

EXAMINATIONS COUNCIL OF ZAMBIA

Examination for School Certificate Ordinary Level

Chemistry

5070/1

Paper 1 Multiple Choice

Thursday

9 NOVEMBER 2017

Additional Materials:

Electronic calculator (non programmable) and/or Mathematical tables
Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

Time 1 hour

Instructions to Candidates

Do not open this question paper until you are told to do so.

Look at the left hand side of your answer sheet. Ensure that your **name**, the **school/centre name** and **subject paper** are **printed**. Also ensure that the **subject code**, **paper number**, **centre code**, your **examination number** and the year are printed and shaded. Do not change the already printed information.

There are **forty** questions in this paper. Answer all questions. For each question there are four possible answers, **A, B, C** and **D**. Choose the one you consider correct and record your choice in **soft pencil** on the separate answer sheet provided.

Read very carefully the instructions on the Answer Sheet.

Information for Candidates

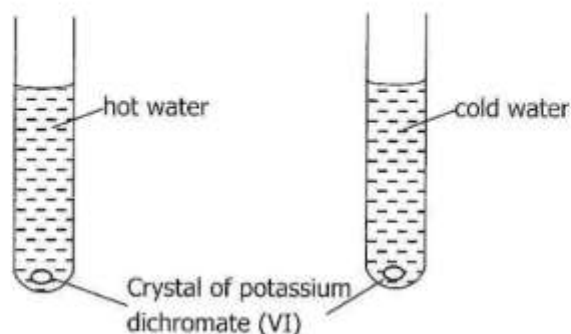
Each correct answer will score one mark.

Any rough working should be done in this question paper.

The **Periodic Table** is printed on page 13.

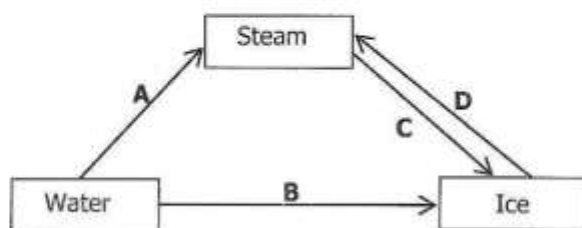
Cell phones are not allowed in the examination room.

- 1 A crystal of orange potassium dichromate VI was added to each of the test tubes in the diagram.

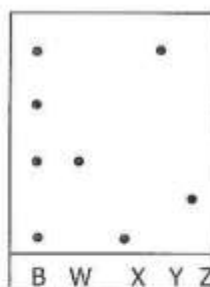


One test tube contained hot water and the other test tube contained cold water. In both test tubes, the orange colour of potassium dichromate VI spreads out. Which result and explanation are correct? The colour spreads faster in ...

- A cold water because particles move faster at a higher temperature.
 B cold water because particles move slower at a higher temperature.
 C hot water because particles move faster at a higher temperature.
 D hot water because particles move slower at a higher temperature.
- 2 Which change **A**, **B**, **C** or **D** can involve both condensation and freezing?



- 3 The diagram shows the results of the chromatography using the blue ink B, and several dyes W, X, Y and Z.



Which of the dyes, W, X, Y and Z were in the blue ink?

- A W and X
 B W, X and Y
 C W, Y and Z
 D X, Y and Z

- 4 Which method is most suitable for separating a mixture of sodium chloride and ammonium chloride?

A Chromatography
 B Distillation
 C Filtration
 D Sublimation

- 5 The table below shows the atomic composition of four particles.

Particle	Neutrons	Electrons
P ²⁻	9	10
Q ³⁻	9	10
R	10	8
S	10	9

Which two particles are isotopes?

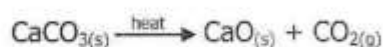
- A P and Q
 B P and R
 C Q and S
 D R and S
- 6 An element Y consists of 60.10% atoms with a mass of 63.93 and 39.9 % of atoms with a mass of 70.92. Find the relative atomic mass of the element.

