



XINMIN SECONDARY SCHOOL

新民中学

SEKOLAH MENENGAH XINMIN

Preliminary Examination 2024

CANDIDATE NAME

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CLASS

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INDEX NUMBER

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**CHEMISTRY**

**6092/01**

Secondary 4 Express

**28 August 2024**

Setter: Ms Tiffany Lim

Vetter: Mrs Annie Ng

**1 hour**

Additional Materials: Multiple Choice Answer Sheet

**READ THESE INSTRUCTIONS FIRST**

Write in soft pencil.

Do not use staples, paper clips, glue or correction fluid.

Write your name, class and index number on the Question Paper and Answer Sheet in the spaces provided.

There are **forty** questions in this paper. Answer **all** questions. For each question, there are four possible answers, **A, B, C, D**.

Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

**Read the instructions on the Answer Sheet very carefully.**

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

Any rough working should be done in this booklet.

A copy of the Periodic Table is printed on page 2.

The use of an approved scientific calculator is expected, where appropriate.

For Examiner's Use	
Total	40
Parent's Signature	

## The Periodic Table of Elements

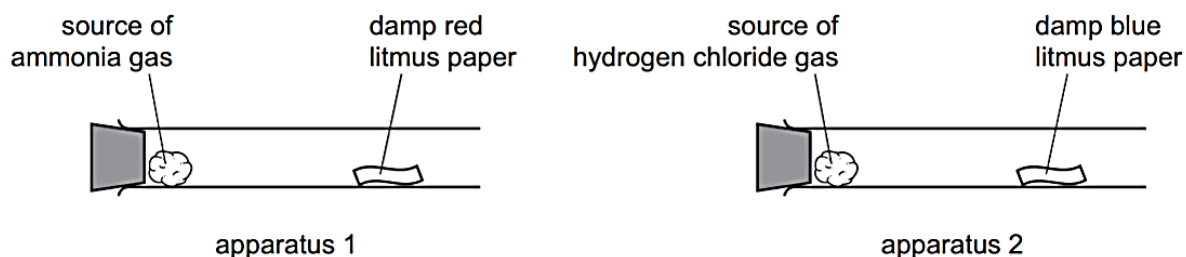
Group																	
1	2											13	14	15	16	17	18
<div>Key</div> <div>proton (atomic) number</div> <div>atomic symbol</div> <div>name</div> <div>relative atomic mass</div>							<div>1</div> <div>H</div> <div>hydrogen</div> <div>1</div>										<div>2</div> <div>He</div> <div>helium</div> <div>4</div>
<div>3</div> <div>Li</div> <div>lithium</div> <div>7</div>	<div>4</div> <div>Be</div> <div>beryllium</div> <div>9</div>											<div>5</div> <div>B</div> <div>boron</div> <div>11</div>	<div>6</div> <div>C</div> <div>carbon</div> <div>12</div>	<div>7</div> <div>N</div> <div>nitrogen</div> <div>14</div>	<div>8</div> <div>O</div> <div>oxygen</div> <div>16</div>	<div>9</div> <div>F</div> <div>fluorine</div> <div>19</div>	<div>10</div> <div>Ne</div> <div>neon</div> <div>20</div>
<div>11</div> <div>Na</div> <div>sodium</div> <div>23</div>	<div>12</div> <div>Mg</div> <div>magnesium</div> <div>24</div>	3	4	5	6	7	8	9	10	11	12	<div>13</div> <div>Al</div> <div>aluminium</div> <div>27</div>	<div>14</div> <div>Si</div> <div>silicon</div> <div>28</div>	<div>15</div> <div>P</div> <div>phosphorus</div> <div>31</div>	<div>16</div> <div>S</div> <div>sulfur</div> <div>32</div>	<div>17</div> <div>Cl</div> <div>chlorine</div> <div>35.5</div>	<div>18</div> <div>Ar</div> <div>argon</div> <div>40</div>
<div>19</div> <div>K</div> <div>potassium</div> <div>39</div>	<div>20</div> <div>Ca</div> <div>calcium</div> <div>40</div>	<div>21</div> <div>Sc</div> <div>scandium</div> <div>45</div>	<div>22</div> <div>Ti</div> <div>titanium</div> <div>48</div>	<div>23</div> <div>V</div> <div>vanadium</div> <div>51</div>	<div>24</div> <div>Cr</div> <div>chromium</div> <div>52</div>	<div>25</div> <div>Mn</div> <div>manganese</div> <div>55</div>	<div>26</div> <div>Fe</div> <div>iron</div> <div>56</div>	<div>27</div> <div>Co</div> <div>cobalt</div> <div>59</div>	<div>28</div> <div>Ni</div> <div>nickel</div> <div>59</div>	<div>29</div> <div>Cu</div> <div>copper</div> <div>64</div>	<div>30</div> <div>Zn</div> <div>zinc</div> <div>65</div>	<div>31</div> <div>Ga</div> <div>gallium</div> <div>70</div>	<div>32</div> <div>Ge</div> <div>germanium</div> <div>73</div>	<div>33</div> <div>As</div> <div>arsenic</div> <div>75</div>	<div>34</div> <div>Se</div> <div>selenium</div> <div>79</div>	<div>35</div> <div>Br</div> <div>bromine</div> <div>80</div>	<div>36</div> <div>Kr</div> <div>krypton</div> <div>84</div>
<div>37</div> <div>Rb</div> <div>rubidium</div> <div>85</div>	<div>38</div> <div>Sr</div> <div>strontium</div> <div>88</div>	<div>39</div> <div>Y</div> <div>yttrium</div> <div>89</div>	<div>40</div> <div>Zr</div> <div>zirconium</div> <div>91</div>	<div>41</div> <div>Nb</div> <div>niobium</div> <div>93</div>	<div>42</div> <div>Mo</div> <div>molybdenum</div> <div>96</div>	<div>43</div> <div>Tc</div> <div>technetium</div> <div>—</div>	<div>44</div> <div>Ru</div> <div>ruthenium</div> <div>101</div>	<div>45</div> <div>Rh</div> <div>rhodium</div> <div>103</div>	<div>46</div> <div>Pd</div> <div>palladium</div> <div>106</div>	<div>47</div> <div>Ag</div> <div>silver</div> <div>108</div>	<div>48</div> <div>Cd</div> <div>cadmium</div> <div>112</div>	<div>49</div> <div>In</div> <div>indium</div> <div>115</div>	<div>50</div> <div>Sn</div> <div>tin</div> <div>119</div>	<div>51</div> <div>Sb</div> <div>antimony</div> <div>122</div>	<div>52</div> <div>Te</div> <div>tellurium</div> <div>128</div>	<div>53</div> <div>I</div> <div>iodine</div> <div>127</div>	<div>54</div> <div>Xe</div> <div>xenon</div> <div>131</div>
<div>55</div> <div>Cs</div> <div>caesium</div> <div>133</div>	<div>56</div> <div>Ba</div> <div>barium</div> <div>137</div>	<div>57–71</div> <div>lanthanoids</div>	<div>72</div> <div>Hf</div> <div>hafnium</div> <div>178</div>	<div>73</div> <div>Ta</div> <div>tantalum</div> <div>181</div>	<div>74</div> <div>W</div> <div>tungsten</div> <div>184</div>	<div>75</div> <div>Re</div> <div>rhenium</div> <div>186</div>	<div>76</div> <div>Os</div> <div>osmium</div> <div>190</div>	<div>77</div> <div>Ir</div> <div>iridium</div> <div>192</div>	<div>78</div> <div>Pt</div> <div>platinum</div> <div>195</div>	<div>79</div> <div>Au</div> <div>gold</div> <div>197</div>	<div>80</div> <div>Hg</div> <div>mercury</div> <div>201</div>	<div>81</div> <div>Tl</div> <div>thallium</div> <div>204</div>	<div>82</div> <div>Pb</div> <div>lead</div> <div>207</div>	<div>83</div> <div>Bi</div> <div>bismuth</div> <div>209</div>	<div>84</div> <div>Po</div> <div>polonium</div> <div>—</div>	<div>85</div> <div>At</div> <div>astatine</div> <div>—</div>	<div>86</div> <div>Rn</div> <div>radon</div> <div>—</div>
<div>87</div> <div>Fr</div> <div>francium</div> <div>—</div>	<div>88</div> <div>Ra</div> <div>radium</div> <div>—</div>	<div>89–103</div> <div>actinoids</div>	<div>104</div> <div>Rf</div> <div>rutherfordium</div> <div>—</div>	<div>105</div> <div>Db</div> <div>dubnium</div> <div>—</div>	<div>106</div> <div>Sg</div> <div>seaborgium</div> <div>—</div>	<div>107</div> <div>Bh</div> <div>bohrium</div> <div>—</div>	<div>108</div> <div>Hs</div> <div>hassium</div> <div>—</div>	<div>109</div> <div>Mt</div> <div>meitnerium</div> <div>—</div>	<div>110</div> <div>Ds</div> <div>darmstadtium</div> <div>—</div>	<div>111</div> <div>Rg</div> <div>roentgenium</div> <div>—</div>	<div>112</div> <div>Cn</div> <div>copernicium</div> <div>—</div>	<div>113</div> <div>Nh</div> <div>nihonium</div> <div>—</div>	<div>114</div> <div>Fl</div> <div>flerovium</div> <div>—</div>	<div>115</div> <div>Mc</div> <div>moscovium</div> <div>—</div>	<div>116</div> <div>Lv</div> <div>livermorium</div> <div>—</div>	<div>117</div> <div>Ts</div> <div>tennessine</div> <div>—</div>	<div>118</div> <div>Og</div> <div>oganesson</div> <div>—</div>

