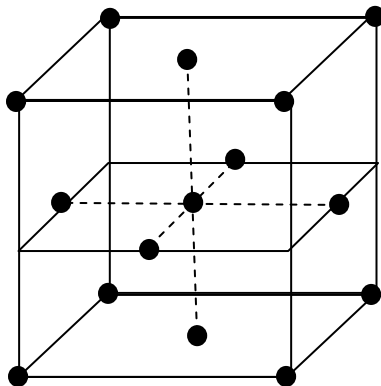
*Baca arahan pada helaian jawapan aneka pilihan itu dengan teliti.
Jawab **semua** soalan. Markah tidak akan ditolak bagi jawapan yang salah.*

**This question paper consists of 18 printed pages
(Kertas soalan ini terdiri daripada 18 halaman bercetak)**

Section A

Four suggested answers labeled **A**, **B**, **C**, and **D** are given for each question. Choose **one** correct answer.

- 1 The unit cell of an element M is shown below:

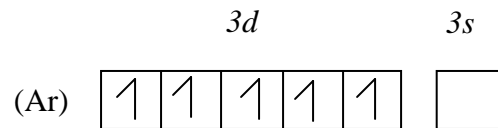


Given the volume of the unit cell is $\alpha \text{ cm}^3$ and the molar volume of M atoms is $b \text{ cm}^3$, what the value for the Avogadro constant?

- A $\frac{b}{\alpha}$
- B $\frac{b}{\alpha} \times 14$
- C $\frac{b}{\alpha} \times 12$
- D $\frac{b}{\alpha} \times 4$
- 2 Copper is usually obtained as a mixture of 69.09% ^{63}Cu isotope and 30.91% ^{65}Cu isotope. If the masses of ^{63}Cu and ^{65}Cu isotopes are 62.93 amu and 64.93 amu respectively, what is the relative atomic mass of copper?
- A 63.62
- B 63.55
- C 63.93
- D 64.31

- 3 What is the maximum number of electrons in third shell of an atom?
- A 2
B 8
C 18
D 32

- 4 An element M has the following electron configuration.



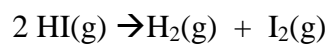
What is M ?

[Proton numbers: Ti = 22; V = 23; Mn = 25; Fe = 26; and Ni = 28]