A 55.7
 B 66.7
 C 77.7
 D 88.7

- 7 In which option do the three particles each have the same number of electrons?

A F⁻, Ne, Na⁺
 B Li⁺, Na⁺, K⁺
 C Cl⁻, Br⁻, I⁻
 D K⁺, Ar, Br⁻

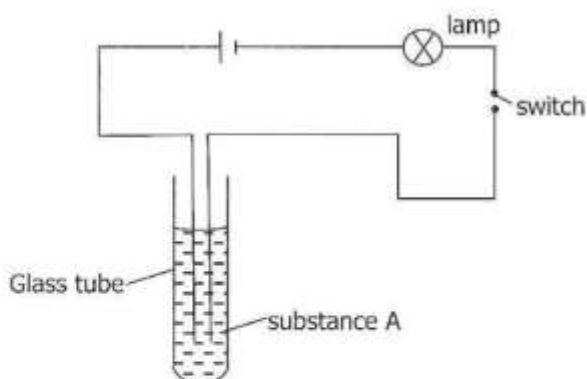
- 8 50.0 g calcium carbonate was decomposed by heating in open air as shown by the equation;



What was the loss in mass when the reaction was completed?

A 2.2 g
 B 11.36 g
 C 22.0 g
 D 113.6 g

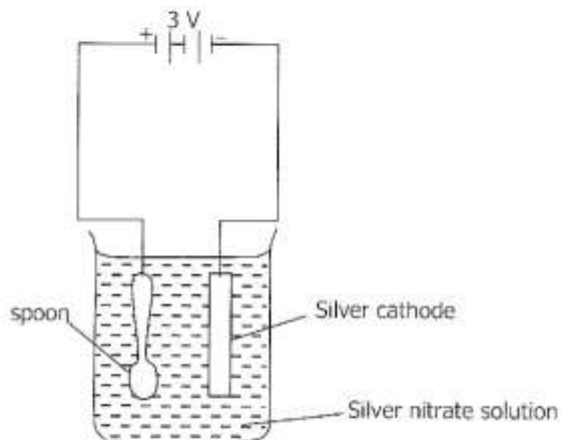
- 9 In athletics, banned drugs such as nandrolone have been taken illegally to improve performance. Nandrolone has the molecular formula, $C_{18}H_{26}O_2$. What is the relative molecular mass M_r of nandrolone?
- A 306
B 274
C 150
D 46
- 10 What volume of 0.5 mol/dm^3 sodium carbonate, Na_2CO_3 solution contains 2.0 g of the solute?
- A 37.7 cm^3
B 39.7 cm^3
C 337.7 cm^3
D 377.7 cm^3
- 11 18 g of water contains the same number of molecules as ...
- A 2 g of hydrogen gas.
B 14 g of nitrogen gas.
C 16 g of oxygen gas.
D 18 g of ammonia gas.
- 12 6.0 g of aluminium metal reacts with excess dilute hydrochloric acid as shown.
- $$2\text{Al}_{(\text{s})} + 6\text{HCl}_{(\text{aq})} \rightarrow 2\text{AlCl}_{3(\text{aq})} + 3\text{H}_{2(\text{g})}$$
- What volume of hydrogen gas is produced at r.t.p?
- A 5.28 dm^3
B 8.00 dm^3
C 48 dm^3
D 72 dm^3
- 13 The diagram shows a circuit. When the switch was closed, the lamp produced light.



Which of the following is substance A?