lanthanoids	<div>57</div> <div>La</div> <div>lanthanum</div> <div>139</div>	<div>58</div> <div>Ce</div> <div>cerium</div> <div>140</div>	<div>59</div> <div>Pr</div> <div>praseodymium</div> <div>141</div>	<div>60</div> <div>Nd</div> <div>neodymium</div> <div>144</div>	<div>61</div> <div>Pm</div> <div>promethium</div> <div>–</div>	<div>62</div> <div>Sm</div> <div>samarium</div> <div>150</div>	<div>63</div> <div>Eu</div> <div>europium</div> <div>152</div>	<div>64</div> <div>Gd</div> <div>gadolinium</div> <div>157</div>	<div>65</div> <div>Tb</div> <div>terbium</div> <div>159</div>	<div>66</div> <div>Dy</div> <div>dysprosium</div> <div>163</div>	<div>67</div> <div>Ho</div> <div>holmium</div> <div>165</div>	<div>68</div> <div>Er</div> <div>erbium</div> <div>167</div>	<div>69</div> <div>Tm</div> <div>thulium</div> <div>169</div>	<div>70</div> <div>Yb</div> <div>ytterbium</div> <div>173</div>	<div>71</div> <div>Lu</div> <div>lutetium</div> <div>175</div>
actinoids	<div>89</div> <div>Ac</div> <div>actinium</div> <div>–</div>	<div>90</div> <div>Th</div> <div>thorium</div> <div>232</div>	<div>91</div> <div>Pa</div> <div>protactinium</div> <div>231</div>	<div>92</div> <div>U</div> <div>uranium</div> <div>238</div>	<div>93</div> <div>Np</div> <div>neptunium</div> <div>–</div>	<div>94</div> <div>Pu</div> <div>plutonium</div> <div>–</div>	<div>95</div> <div>Am</div> <div>americium</div> <div>–</div>	<div>96</div> <div>Cm</div> <div>curium</div> <div>–</div>	<div>97</div> <div>Bk</div> <div>berkelium</div> <div>–</div>	<div>98</div> <div>Cf</div> <div>californium</div> <div>–</div>	<div>99</div> <div>Es</div> <div>einsteinium</div> <div>–</div>	<div>100</div> <div>Fm</div> <div>fermium</div> <div>–</div>	<div>101</div> <div>Md</div> <div>mendelevium</div> <div>–</div>	<div>102</div> <div>No</div> <div>nobelium</div> <div>–</div>	<div>103</div> <div>Lr</div> <div>lawrencium</div> <div>–</div>