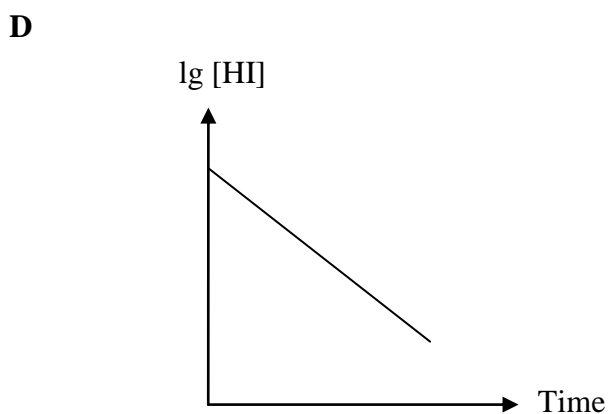
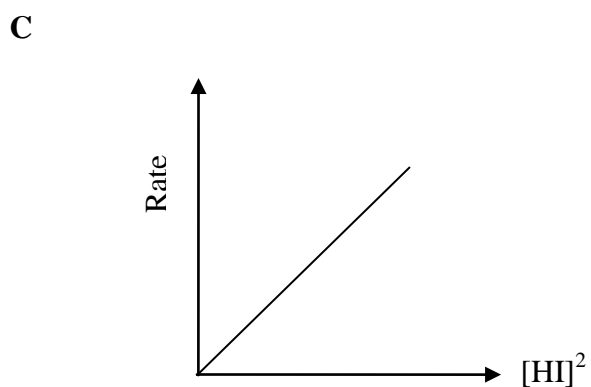
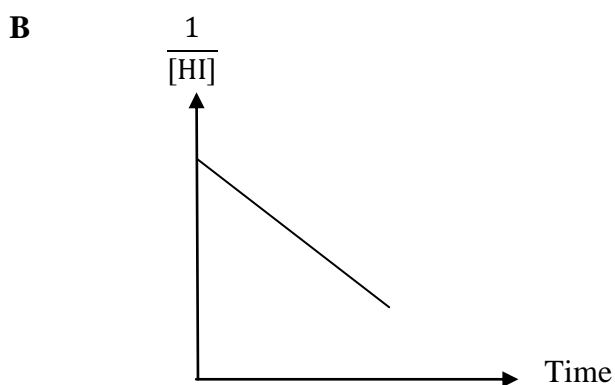
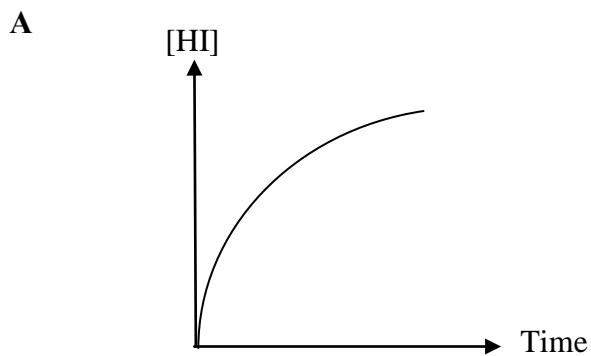
- A Nickel in $[\text{Ni}(\text{NH}_3)_6]^{2+}$
B Iron in $\text{Fe}_2(\text{SO}_4)_3$
C Titanium in TiO_2
D Manganese in MnO_4^{2-}
- 5 Which of the following properties show a gradual increasing trend with increasing proton number for the elements Sc and Cu?
- A Density
B Boiling point
C Melting point
D First ionisation energy
- 6 Ar, K^+ , and Ca^{2+} are isoelectronic. The order of increasing radii is
- A $\text{Ca}^{2+} < \text{K}^+ < \text{Ar}$
B $\text{Ca}^{2+} < \text{Ar} < \text{K}^+$
C $\text{Ar} < \text{Ca}^{2+} < \text{K}^+$
D $\text{K}^+ < \text{Ar} < \text{Ca}^{2+}$

- 7 Which element possesses the strongest metallic bond?
- A Magnesium
 - B Calcium
 - C Sodium
 - D Lithium
- 8 XH_3 is a gaseous hydride of an element in Group 15 of Periodic Table. Which of the following shapes is most appropriate for the hydride molecule?
- A V-shaped
 - B Trigonal pyramid
 - C Plane trigonal
 - D Tetrahedral
- 9 Which of the following molecules is polar?
- A SF_6
 - B BCl_3
 - C SnCl_4
 - D CH_3Cl
- 10 Magnesium metal is a good conductor of electricity. Which of the following statements is true of the metal?
- A The 3s orbital forms the valence and conduction band
 - B The electrons in 3s and 3p orbitals are delocalised
 - C The energy gap between the valence band and the conduction band is large
 - D Its conductivity is lower than silicon when the temperature increase

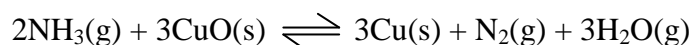
- 11 The thermal decomposition of hydrogen iodide is a second order reaction.



Which of the following graphs is correct for this reaction?



