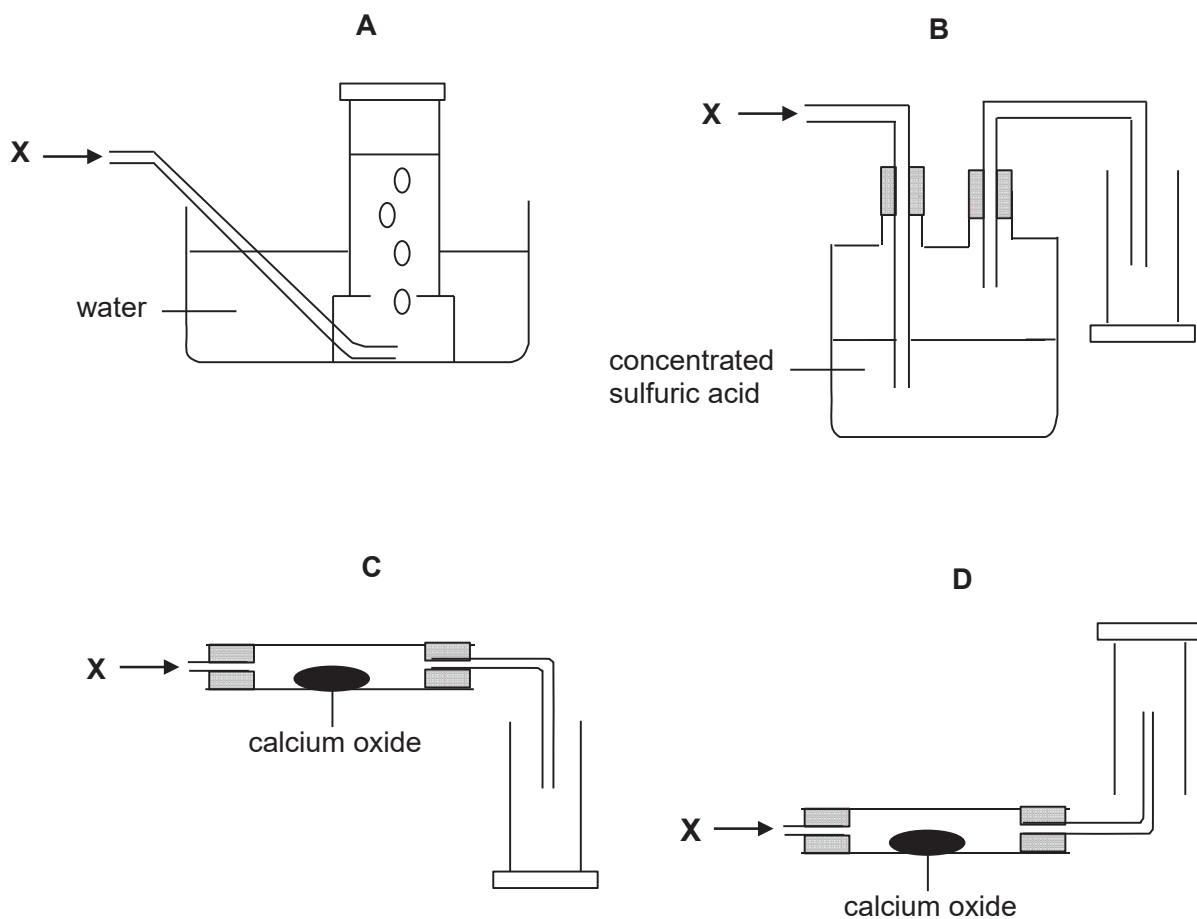


1 A basic gas X is denser than air and is very soluble in water.

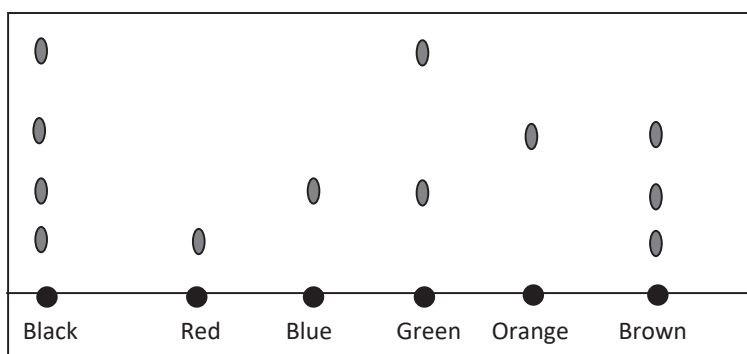
Which method is used to collect a dry sample of the gas?