The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.).

The Avogadro constant,  $L = 6.02 \times 10^{23} \text{ mol}^{-1}$

- 1 A student investigated the diffusion of ammonia gas,  $\text{NH}_3$ , and hydrogen chloride gas,  $\text{HCl}$ . Two sets of apparatus were set up as shown below at room temperature and pressure.

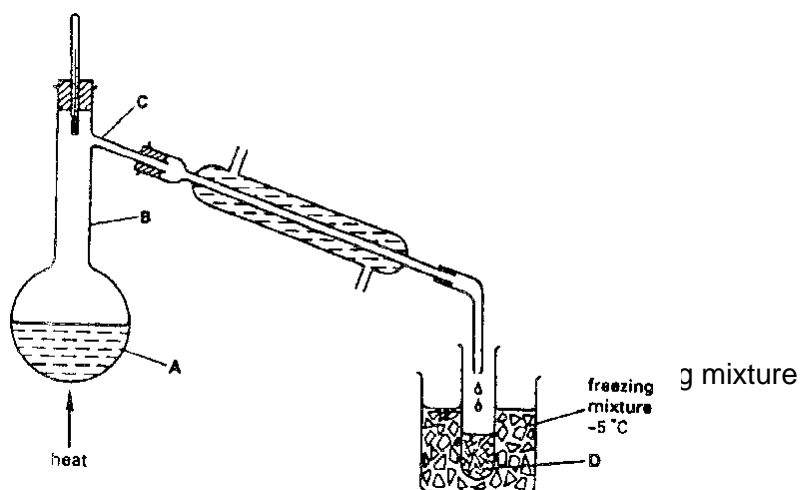


The damp red litmus paper in apparatus 1 changed colour after 30 seconds.

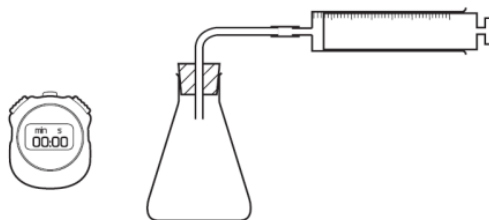
How long does it take for the damp blue litmus paper to change colour in apparatus 2?

- A about 21 seconds  
 B about 30 seconds  
 C about 64 seconds  
 D The blue litmus paper would not change colour.
- 2 Substance X, melts at  $10^\circ\text{C}$  and boils at  $50^\circ\text{C}$ . It can be purified by distillation as shown in the diagram.

At which point will the particles of X be most regularly arranged?



- 3 A student wishes to follow the rate of a chemical reaction using the apparatus shown below.



Which of the following reactions allows a student to do so?

- A  $\text{AgNO}_3 + \text{KI}$
- B  $\text{CuSO}_4 + \text{NaOH}$
- C  $\text{HCl} + \text{Mg}$
- D  $\text{HCl} + \text{NaOH}$
- 4 Three separation methods are listed below.
- 1 obtaining water from sodium chloride solution
  - 2 obtaining solid iodine from a mixture of solid iodine and nickel
  - 3 obtaining solid sodium chloride from aqueous sodium chloride

Which techniques would be involved in these separations?

	1	2	3
A	distillation	sublimation	evaporation
B	distillation	sublimation	filtration
C	filtration	crystallisation	evaporation
D	sublimation	crystallisation	filtration

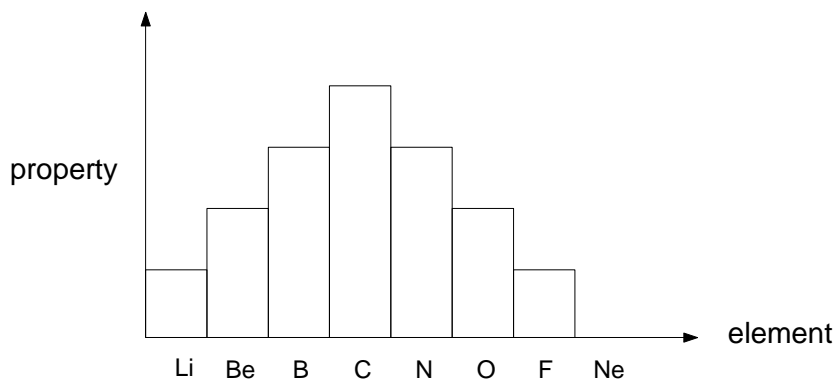
- 5 Three particles and their nuclide notations are shown.

particle	1	2	3
nuclide notation	${}^{40}_{19}\text{X}^{+}$	${}^{39}_{19}\text{Y}$	${}^{34}_{16}\text{Z}^{2-}$

Which of the following statements is correct about the particles?

