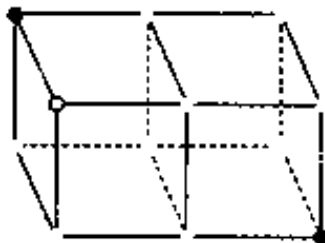


### SECTION A

Answer **ALL** questions. Write your answers in the spaces provided.

1. Consider the following lattice structure of sodium chloride:



● Na<sup>+</sup> ion

○ Cl<sup>-</sup> ion

- (a) (i) Fill in the corresponding ions to complete the above diagram.
- (ii) With reference to the above structure, suggest why solid sodium chloride
- (I) does not conduct electricity.
- (II) has a melting point of 801°C.

(3 marks)

- (b) Give an industrial use of sodium chloride.

(1 mark)

Answers written in the margins will not be marked.

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2. A student attempted to separate hex-1-ene and hexane by simple distillation.

(a) Draw a labeled diagram for an assembly of apparatus employed.

(2 marks)

(b) The following shows the the boiling points of hexane and hex-1-ene:

	hexane	hex-1-ene
boiling point	69°C	64°C

(i) Suggest a reason why the boiling point of hex-1-ene is lower than that of hexane.

(ii) Do you expect the above separation to be effective ? Explain.

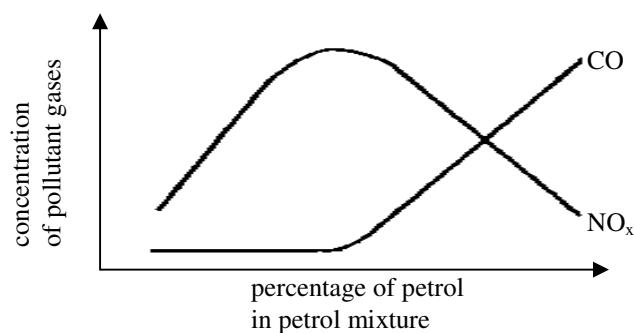
(2 marks)

(c) Suggest a chemical, other than bromine reagent, to distinguish hexane and hex-1-ene.

(1 mark)

Answers written in the margins will not be marked.

3. Consider the variation of atmospheric concentration of pollutants:



(a) Describe, with an appropriate explanation, the variation of concentration of

(i) nitrogen oxide.

(ii) carbon monoxide.

(4 marks)

(c) Suppose the above pollutants can be removed from car exhausts with a specific device. Explain the chemical processes involved.

(2 marks)

Answers written in the margins will not be marked.

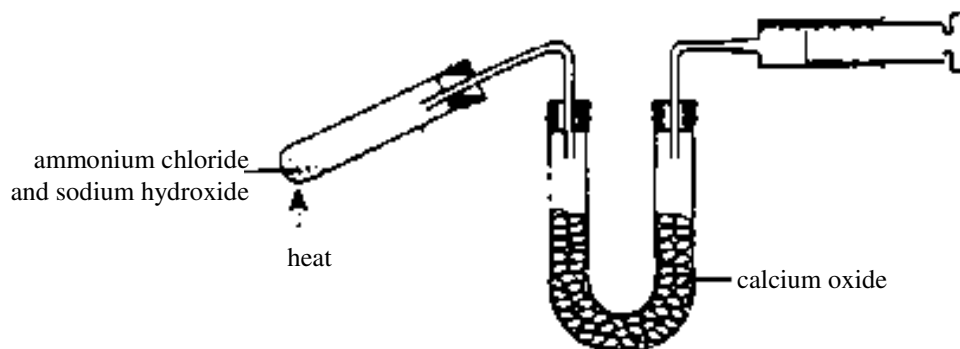
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4. State the chief objective of each of the practical set-up below and point out the mistakes incurred with appropriate explanations.

(a)



(2 marks)

(b)



(2 marks)

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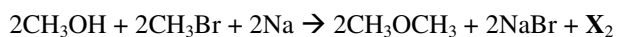
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5. Ether is a homologous series with the presence of –O– group.

(a) What is the meaning of homologous series ?

(1 mark)

(b) An ether is formed when methanol, bromomethane and sodium react together:



Deduce the identity of X in the above reaction.

(1 mark)

(c) (i) Write the chemical equation for the complete combustion of  $\text{CH}_3\text{OCH}_3$ .