- 12 The equilibrium constant, K_c , for the reaction



is given by

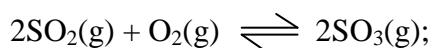
A
$$\frac{[\text{Cu}]^3[\text{N}_2][\text{H}_2\text{O}]^3}{[\text{NH}_3]^2[\text{CuO}]^3}$$

C
$$\frac{[\text{N}_2][\text{H}_2\text{O}]}{[\text{NH}_3]}$$

B
$$\frac{[\text{N}_2][\text{H}_2\text{O}]^3}{[\text{NH}_3]^2}$$

D
$$\frac{3[\text{N}_2][\text{H}_2\text{O}]}{2[\text{NH}_3]}$$

- 13 In the Contact process, sulphur dioxide is converted into sulphur trioxide according to the following equation:



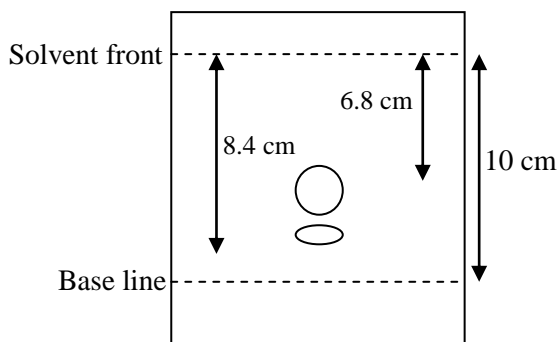
ΔH is negative

Which of the following sets of conditions at equilibrium would give the highest yield of sulphur trioxide?

	<i>Temperature</i>	<i>Pressure</i>	<i>Catalyst</i>
A	High	High	Present
B	Low	High	None
C	High	Low	None
D	High	High	None

- 14 The solubility product of silver chloride is $1.0 \times 10^{-10} \text{ mol}^2 \text{ dm}^{-6}$. What mass of silver chloride will dissolve in 1 dm^3 of a solution of sodium chloride with a concentration of 0.10 mol dm^{-3} ?
- A $1.0 \times 10^{-14} \text{ mol dm}^{-3}$
- B $1.0 \times 10^{-10} \text{ mol dm}^{-3}$
- C $1.0 \times 10^{-9} \text{ mol dm}^{-3}$
- D $1.0 \times 10^{-5} \text{ mol dm}^{-3}$

- 15 Which of the following species could behave as an acid and a base according to Bronsted- Lowry theory?
- A HCO_3^-
 B CO_3^{2-}
 C OH^-
 D HCl
- 16 The partition coefficient of substance X between ether and water is 8.0 at room temperature. An aqueous solution containing 5.0 g of X in 100cm^3 of water is extracted with 100cm^3 of ether. What is the maximum mass of X that can be extracted into the ether layer?
- A 0.35 g
 B 2.34 g
 C 4.44 g
 D 3.98 g
- 17 The chromatogram below is obtained from thin layer chromatography of a sample of amino acid P, Q, R and S.



Base on the R_f value in the table below, deduce the amino acids present in the sample.

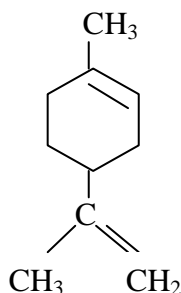
Amino acid	R_f value
P	0.16
Q	0.32
R	0.68
S	0.84

- A P and S
 B Q and R
 C P and Q
 D P and R

- 22 Which of the following is the **correct** physical property of elements across the Third Period from sodium to chlorine in the Periodic Table?
- A Size of atoms increases.
 - B Melting point decreases.
 - C Electronegativity decreases.
 - D First ionization energy increases.
- 23 Which of the following elements in the same period of the Periodic Table has the highest boiling point?
- A Sodium
 - B Sulphur
 - C Aluminium
 - D Magnesium
- 24 Which of the following shows the changes in properties of oxides of Group 14 elements (carbon to lead) in the Periodic Table?
- A Acidic → basic → neutral
 - B Acidic → neutral → basic
 - C Acidic → amphoteric → basic
 - D Basic → amphoteric → acidic
- 25 Which of the following statements about Group 14 elements (carbon to lead) of the Periodic Table is **true**?
- A Only CCl_4 is hydrolysed by water.
 - B Only oxides of tin and lead are amphoteric.
 - C All oxide of elements give oxygen gas when heated strongly.
 - D +2 oxidation state of elements becomes more stable when moving down the group.