- A Particle 1 has more electrons than particle 3.
- B Particle 1 and 2 have the same number of neutrons.
- C Particle 1 and 3 have the same number of electrons.
- D Particle 2 has fewer neutrons than particle 3.

- 6 The bar chart shows the period of elements from lithium to neon.



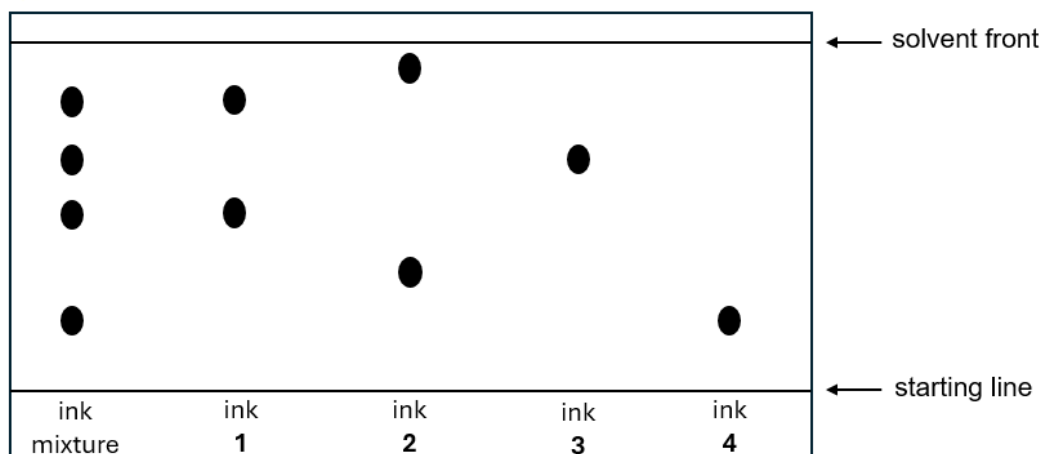
Which property of the elements is shown on the chart?

- A** number of electron shells
- B** number of electrons used in bonding
- C** proton number
- D** relative atomic mass
- 7 Three elements W, X, Y, and Z have consecutive, increasing proton (atomic) numbers. Element Y exists as a colourless, monatomic gas at room temperature. Which will be the chemical formula of a compound formed between W and chlorine?
- A**  $WCl$
- B**  $W_2Cl$
- C**  $WCl_2$
- D**  $W_2Cl_3$
- 8 The mixtures shown in the table are warmed. In which mixture does a gas form?

Key: ✓ = gas forms, ✗ = no gas forms

	NaOH(aq) and $NH_4Cl(s)$	NaOH(aq) and Mg(s)	$H_2SO_4(aq)$ and NaCl(s)
<b>A</b>	✓	✓	✗
<b>B</b>	✓	✗	✓
<b>C</b>	✓	✗	✗
<b>D</b>	✗	✗	✓

- 9 A paper chromatography experiment was carried out to determine the inks present in a mixture, and the results shown below were obtained.



Which statement about the results is **incorrect**?

- A Ink 4 is more soluble than ink 3 in the solvent used.
- B Inks 1 and 2 contained more than one colour pigment.
- C The ink mixture contained inks 1, 3 and 4.
- D The  $R_f$  value of ink 3 in the solvent used is more than 0.5.
- 10 An aqueous solution containing two salts is found.

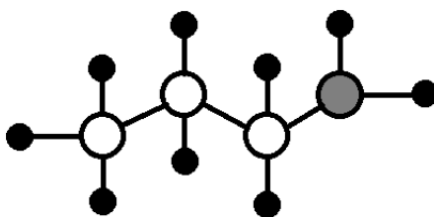
A series of tests is carried out to identify the ions present. The results are shown.

no	description	observations
1	Add dilute nitric acid followed by aqueous barium nitrate.	No effervescence and white precipitate is observed.
2a	Add aqueous sodium hydroxide followed by warming.	White precipitate is formed and dissolves in excess sodium hydroxide to form a colourless solution. No effervescence is observed.
2b	Add aluminium foil followed by warming.	Effervescence is observed and gas turns moist red litmus paper blue.
3	Add aqueous ammonia.	White precipitate is formed. The mass of the white precipitate decreases by half when excess ammonia is added.

Which of the following salts are present in the aqueous solution?

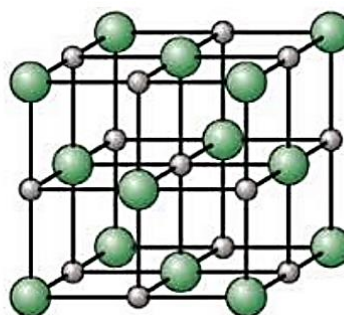
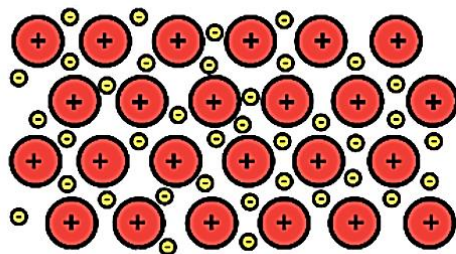
- A zinc sulfate and aluminium nitrate
- B zinc sulfate and calcium nitrate
- C ammonium chloride and aluminium sulfate
- D calcium chloride and ammonium sulfate

- 11 The structure of a molecule of a compound containing carbon, nitrogen and hydrogen is shown below.