(1 mark)

(ii) Calculate the mass of  $\text{CO}_2$  produced when 30 g of  $\text{CH}_3\text{OCH}_3$  is burnt completely in air.  
(Relative atomic masses: H = 1.0, C = 12.0, O = 16.0)

(2 marks)

(d) Draw a structure of different homologous series with a molecular formula of  $\text{CH}_3\text{OCH}_3$ .

(1 mark)

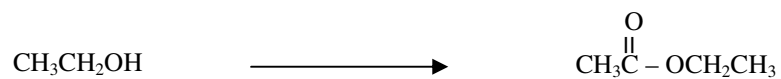
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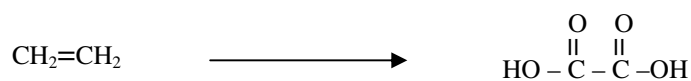
6. Write the chemical equations only, specifying the reagents and conditions used, to show the conversion of the following reactions. (Hint: At least two reactions are involved in each of the following questions.)

(a)



(3 marks)

(b)



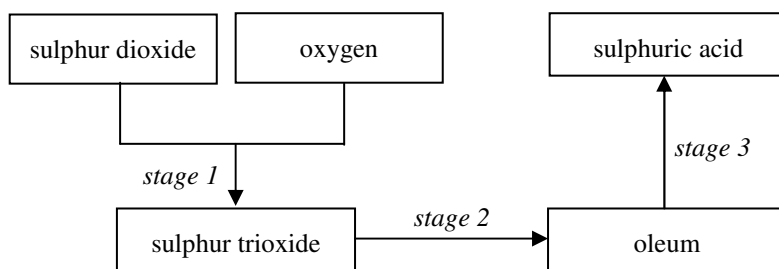
(3 marks)

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7. The flowchart diagram below shows the industrial process of manufacture of sulphuric acid.



- (a) Explain the fact that catalytic effect of the catalyst gradually diminishes over time in *stage 1*. Hence suggest how its catalytic effect could be prolonged.

(2 marks)

- (b) In *stage 2* and *3*, sulphur trioxide is absorbed by concentrated sulphuric acid and followed by dilution with water to form sulphuric acid. Give TWO advantages of such a practice.

(2 marks)

- (c) Give the stages of reactions that do not achieve an expected yield over 85 %. Explain.

(1 mark)

- (d) Suggest ONE dominating factor, in terms of conditions employed, that determines the overall percentage yield of production.

(1 mark)

- (e) Sulphur dioxide can function as industrial bleach. Provide the chemical equations for its bleaching action.

(2 marks)

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8. Write the chemical equations and the expected observations when a piece of iron is added into

(a) silver nitrate solution;

(2 marks)

(b) concentrated nitric acid;

(2 marks)

(c) concentrated hydrochloric acid.

(2 marks)

Answers written in the margins will not be marked.

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Answers written in the margins will not be marked.

12. The following passage is an extract from an online article 'DIY Home aluminum Anodizing for a Hobby'. Read the passage below and answer the questions that follow.

The first thing was making up dilute acid solution in an ovenproof dish. To 300 ml of water, we added roughly 50 ml of acid. Naturally this was all done with lots of gloves and eye protection. Remember - AAA - *Always Add Acid*. Using a PC power supply I connected 12 volts to the bath. The positive lead was fixed to the aluminium bar, and the negative lead attached to the lead cathode.

When I turned on the power, lots of bubbles formed on the lead \_\_\_\_\_, and a few bubbles formed on the aluminium \_\_\_\_\_. More bizarrely, *a faint purple colour was seen around the aluminium*. This is apparently due to manganese in the aluminium alloy.

I left the whole thing to fizz for about 45 minutes. Then I removed the aluminium and washed it under the tap. I then mixed up some red food colouring with some water and stood the bar in this for about 15 minutes. It turned pink! Finally I boiled the part in water for half an hour to seal it. I ended up with a aluminium bar with a pink bottom!

Source: <http://astro.neutral.org/anodise.shtml>

- (a) State the significance of '*Remember AAA- Always Add Acid*' in line 4 in the passage. (1 mark)
- (b) Fill in the missing words with the word 'anode' or 'cathode' in the above passage. (2 marks)
- (c) Provide the chemical equation, with state symbols, for the liberation of the gas on the lead electrode. (1 mark)
- (d) In the passage, it says '*a faint purple colour was seen around the aluminium, apparently due to manganese in the aluminium alloy*'. Suggest a possible reaction that takes place. (2 marks)
- (e) Apart from the goggles and gloves mentioned above, suggest one precaution for this DIY experiment. (1 mark)
- (f) A student made the following notes in his chemistry class:

*'Anodization can increase the metallic strength of aluminum metal.'*

Do you agree with him ? Explain.