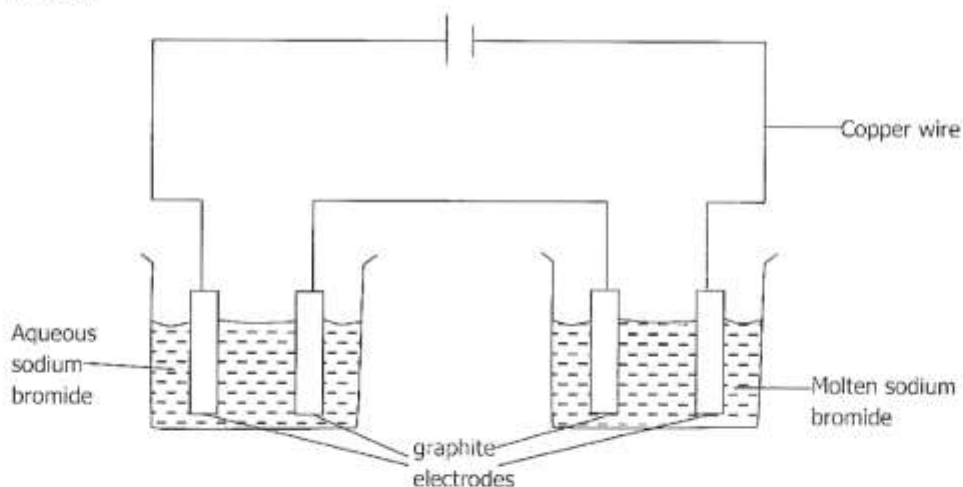
- A Aqueous ethanol
- B Distilled water
- C Molten sugar
- D Potassium nitrate solution

14 The diagram shows a failed attempt to silver-plate a spoon.



Which action will plate the spoon with silver?

- A Using concentrated silver nitrate solution
 - B Heating the silver nitrate solution
 - C Making the spoon the cathode and the silver the anode.
 - D Increasing the voltage from 3 V to 6 V
- 15 The diagram shows the electrolysis of aqueous sodium bromide and molten sodium bromide.



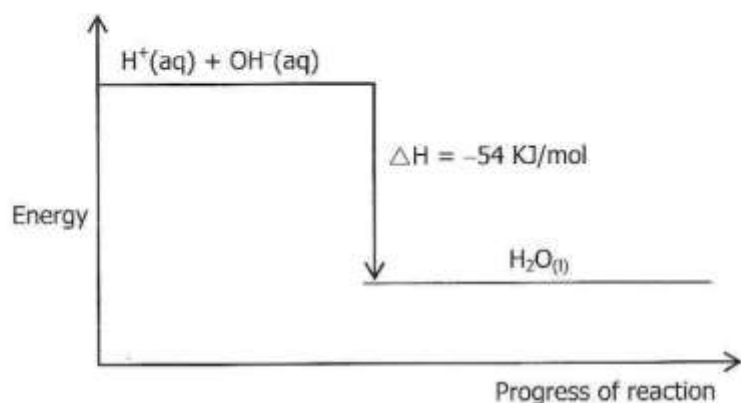
Which substance in the diagram has both positive ions and mobile electrons?

- A Aqueous Sodium bromide
- B Copper Wire
- C Graphite electrodes
- D Molten sodium bromide

- 16** A substance P, conducts electricity both when solid and molten. What could substance P be?
- A** A salt
 - B** A metal oxide
 - C** A hydrocarbon
 - D** An alloy
- 17** Some reactions are exothermic. How does the temperature and energy change in an exothermic reaction?

	Temperature of the environment	Energy Change
A	Decreases	Energy taken in
B	Decreases	Energy given out
C	Increases	Energy taken in
D	Increases	Energy given out

- 18** The energy diagram for the reaction between aqueous sodium hydroxide and dilute hydrochloric acid is shown below.



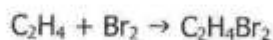
What can be deduced from the diagram? The ...

- A** energy change when one mole of water is formed from its elements is 54 kJ/mol.
- B** OH^- ions have more energy than the H^+ ions.
- C** products contain less energy than the reactants.
- D** reaction is endothermic.