What is the molecular formula of this compound?

- A  $\text{CN}_3\text{H}_7$       B  $\text{CN}_3\text{H}_9$       C  $\text{C}_3\text{H}_7\text{N}$       D  $\text{C}_3\text{H}_9\text{N}$
- 12 The structures of two materials are shown below.



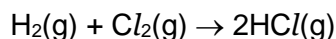
Which statement is correct?

- A Both substances are hard and rigid.
- B Both substances are pure compounds.
- C Both substances can conduct electricity in the solid state.
- D Both substances contain particles held together by strong electrostatic forces of attraction.
- 13 On adding 50 g of impure limestone,  $\text{CaCO}_3$  ( $M_r = 100$ ), to excess hydrochloric acid,  $6.0 \text{ dm}^3$  of  $\text{CO}_2$  was evolved at room temperature and pressure.

What is the percentage purity of the limestone?

- A 25%      B 50%      C 75%      D 100%

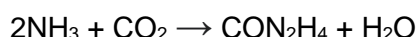
- 14 Hydrogen gas reacts with chlorine gas to form hydrogen chloride gas.



What is the final volume of the gas mixture when 20 dm<sup>3</sup> of hydrogen is reacted with 30 dm<sup>3</sup> of chlorine gas at 100 °C?

- A 40 dm<sup>3</sup>                      B 50 dm<sup>3</sup>                      C 60 dm<sup>3</sup>                      D 70 dm<sup>3</sup>

- 15 Ammonia and excess carbon dioxide can react to form urea and water in a reaction.



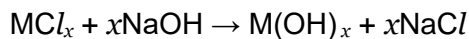
The percentage yield of this reaction is 80 %.

What is the mass of ammonia required for this reaction to obtain 60.0 g of urea?

[*M<sub>r</sub>*: NH<sub>3</sub>, 17; CO<sub>2</sub>, 44; CON<sub>2</sub>H<sub>4</sub>, 60; H<sub>2</sub>O, 18]

- A 10.6 g                      B 27.2 g                      C 34.0 g                      D 42.5 g

- 16 Aqueous sodium hydroxide reacts with the solution of a certain metal chloride MCl<sub>*x*</sub>, to form a precipitate of the metal hydroxide according to the following equation.



10.0 cm<sup>3</sup> of 3.0 mol/dm<sup>3</sup> sodium hydroxide solution reacts exactly with 10.0 cm<sup>3</sup> of 1.5 mol/dm<sup>3</sup> MCl<sub>*x*</sub> solution.

What is the formula of the metal chloride?

- A MCl                      B MCl<sub>2</sub>                      C MCl<sub>3</sub>                      D MCl<sub>4</sub>

- 17 In which equation does the metal oxide act as an acidic oxide?

- A  $\text{K}_2\text{O} (\text{s}) + \text{H}_2\text{O} (\text{l}) \rightarrow 2\text{KOH} (\text{aq})$   
 B  $\text{Fe}_2\text{O}_3 (\text{g}) + 3\text{CO} (\text{g}) \rightarrow 2\text{Fe} (\text{s}) + 3\text{CO}_2 (\text{g})$   
 C  $\text{Al}_2\text{O}_3 (\text{s}) + 6\text{HCl} (\text{aq}) \rightarrow 2\text{AlCl}_3 (\text{aq}) + 3\text{H}_2\text{O} (\text{l})$   
 D  $\text{PbO} (\text{s}) + \text{H}_2\text{O} (\text{l}) + \text{OH}^- (\text{aq}) \rightarrow \text{Pb}(\text{OH})_3^- (\text{aq})$



- 18 The table below shows the range of colours of an indicator at different pH values.

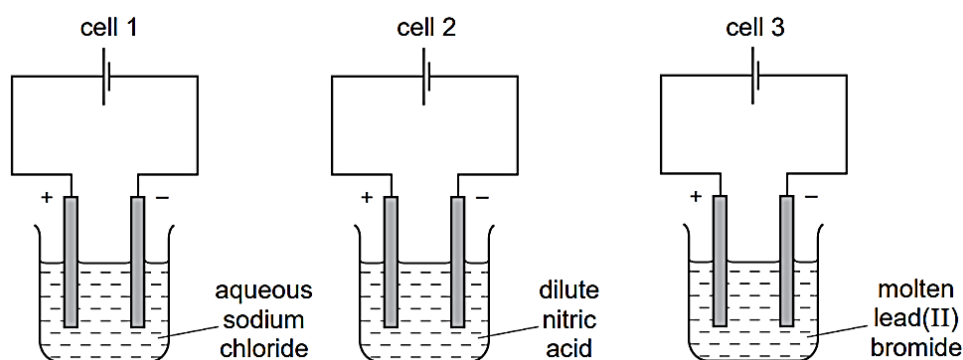
pH	colour
0 – 2.5	red
2.6 – 5.0	yellow
5.1 – 7.0	orange
7.1 – 14.0	green

Which pair of substances can be distinguished using the indicator above?

- A aqueous ammonia and aqueous potassium hydroxide  
 B dilute hydrochloric acid and dilute sulfuric acid  
 C dilute hydrochloric acid and water  
 D water and aqueous potassium chloride
- 19 During an electrolysis experiment, the same amount of charge deposited 32.5 g of zinc and 10.2 g of vanadium.