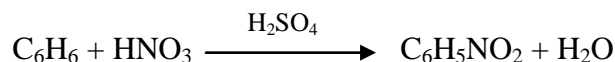
- 26 Which statement about the properties of the tetrachlorides of Group 14, CCl_4 to SnCl_4 , is **correct**?
- A They are all polar molecules.
 - B Their melting points increase down the group.
 - C Their boiling points decrease down the group.
 - D Tin (IV) chloride is the only ionic tetrachloride.
- 27 Nitrogen is very non-reactive at low temperatures because the gas
- A has half-filled p orbitals.
 - B has high atomisation energy.
 - C exists as diatomic molecules.
 - D has a stable electron configuration.
- 28 Which of the following statements is **not** true about halogens?
- A Solubility in water decreases.
 - B They exist as diatomic molecules.
 - C Reactivity with hydrogen increases down the group.
 - D They become darker in colour moving down the group.
- 29 Which of the following elements in the first series of transition elements does **not** show general characteristics of a transition element?
- A Copper
 - B Nickel
 - C Scandium
 - D Vanadium

- 30 An organic compound has the structure



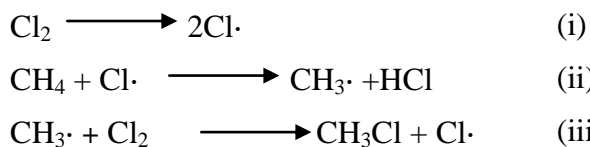
Which of the following is **not** true regarding the compound?

- A It exhibits geometrical isomerism
 B It exhibits optical isomerism
 C It decolorises acidified potassium manganate (VII)
 D It is insoluble in water
- 31 Benzene reacts with a mixture of concentrated nitric acid and concentrated sulphuric acid to produce nitrobenzene according to the equation:



What is the function of sulphuric acid in the above reaction?

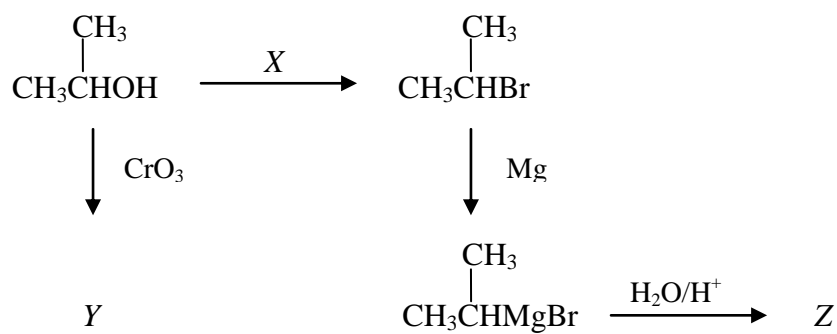
- A To protonate the nitric acid
 B To eliminate the water produced
 C To prevent di-substitution from occurring
 D To prevent oxidation of benzene by nitric acid
- 32 The reaction mechanism between chlorine and methane is shown below:



Which of the following is **not** true regarding the reaction?

- A Reaction (i) requires ultra-violet light
 B The reaction can occur in the dark if the mixture is heated with benzoyl peroxide
 C CH_3Cl is the only product formed
 D A little C_2H_6 is also formed in the reaction

33 The scheme below shows the production of compound Z from 2-propanol.



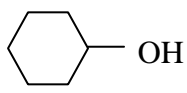
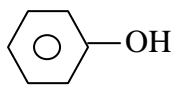
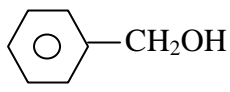
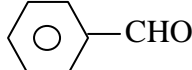
Which of the following are X, Y and Z?