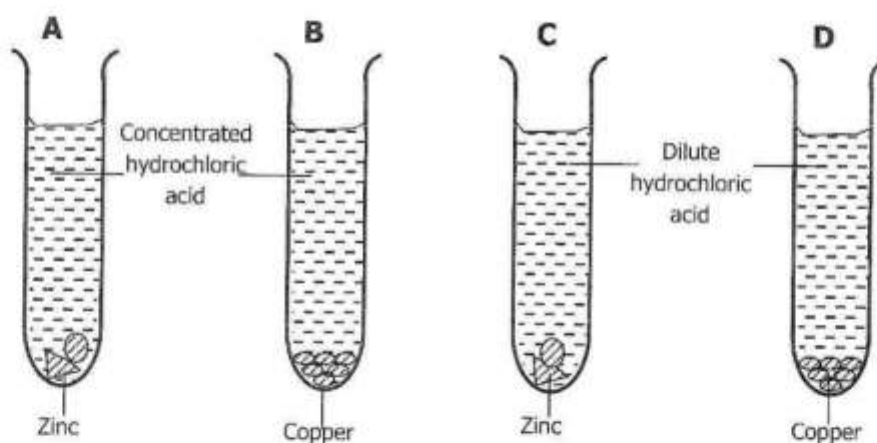
- 19 Study the bond enthalpy change in KJ/mol in the table below.

Bond	C – H	C – Br	C≡C	C – C	Br – Br
Bond energy KJ/mol	416	322	610	346	193

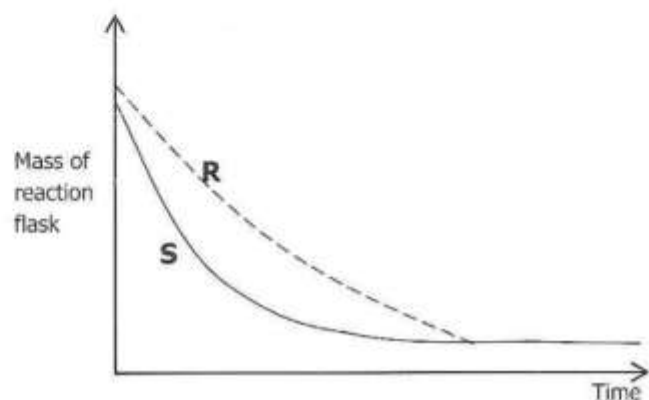
What is the enthalpy change for the reaction below?



- A +187 KJ/mol
 B -187 KJ/mol
 C +2 467 KJ/mol
 D -2 654 KJ/mol
- 20 Which equation represents a redox reaction?
- A $\text{CuCO}_3 \rightarrow \text{CuO} + \text{CO}_2$
 B $\text{CuO} + \text{H}_2\text{SO}_4 \rightarrow \text{CuSO}_4 + \text{H}_2\text{O}$
 C $4\text{CuO} + \text{CH}_4 \rightarrow 4\text{Cu} + 2\text{H}_2\text{O} + \text{CO}_2$
 D $\text{CuSO}_4 + 2\text{NaOH} \rightarrow \text{Cu}(\text{OH})_2 + \text{Na}_2\text{SO}_4$
- 21 The diagram shows an experiment to compare the rate of reaction when a metal is added to hydrochloric acid. In which test tube is the reaction fastest?

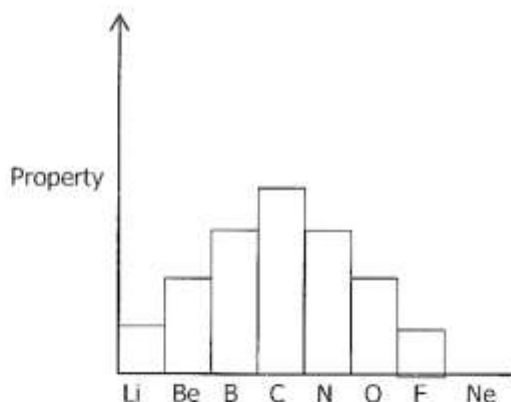


- 22 A group of learners investigate the rate of reaction between calcium carbonate and hydrochloric acid. The mass of the reaction flask is measured. The graph shows the results of two experiments R and S.