What was the charge on the vanadium ion?

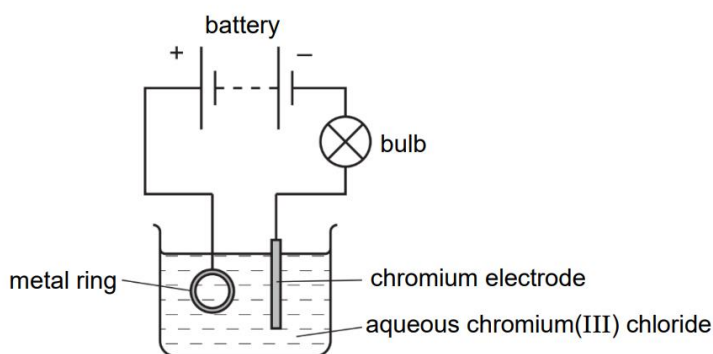
- A 2+                      B 3+                      C 4+                      D 5+
- 20 Three electrolysis cells are set up. Each cell has platinum electrodes.



In which of these cells is a gas formed at both electrodes?

- A 1 and 2                      B 1 and 3                      C 2 only                      D 3 only

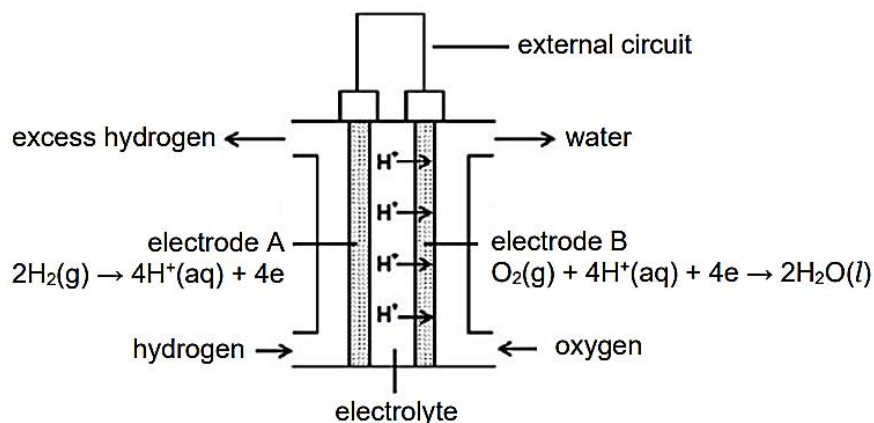
- 21 The diagram shows the apparatus used in an attempt to electroplate a metal ring with chromium.



The experiment did not work.

Which change is needed in the experiment to make it work?

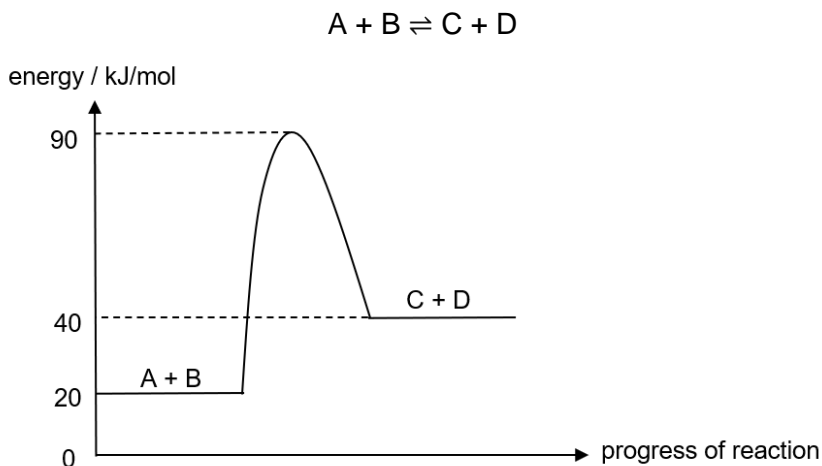
- A** add solid chromium(III) chloride to the electrolyte
- B** increase size of the chromium electrode
- C** increase the temperature of the electrolyte
- D** switch the ring and the chromium electrode
- 22 The hydrogen-oxygen fuel cell generates electricity under a continuous supply of hydrogen gas and oxygen gas, as shown in the diagram.



Which of the following correctly shows the direction of electron flow and a suitable electrolyte which can be used in the fuel cell?

	direction of electron flow	electrolyte
<b>A</b>	from electrode A to B	aqueous sodium hydroxide
<b>B</b>	from electrode B to A	aqueous sodium hydroxide
<b>C</b>	from electrode A to B	dilute sulfuric acid
<b>D</b>	from electrode B to A	dilute sulfuric acid

- 23 The energy profile diagram of a reversible reaction is shown below.



What is the value of the activation energy for the backward reaction?

- A** 20 kJ/mol      **B** 50 kJ/mol      **C** 70 kJ/mol      **D** 90 kJ/mol
- 24 In which equation is the sign of enthalpy,  $\Delta H$ , correctly shown?

	equation	$\Delta H$
<b>A</b>	$2\text{AgCl(s)} \rightarrow 2\text{Ag(s)} + \text{Cl}_2\text{(g)}$	positive
<b>B</b>	$\text{CH}_4\text{(g)} + 2\text{O}_2\text{(g)} \rightarrow \text{CO}_2\text{(g)} + 2\text{H}_2\text{O(g)}$	positive
<b>C</b>	$\text{H}_2\text{(g)} \rightarrow 2\text{H(g)}$	negative
<b>D</b>	$\text{H}_2\text{O(s)} \rightarrow \text{H}_2\text{O(l)}$	negative

- 25 Which equations below represent redox reactions?