(2 marks)

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Answers written in the margins will not be marked.

Answers written in the margins will not be marked.









## GROUP 族

## PERIODIC TABLE 週期表

atomic number 原子序

relative atomic mass 相對原子質量

																	0		
I		II												III	IV	V	VI	VII	0
3 <b>Li</b> 6.9		4 <b>Be</b> 9.0												5 <b>B</b> 10.8	6 <b>C</b> 12.0	7 <b>N</b> 14.0	8 <b>O</b> 16.0	9 <b>F</b> 19.0	10 <b>Ne</b> 20.2
11 <b>Na</b> 23.0		12 <b>Mg</b> 24.3												13 <b>Al</b> 27.0	14 <b>Si</b> 28.1	15 <b>P</b> 31.0	16 <b>S</b> 32.1	17 <b>Cl</b> 35.5	18 <b>Ar</b> 40.0
19 <b>K</b> 39.1	20 <b>Ca</b> 40.1	21 <b>Sc</b> 45.0	22 <b>Ti</b> 47.9	23 <b>V</b> 50.9	24 <b>Cr</b> 52.0	25 <b>Mn</b> 54.9	26 <b>Fe</b> 55.8	27 <b>Co</b> 58.9	28 <b>Ni</b> 58.7	29 <b>Cu</b> 63.5	30 <b>Zn</b> 65.4	31 <b>Ga</b> 69.7	32 <b>Ge</b> 72.6	33 <b>As</b> 74.9	34 <b>Se</b> 79.0	35 <b>Br</b> 79.9	36 <b>Kr</b> 83.8		
37 <b>Rb</b> 85.5	38 <b>Sr</b> 87.6	39 <b>Y</b> 88.9	40 <b>Zr</b> 91.2	41 <b>Nb</b> 92.9	42 <b>Mo</b> 95.9	43 <b>Tc</b> (98)	44 <b>Ru</b> 101.1	45 <b>Rh</b> 102.9	46 <b>Pd</b> 106.4	47 <b>Ag</b> 107.9	48 <b>Cd</b> 112.4	49 <b>In</b> 114.8	50 <b>Sn</b> 118.7	51 <b>Sb</b> 121.8	52 <b>Te</b> 127.6	53 <b>I</b> 126.9	54 <b>Xe</b> 131.3		
55 <b>Cs</b> 132.9	56 <b>Ba</b> 137.3	57 * <b>La</b> 138.9	72 <b>Hf</b> 178.5	73 <b>Ta</b> 180.9	74 <b>W</b> 183.9	75 <b>Re</b> 186.2	76 <b>Os</b> 190.2	77 <b>Ir</b> 192.2	78 <b>Pt</b> 195.1	79 <b>Au</b> 197.0	80 <b>Hg</b> 200.6	81 <b>Tl</b> 204.4	82 <b>Pb</b> 207.2	83 <b>Bi</b> 209.0	84 <b>Po</b> (209)	85 <b>At</b> (210)	86 <b>Rn</b> (222)		
87 <b>Fr</b> (223)	88 <b>Ra</b> (226)	89 ** <b>Ac</b> (227)	104 <b>Rf</b> (261)	105 <b>Db</b> (262)															
* 58 <b>Ce</b> 140.1	59 <b>Pr</b> 140.9	60 <b>Nd</b> 144.2	61 <b>Pm</b> (145)	62 <b>Sm</b> 150.4	63 <b>Eu</b> 152.0	64 <b>Gd</b> 157.3	65 <b>Tb</b> 158.9	66 <b>Dy</b> 162.5	67 <b>Ho</b> 164.9	68 <b>Er</b> 167.3	69 <b>Tm</b> 168.9	70 <b>Yb</b> 173.0	71 <b>Lu</b> 175.0						
** 90 <b>Th</b> 232.0	91 <b>Pa</b> (231)	92 <b>U</b> 238.0	93 <b>Np</b> (237)	94 <b>Pu</b> (244)	95 <b>Am</b> (243)	96 <b>Cm</b> (247)	97 <b>Bk</b> (247)	98 <b>Cf</b> (251)	99 <b>Es</b> (252)	100 <b>Fm</b> (257)	101 <b>Md</b> (258)	102 <b>No</b> (259)	103 <b>Lr</b> (260)						