- Which change **does not** explain the difference between R and S?
- A A catalyst is added in S.
 - B A higher temperature is used in S.
 - C Hydrochloric acid is more dilute in R.
 - D Hydrochloric acid is more concentrated in R.
- 23 Which compound is **not** formed by the precipitation method?
- A NH_4Cl
 - B PbSO_4
 - C BaSO_4
 - D AgCl
- 24 An ammonium salt was added to excess hot aqueous sodium hydroxide. Ammonia gas was evolved. When no more ammonia was evolved, aluminium was added to the remaining solution and more ammonia was given off. What was the ammonium salt?
- A $(\text{NH}_4)_2\text{SO}_4$
 - B $(\text{NH}_4)_2\text{CO}_3$
 - C $(\text{NH}_4)_3\text{PO}_4$
 - D NH_4NO_3
- 25 An acid can best be defined as a substance which ...
- A liberates both OH^- and H^+ ions when dissolved in water.
 - B does not liberate OH^- and H^+ ions when dissolved in water.
 - C dissolves in water to liberate OH^- ions as the only negatively charged ions.
 - D dissolves in water to liberate H^+ ions as the only positively charged ions.

- 26 Which is the best pair of substances that can be used to prepare copper II sulphate, CuSO_4 ?
- A Cu and H_2SO_4
- B CuO and H_2SO_3
- C Cu(OH)_2 and H_2SO_3
- D CuCO_3 and H_2SO_4
- 27 The bar chart shows the Period of elements from Lithium to Neon.

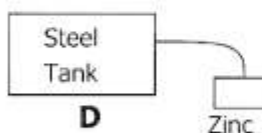
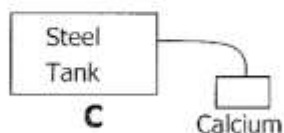
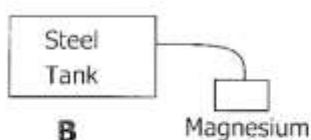
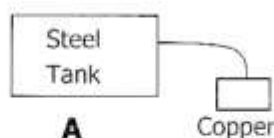


Which property of these elements is shown on the chart?

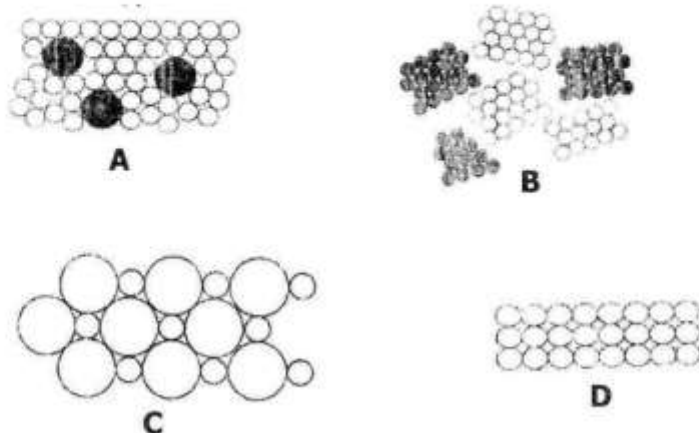
- A The number of electrons used in bonding.
- B The number of orbits holding electrons.
- C The proton (atomic) number.
- D The relative atomic mass.
- 28 The electronic configuration of an ion is 2, 8. What could this ion be?

	F^-	Mg^{2+}
A	X	✓
B	✓	✓
C	✓	X
D	X	X

- 29 Sacrificial protection can be used to prevent an underground steel tank from rusting. Which tank below will rust?