- 1  $\text{H}^+ + \text{OH}^- \rightarrow \text{H}_2\text{O}$
- 2  $\text{MnO}_4^- + 8\text{H}^+ + 5\text{e}^- \rightarrow \text{Mn}^{2+} + 4\text{H}_2\text{O}$
- 3  $\text{Cl}_2 + 2\text{Br}^- \rightarrow \text{Br}_2 + 2\text{Cl}^-$

- A** 1 only  
**B** 3 only  
**C** 1 and 2 only  
**D** 2 and 3 only

- 26** Small portions of aqueous potassium iodide and acidified aqueous potassium manganate(VII) were added to four different solutions.

The colour changes seen are shown in the table.

solution number	aqueous potassium iodide	acidified potassium manganate(VII)
1	colourless to brown	purple to colourless
2	colourless to brown	no change observed
3	no change observed	purple to colourless
4	no change observed	no change observed

Which solution(s) contained an oxidising agent?

- A** 2 only                      **B** 1 and 2                      **C** 1 and 3                      **D** 3 and 4
- 27** Antacid tablets neutralise acids. A student investigated the time taken for an antacid tablet to react completely with excess hydrochloric acid under different conditions. The table below shows the results.

experiment number	volume of acid / cm <sup>3</sup>	concentration of acid / mol dm <sup>-3</sup>	temperature of acid / °C	reaction time / s
1	50	1.00	25.0	132
2	50	2.00	25.0	65
3	100	2.00	25.0	65
4	50	2.00	35.0	33

What does the experiment show?

- A** Increasing the concentration of acid will increase the rate of reaction.
- B** Increasing the temperature of the reaction does not affect the rate of reaction.
- C** Increasing the volume of acid will decrease the rate of reaction.
- D** The addition of a catalyst will increase the rate of reaction.
- 28** A student has five reagents.
- dilute hydrochloric acid
  - dilute sulfuric acid
  - dilute nitric acid
  - solid calcium carbonate
  - solid copper(II) carbonate

How many soluble salts can be prepared?

- A** 3                      **B** 4                      **C** 5                      **D** 6

- 29 The table below gives some information about four metals P, Q, R and S.

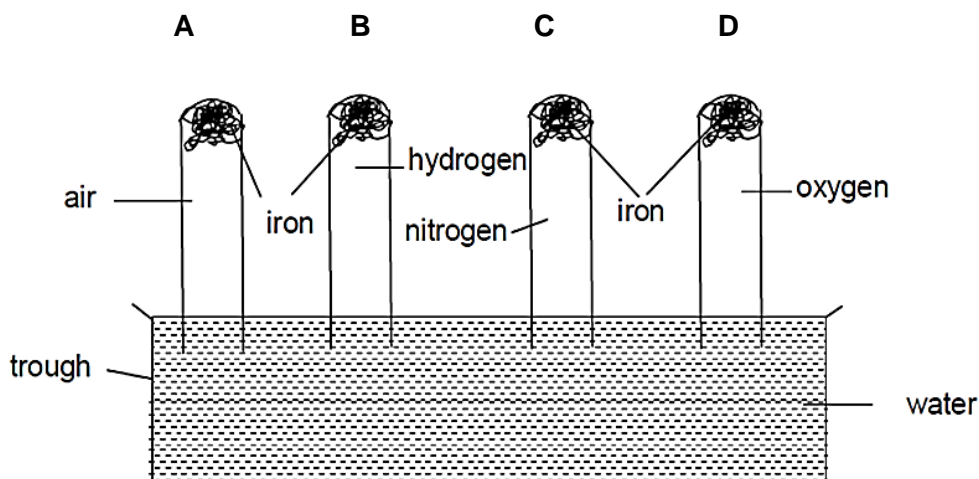
metal	reaction with cold water	reaction with acids	action of heat on carbonate of metal
P	reacts vigorously	reacts vigorously	decomposes to metal oxide
Q	no reaction	reacts moderately	decomposes to metal oxide
R	reacts vigorously	reacts vigorously	no visible reaction
S	no reaction	no reaction	decomposes to metal

What is the order of reactivity of the four metals?

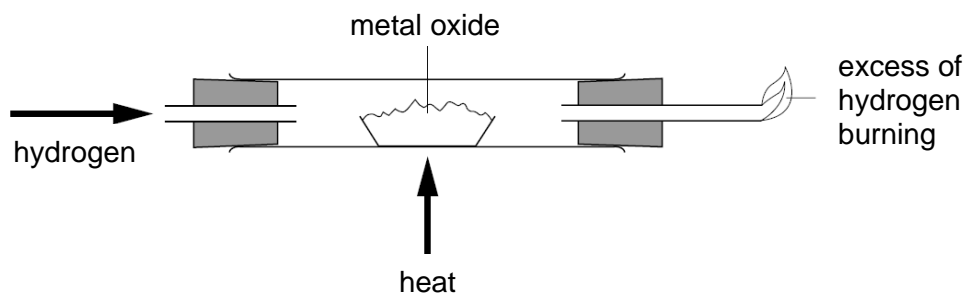
	<div> <div>most reactive</div> <div>→</div> <div>least reactive</div> </div>			
<b>A</b>	P	R	Q	S
<b>B</b>	R	P	Q	S
<b>C</b>	R	Q	P	S
<b>D</b>	S	Q	P	R

- 30 An experiment was set up as shown in the diagram below.