2 Which changes will occur when a liquid at room temperature becomes a gas?

	energy of particle	separation of particles
A	decrease	increase
B	decrease	decrease
C	increase	decrease
D	increase	increase

3 A chromatogram of several inks is shown below.



Which of the following three inks, when mixed, does **not** obtain black ink?

- A blue, green, brown
- B green, orange, brown
- C red, blue, green
- D red, green, brown

4 Students are asked to state

- the number of atoms in one molecule of aqueous ammonia; and
- the relative molecular mass, M_r of this alkali.

Which of the following options shows the correct answers?

	number of atoms	M_r
A	3	17
B	4	18
C	4	35
D	7	35

- 5 The table below shows four substances and some of their properties.

substance	effect of heat in air	solid conducts electricity	melting point
W	decomposes to form a solid and a gas	no	fixed
X	forms a basic oxide	no	fixed
Y	melts	yes	fixed
Z	melts	yes	variable

Which of the following statements is true about the substances **W**, **X**, **Y** and **Z**?

- A** **W** is an element.
- B** **X** is a diatomic element.
- C** **Y** can be separated by physical methods.
- D** **Z** is a mixture.

- 6 The following table shows information about elements **X** and **Y**.

element	proton number	mass number
X	11	23
Y	8	17

What is the chemical formula and type of bond of the compound that is formed between **X** and **Y**?

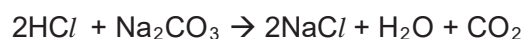
	chemical formula	type of bond
A	X₂Y	covalent
B	XY₂	covalent
C	X₂Y	ionic
D	XY₂	ionic

7 Which of the following substances is expected to have low melting and boiling point, is insoluble in water and does not conduct electricity at all?

- A CCl_4
- B MgO
- C NaCl
- D PbSO_4

8 0.1 mol/dm^3 hydrochloric acid reacts with 25 cm^3 of 0.2 mol/dm^3 aqueous sodium carbonate.

The equation for the reaction is shown.



What is the volume of acid required to neutralise exactly this volume of sodium carbonate?

- A 6.25 cm^3
- B 25 cm^3
- C 50 cm^3
- D 100 cm^3

9 Solutions of two chemicals are mixed. A reaction occurs and the temperature change is measured.

Which statement is correct?

- A If the reaction is endothermic, energy is taken in and the temperature of the mixture decreases.
- B If the reaction is endothermic, energy is given out and the temperature of the mixture increases.
- C If the reaction is exothermic, energy is given out and the temperature of the mixture decreases.
- D If the reaction is exothermic, energy is taken in and the temperature of the mixture increases.

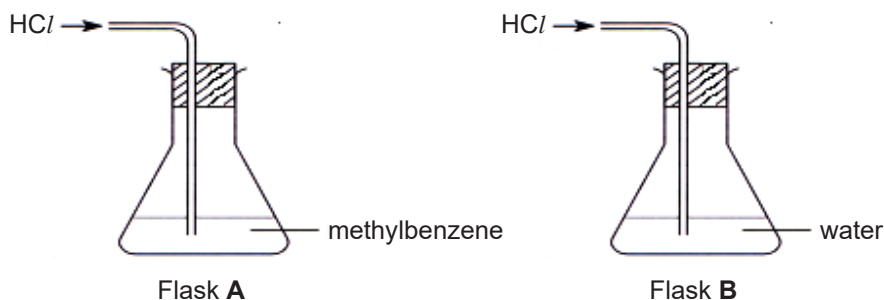
10 Acidified aqueous solution **X** is added to compound **Y**.

Solution **X** changes from purple to colourless. What can **X** and **Y** be?

	solution X	compound Y
A	potassium manganate (VII)	reducing agent
B	iodine solution	reducing agent
C	potassium manganate (VII)	oxidising agent
D	iodine solution	oxidising agent

11 Hydrogen chloride gas is soluble in both methylbenzene, an organic solvent, and in water.

In an experiment, hydrogen chloride gas is bubbled into the different solvents.



When a few drops of Universal Indicator solution is added into flask **A**, the indicator remained green but when added to flask **B**, it turned red. What could be the reason?

- A** HCl does not produce hydrogen ions in methylbenzene.
- B** HCl undergoes a redox reaction with methylbenzene.
- C** HCl neutralises the Universal Indicator solution.
- D** HCl neutralises methylbenzene.

12 Which of the following oxides can react with both acids and alkalis?

- A** lead(II) oxide
- B** calcium oxide
- C** iron(II) oxide
- D** copper(II) oxide

- 13 The following shows part of the Periodic Table. The letters do not represent the actual symbols of the elements.

Period	Group								
	I	II		III	IV	V	VI	VII	0
1									
2	U	S						T	
3	Y							Z	

Which one of the following statements is **false**?