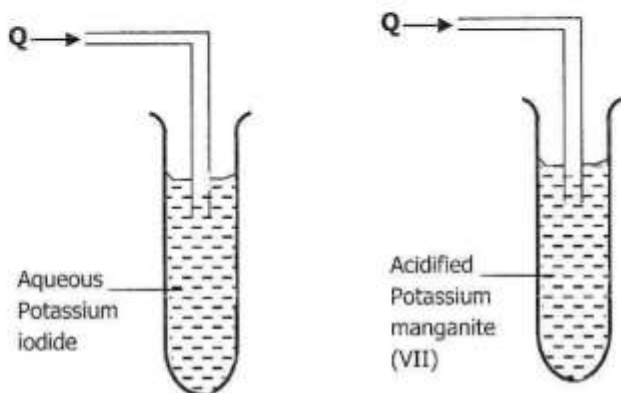
30 Which diagram represents an alloy?



31 What is the function of cryolite in the extraction of aluminium? It ...

- A acts as a solvent to aluminium oxide.
- B lowers the melting point of aluminium oxide.
- C increases the melting point of aluminium oxide.
- D acts as a reducing agent for aluminium.

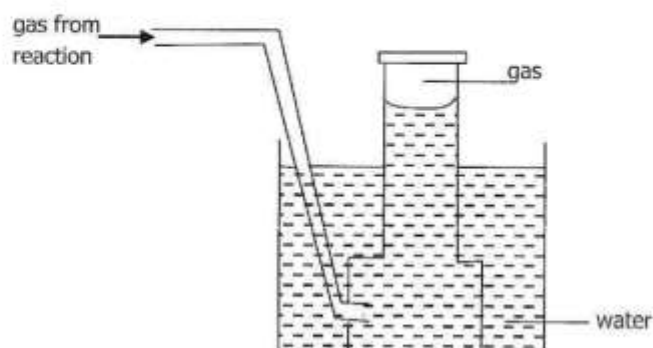
32 Gaseous compound Q is a reducing agent. Q is bubbled through separate solutions of aqueous potassium iodide and acidified potassium manganate VII.



Which row shows the colour changes when Q is bubbled through two solutions?

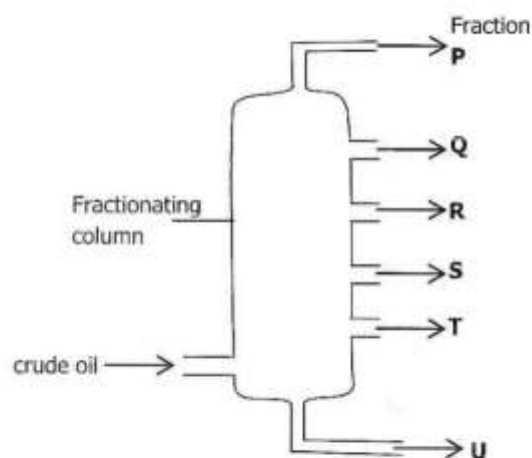
	Aqueous Potassium iodide	Acidified Potassium Manganate VII
A	No change	Purple to colourless
B	Colourless to brown	Purple to colourless
C	No change	Colourless to purple
D	Colourless to brown	No change

- 33 Below is one of the methods for collecting gases from a reaction.



Ammonia **cannot** be collected using the method above because it is ...

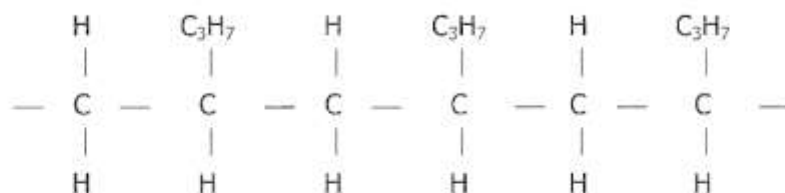
- A denser than water.
 - B less dense than water.
 - C insoluble in water.
 - D soluble in water.
- 34 Which pair of gases are both neutral?
- A Ammonia and oxygen
 - B Carbon monoxide and ammonia
 - C Carbon monoxide and hydrogen
 - D Carbon dioxide and nitrogen dioxide
- 35 The diagram shows the fractional distillation of crude oil.