Which tube will have the highest water level after one month?



- 31 The experimental set-up below shows the reduction of a metal oxide by hydrogen.



Which of the following oxides cannot be reduced by the method shown above?

- A AgO                      B FeO                      C PbO                      D ZnO
- 32 Elements X, Y and Z are in the same period of the Periodic Table.

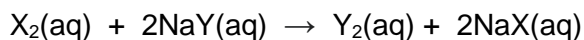
Gaseous X exists as diatomic molecules.

Oxides of Y react with both acid and alkali.

Oxides of Z dissolve in water to form solution with  $\text{pH} > 7$ .

In which order do the elements appear in the Periodic Table?

- A  $X \rightarrow Y \rightarrow Z$
- B  $Y \rightarrow X \rightarrow Z$
- C  $Z \rightarrow X \rightarrow Y$
- D  $Z \rightarrow Y \rightarrow X$
- 33 In the equation shown, X and Y represent elements in Group 17 of the Periodic Table.



	X	Y
1	iodine	chlorine
2	bromine	iodine
3	chlorine	bromine
4	bromine	chlorine

Which pair of elements could be X and Y?

- A 1 and 3                      B 1 and 4                      C 2 and 3                      D 2 and 4

- 34 How many of the following processes will lead to an increase in greenhouse gas emissions?

decomposition of vegetation	fermentation of glucose	photosynthesis
polymerisation	respiration	neutralisation

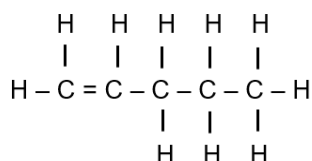
- A 1                      B 2                      C 3                      D 4

- 35 Which of the following statements about a homologous series is correct?

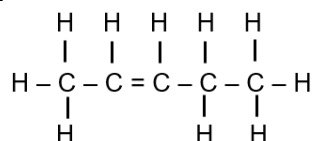
- A The melting and boiling point increases with increasing relative molecular mass.  
 B The members have similar physical properties.  
 C The members have the same molecular formula.  
 D The relative molecular masses of consecutive members differ by 12.

- 36 How many different isomers of  $C_5H_{10}$  are shown below?

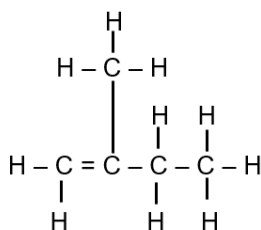
structure 1



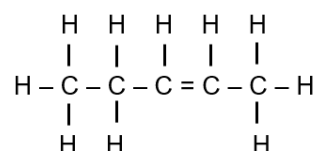
structure 2



structure 3



structure 4



- A 0                      B 2                      C 3                      D 4

- 37 When crude oil is fractionally distilled, which list best describes the mixture of compounds collected at the bottom of the fractionating column?

- A Short chain molecules, low viscosity, high flammability  
 B Short chain molecules, low boiling point, low flammability  
 C Long chain molecules, high flammability, high boiling point  
 D Long chain molecules, high viscosity, high boiling point

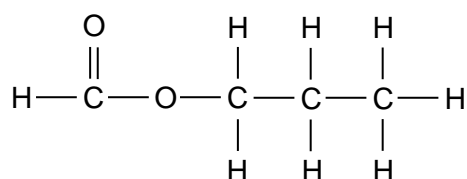
38 The following chemicals are available in the laboratory.

- 1 aqueous bromine
- 2 Universal Indicator solution
- 3 magnesium powder
- 4 sodium carbonate

Which of these chemicals can be used to distinguish between propene and propanoic acid?

- A** All of them      **B** 1 only      **C** 1 and 4 only      **D** 1, 2 and 3 only

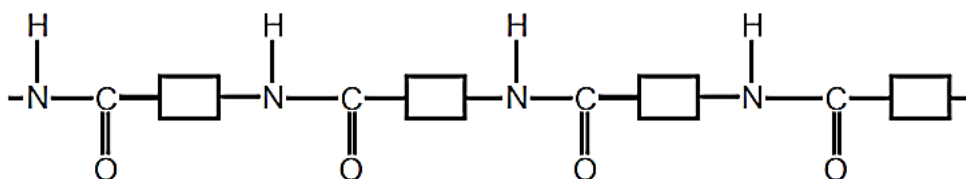
39 The structure of a compound associated with the smell of raspberries is shown below.



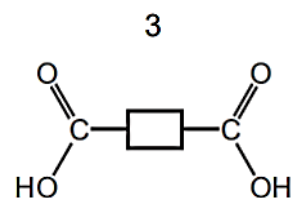
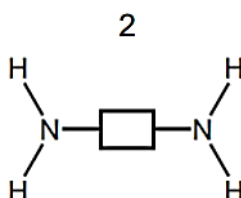
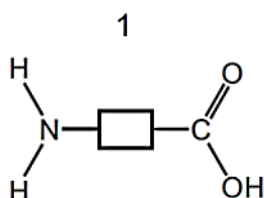
Which reactants are suitable for synthesising the above compound in the laboratory?

- A** butanol and methanoic acid  
**B** methanol and butanoic acid  
**C** methanol and propanoic acid  
**D** propanol and methanoic acid

40 The partial structure of a polymer is shown below.



Which monomers would form the above polymer?



- A** 1 only      **B** 1 and 2 only      **C** 2 and 3 only      **D** 1, 2 and 3

**End of Paper**