- A** **U**, **S** and **Y** are metals, while **T** and **Z** are non-metals.
B **Y** has a higher boiling and melting point than **U**.
C The compound formed between **S** and **T** has the formula of **ST₂**.
D The oxides of **U**, **Y** and **S** are basic.
- 14 Stainless steel is used to make cutlery. Aluminium is used to make food containers.

Which property do both stainless steel and aluminium have that makes them suitable for these uses?

- A** They are very strong.
B They are good conductors of heat.
C They are good conductors of electricity.
D They are resistant to corrosion.
- 15 Which reaction occurring in the blast furnace is a neutralisation reaction?

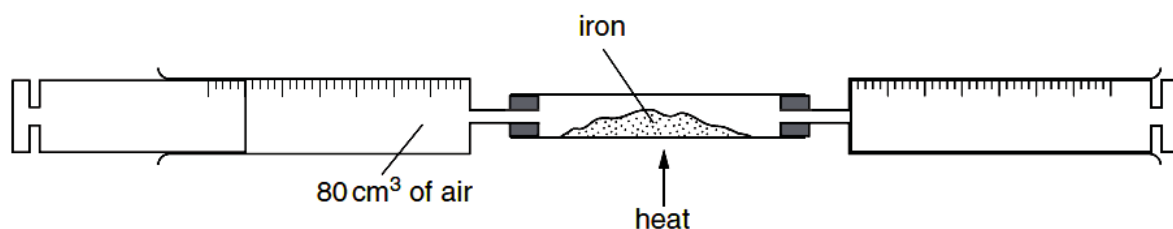
- A** $C + CO_2 \rightarrow 2CO$
B $C + O_2 \rightarrow CO_2$
C $CaO + SiO_2 \rightarrow CaSiO_3$
D $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$

- 16 Metals **X** and **Y** display the chemical behaviours as shown below when added to the various solutions.

aqueous solution	metal X added	metal Y added
magnesium nitrate	no reaction	no reaction
zinc nitrate	zinc displaced	no reaction
iron(II) nitrate	iron displaced	no reaction
copper(II) nitrate	copper displaced	copper displaced

Which of the following is the correct arrangement of metals in order of decreasing reactivity?

- A magnesium, **X**, zinc, iron, **Y**, copper
B magnesium, zinc, iron, **X**, **Y**, copper
C magnesium, **X**, zinc, iron, copper, **Y**
D **X**, magnesium, zinc, iron, **Y**, copper
- 17 An 80 cm³ sample of air is trapped in a syringe. The air is slowly passed over heated iron in a tube until there is no further decrease in volume.



When cooled to the original temperature, what is the volume of gas remaining?

- A 17 cm³
B 21 cm³
C 63 cm³
D 80 cm³

18 Which of the following hydrocarbons would you expect to find in petroleum gas?

- A C_3H_8
- B C_7H_{14}
- C $C_{16}H_{34}$
- D $C_{20}H_{22}$

19 Which of the following petroleum fractions is correctly matched to its use?

	fraction	use
A	bitumen	as feedstock for chemical industry
B	naphtha	for making roads
C	lubricating oil	for making polishes and waxes
D	diesel oil	as jet fuel

20 When petrol is burnt, gases are produced.

Which gas is toxic and is produced by incomplete combustion of petrol?

- A carbon dioxide
- B carbon monoxide
- C oxides of nitrogen
- D water vapour

Data Sheet

Colours of Some Common Metal Hydroxides

calcium hydroxide	white
copper(II) hydroxide	light blue
iron(II) hydroxide	green
iron(III) hydroxide	red-brown
lead(II) hydroxide	white
zinc hydroxide	white

The Periodic Table of Elements

		Group																																																																															
I	II	III	IV	V	VI	VII	0																																																																										
3 Li lithium 7	4 Be beryllium 9	11 Na sodium 23	12 Mg magnesium 24	13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40	19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84	37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium -	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131	55 Cs caesium 133	56 Ba barium 137	57-71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium -	85 At astatine -	86 Rn radon -	87 Fr francium -	88 Ra radium -	89-103 actinoids	104 Rf rutherfordium -	105 Db dubnium -	106 Sg seaborgium -	107 Bh bohrium -	108 Hs hassium -	109 Mt meitnerium -	110 Ds darmstadtium -	111 Rg roentgenium -	112 Cn copernicium -	113 Nh nihonium -	114 Fl flerovium -	115 Lv livermorium -	116 Ts tennessine -	117 Og oganeson -	118 Uue unbinilium -

Key

proton (atomic) number
atomic symbol
name
relative atomic mass

1	H
hydrogen	1

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

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).