- | | X | Y | Z |
|----------|----------------|---|--|
| A | Br_2 | $ \begin{array}{c} \text{CH}_3 \\ \\ \text{CH}_3\text{C}=\text{O} \end{array} $ | $ \begin{array}{c} \text{CH}_3 \quad \text{CH}_3 \\ \quad \\ \text{CH}_3\text{CH} - \text{C} - \text{CH}_3 \\ \\ \text{OH} \end{array} $ |
| B | Br_2 | $ \begin{array}{c} \text{CH}_3 \\ \\ \text{CH}_3\text{C}=\text{O} \end{array} $ | $ \begin{array}{c} \text{CH}_3 \\ \\ \text{CH}_3\text{CHCH}_2\text{CH}_2\text{CH}_2\text{OH} \end{array} $ |
| C | PBr_3 | $ \begin{array}{c} \text{CH}_3 \\ \\ \text{CH}_3\text{C}=\text{O} \end{array} $ | $ \begin{array}{c} \text{OH} \quad \text{CH}_3 \\ \quad \\ \text{CH}_3\text{CH} - \text{C} - \text{CH}_3 \\ \\ \text{CH}_3 \end{array} $ |
| D | PBr_3 | $ \begin{array}{c} \text{CH}_3 \\ \\ \text{CH}_3\text{C}=\text{O} \end{array} $ | $ \begin{array}{c} \text{CH}_3 \quad \text{CH}_3 \\ \quad \\ \text{CH}_3\text{CH} - \text{C} - \text{CH}_3 \\ \\ \text{OH} \end{array} $ |

34 A compound Z shows the following properties:

- (i) Reacts with sodium to give a combustible gas
- (ii) Reacts with benzoyl chloride to give a precipitate
- (iii) Reacts with aqueous solution of sodium hydroxide to give a salt

Compound Z could be

- A 
- B 
- C 
- D 

35 When a compound *P* which does not react with acidified solution of potassium dichromate (VI), is heated with aluminium oxide, compound *Q* is produced. The compound *Q* can decolourise bromine water. If *Q* is treated with hydrogen bromide, 2-bromo-2-methylpropane is produced.

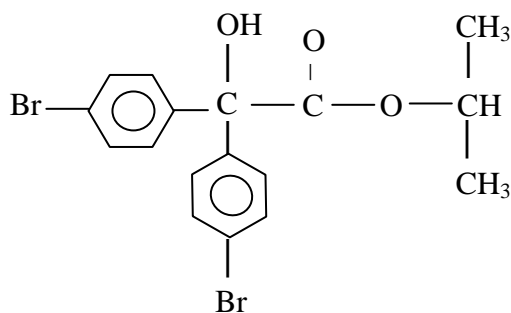
Compound *P* could be

- A butan-2-one
- B propan-2-ol
- C butan-2-ol
- D 2-methylpropan-2-ol

36 Which of the following compounds could be the main product when ethanoic acid is treated with lithium tetrahydridoaluminate (III) ?

- A CH_3CH_3
- B $\text{CH}_2=\text{CH}_2$
- C CH_3CHO
- D $\text{CH}_3\text{CH}_2\text{OH}$

- 37 Acarol is sold as insecticides for fruits and vegetables.



Acarol

The last step in its manufacture is esterification. Which alcohol is used to make the above ester?

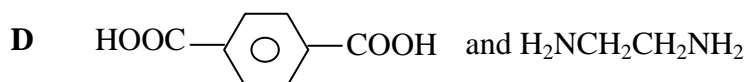
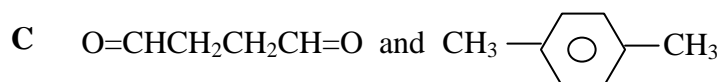
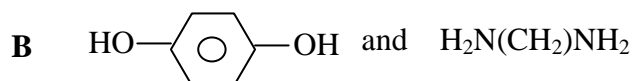
- A Di(4-bromophenyl)methanol
 B Methanol
 C Propan-1-ol
 D Propan-2-ol
- 38 The **correct** order of increasing basicity of ammonia, ethylamine and phenylamine is
 A ammonia < ethylamine < phenylamine
 B phenylamine < ammonia < ethylamine
 C ethylamine < phenylamine < ammonia
 D phenylamine < ethylamine < ammonia
- 39 Which of the following statements about 2-aminopropanoic acid and aminoethanoic acid is **not** true?
 A both are optically active
 B Both form a salt with mineral acid
 C Both react with nitric (III) acid
 D Both form zwitterions in aqueous solutions

Section B

For each of the questions in this section one or more of the three numbered statements 1 to 3 may be correct. Decide whether each of the statements is or is not correct. The responses A to D should be selected on the basis of the following.