Which statement is correct?

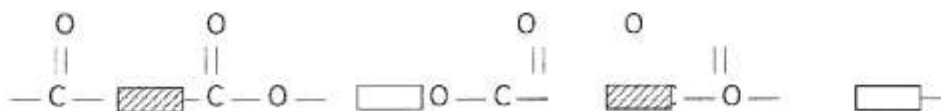
- A Each fraction consists of a single compound.
- B Fraction P has the highest boiling point.
- C Fraction U has the lowest boiling point.
- D Lubricating oil and waxes collect at T.

- 36 Below is part of a polymer molecule.



The monomer for this polymer is ...

- A** C_2H_4
B C_3H_6
C C_4H_8
D C_5H_{10}
- 37 Polymer Y has the structure shown below.



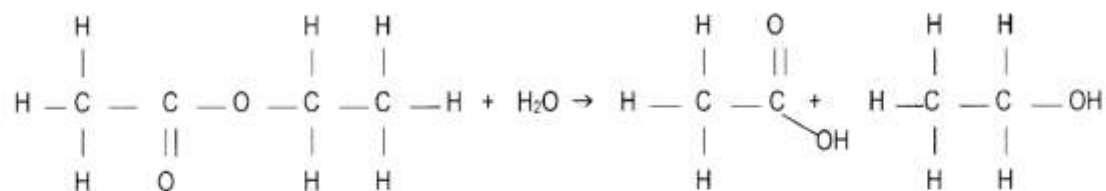
These four terms can be used to describe polymers.

- 1 addition polymer
- 2 condensation polymer
- 3 polyester
- 4 polyamide

Which two terms can be used to describe polymer Y?

- A** 1 and 3
B 1 and 4
C 2 and 3
D 2 and 4
- 38 When cracked, one mole of a compound Z, produces one mole of butane and one mole of hydrogen.
- $$\text{Z} \rightarrow \text{C}_4\text{H}_{10} + \text{H}_2$$
- What type of compound is Z?
- A** An alcohol
B An alkene
C An alkane
D A carboxylic acid

- 39 Ethyl ethanoate reacts with water according to the equation below.



What do we call this reaction?

- A** Cracking
B Esterification
C Hydrolysis
D Polymerisation
- 40 Identify the functional group for carboxylic acids.

- A** $-\text{O}-\text{H}$
B $\begin{array}{c} -\text{C}-\text{O}-\text{H} \\ || \\ \text{O} \end{array}$
C $\begin{array}{c} -\text{C}- \\ || \\ \text{O} \end{array}$
D $\begin{array}{c} -\text{C}-\text{O}- \\ || \\ \text{O} \end{array}$

DATA SHEET The Periodic Table of the Elements

Group																		
I	II											III	IV	V	VI	VII	0	
		<div>1 H Hydrogen</div>																
7 Li Lithium 3	9 Be Beryllium 4											11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10	
23 Na Sodium 11	24 Mg Magnesium 12											27 Al Aluminum 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulfur 16	35.5 Cl Chlorine 17	40 Ar Argon 18	
39 K Potassium 19	40 Ca Calcium 20	45 Sc Scandium 21	46 Ti Titanium 22	51 V Vanadium 23	52 Cr Chromium 24	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	64 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36	
85 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	Tc Technetium 43	104 Ru Ruthenium 44	103 Rh Rhodium 45	108 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54	
133 Cs Cesium 55	137 Ba Barium 56	139 La Lanthanum 57	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	196 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	210 Po Polonium 84	210 At Astatine 85	222 Rn Radon 86	

*59-71 Lanthanoid series
+90-103 Actinoid series

Key

a

X

b

a = relative atomic mass
X = atomic symbol
b = proton (atomic) number

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).
N_A = 6.0 × 10²³/mol; 1F = 96500C.
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