A	B	C	D
1 only is correct	1 and 2 are correct	2 and 3 only are correct.	1, 2, and 3 are correct.

40 Which of the following pairs are monomers of a condensation polymer?



41 Which of the following statements are correct for the elements in the Periodic Table?

- 1 The elements are arranged in the order of increasing proton number.
- 2 The atomic radii increases down a group.
- 3 Electronegativity increase across a period.

42 Which of the following are true of a first order reaction?

- 1 The rate constant is dependent on the temperature.
- 2 The half-life is independent of the initial reactant concentration
- 3 The units of the rate constant is time^{-1} .

A	B	C	D
1 only is correct	1 and 2 are correct	2 and 3 only are correct.	1, 2, and 3 are correct.

43 In the Nernst equation,

$$E_{\text{cell}} = E^{\circ}_{\text{cell}} + \frac{RT}{nF} \ln \frac{[\text{oxidised form}]}{[\text{reduced form}]}$$

Which of the following quantities can have both positive and negative values?

- 1 $\ln \frac{[\text{Oxidation form}]}{[\text{reduced form}]}$
- 2 E°
- 3 T

44 Which of the following properties of ammonia can be explained in terms of hydrogen bonding?

- 1 It is very soluble in water.
- 2 It is a base.
- 3 The liquid form contains the ions NH_4^+ and NH_2^-

45 Why are most catalysts transition elements or their compounds?

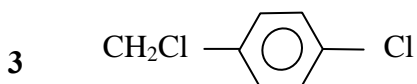
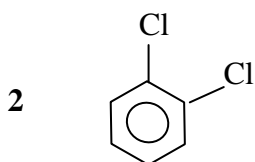
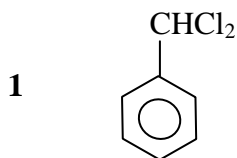
- 1 They have a high charge density.
- 2 They show variable oxidation states.
- 3 They have available d orbitals for bonding.

46 Ethene and ethane can be differentiated by using

- 1 acidified KMnO_4
- 2 bromine in the absence of light
- 3 concentrated sulphuric (VI) acid

A	B	C	D
1 only is correct	1 and 2 are correct	2 and 3 only are correct.	1 , 2 , and 3 are correct.

- 47** One mole of organic compound, *X*, reacts with two moles of sodium hydroxide on heating. *X* could be,



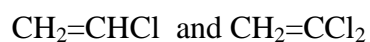
- 48** Oxidation of pentane-2-ol produces compound *X*. *X* is expected to

- 1** give an orange precipitate with 2,4-dinitrophenylhydrazine
- 2** give a negative reaction with Tollen's reagent
- 3** give a yellow precipitate with alkaline iodine

49 Z, $C_2H_5NO_2$, reacts with nitrous acid to release nitrogen gas. 10cm^3 of a solution containing 0.75g dm^{-3} of Z requires 10cm^3 of 0.01 mol dm^{-3} sodium hydroxide for complete reaction. Which of the following is/ are true regarding Z?

- 1 It is an amino acid
- 2 It contains one $-\text{COOH}$ group in its molecule
- 3 It is an amide

50 'Clearfilm' is manufactured from a polymer made by copolymerizing



- 1 $--\text{CHCl}-\text{CH}_2-\text{CCl}_2--$
- 2 $--\text{CCl}_2-\text{CCl}_2-\text{CH}_2-\text{CHCl}--$
- 3 $--\text{CH}_2-\text{CHCl}-\text{CCl}_2--$

END OF QUESTION PAPER