

Revision PPQu Unit 2a: Groups 1 and 7 and Unit 2b: Acids, Bases and Salts

1. This question is about some of the Group 1 elements and their compounds.

(a) A teacher adds a small piece of lithium to water in a trough.

3 from: (i) Give three observations that are made when lithium reacts with water. (3)

1. Bubbles / fizzing

2. Piece of lithium floats (on water)

3. Piece of lithium moves (on water)

Piece of lithium gets smaller / disappears

(ii) After the reaction has finished, the teacher adds a few drops of universal indicator to the solution in the trough.

What & why

Explain the colour of the universal indicator after it is added to the solution. (2)

• Indicator turns blue OR purple

• Because an alkali has been produced OR

because OH^- ions are present

(iii) Write a chemical equation for the reaction of lithium with water.

(2)



m1: all formulae correct
m2: balanced

Can only get m2 if m1 scored

(Total for question = 7 marks)

Don't forget:

• Hydrogen is diatomic

• Pure metals are never diatomic

• Li^+ & OH^- so LiOH

2. The Group 7 elements are called halogens.
 Halogens form compounds called halides.
 Three of the halogens are represented by the formulae X_2 , Y_2 and Z_2
 Solutions of these halogens are added separately to solutions of sodium halides,
 NaX , NaY and NaZ .

The table shows whether or not a reaction occurs.

X₂ didn't displace any halides

	X_2	Y_2	Z_2
NaX	no	yes	yes
NaY	no	no	yes
NaZ	no	no	no

-Z₂ displaced 2 halides

This question is tricky!

- (a) Use the information in the table to deduce the order of reactivity of the halogens X_2 , Y_2 and Z_2 (1)

most reactive Z_2

..... Y_2

least reactive X_2

- (b) An aqueous solution of halogen Y_2 is orange.
 Deduce the identity of halogen Y_2 (1)

Bromine

- (c) (i) The table shows some physical properties of the halogens.
 Complete the table by predicting a boiling point for chlorine, the state of fluorine at room temperature and the colour of astatine. (3)

Halogen	Boiling point in °C	State at room temperature	Colour
fluorine	-188	gas	yellow
chlorine	-140 *	gas	green
bromine	59	liquid	red-brown
iodine	sublimes	solid	grey
astatine	337	solid	black

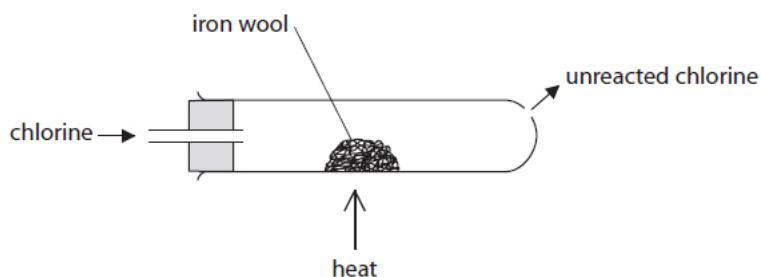
* ACCEPT any number between -150 & 10

OR dark grey
 (NOT just grey,
 must be darker than iodine)

(ii) Why do the halogens have similar chemical properties? (1)
All to do with electrons!

- ☐ A they are non-metals
- ☐ B they are molecules
- ☒ C they have the same number of outer shell electrons
- ☐ D they are in the same period of the Periodic Table

(d) A teacher uses this apparatus to demonstrate the reaction between chlorine gas and iron wool. The teacher does the reaction in a fume cupboard.



(i) Suggest why the teacher does the reaction in a fume cupboard. (1)

Chlorine gas is poisonous or toxic
(Be specific - not "it" !)

(ii) The product of the reaction between iron and chlorine is iron(III) chloride.

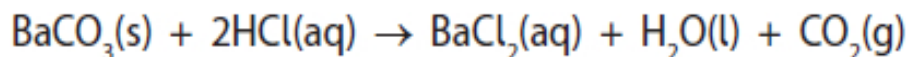
The ions in iron(III) chloride are Fe^{3+} and Cl^- *— swap + drop charges*

Use this information to give the chemical equation for this reaction. (2)



(Total for question = 9 marks)

3. Hydrochloric acid is added to a beaker. A few drops of methyl orange is added. An excess of solid barium carbonate is added to the beaker. A chemical reaction takes place.
The chemical equation for the reaction is



- (a) (i) Give the colour of the methyl orange at the start of the reaction. (1)

Red

- (ii) Give the formula of the ion which is responsible for the colour seen (1)

H^+

- (iii) Give one observation you would see during this reaction. (1)

Bubbles or fizzing or effervescence or

powder disappears or colourless solution forms
(NOT dissolves)

- (iv) explain why barium carbonate is described as a base but not an alkali (2)

• Barium carbonate can neutralise an acid (so is a base)

• But cannot dissolve (so is not an alkali)

- (v) Explain why an excess of barium carbonate is used (1)

To ensure all acid is reacted

- extract + dry

Reaction already happened

(b) Describe a method to produce dry crystals of hydrated barium chloride from the solution obtained in (a). (5)

- Filter to remove excess barium carbonate
- Heat until crystals form
- Leave to cool
- Filter to remove the crystals
- Leave on a windowsill OR in a warm place to dry

(Total for question = 11 marks)

TOTAL MARKS FOR QUESTIONS = 27

Now use the mark scheme and worked answers on FireFly to mark your work carefully!

There's no point doing these questions without knowing if you got them right!!!

The Periodic Table of the Elements

1	2	Key											3	4	5	6	7	0						
1 H hydrogen 1																								
7 Li lithium 3		9 Be beryllium 4		relative atomic mass atomic symbol atomic (proton) number														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 aluminium 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	48 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	63.5 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	[98] Tc technetium 43	101 Ru ruthenium 44	103 Rh rhodium 45	106 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 caesium 55	137 Ba barium 56	139 La* lanthanum 57	178 Hf hafnium 72	181 Ta tantalum 73	184 W tungsten 74	186 Re rhenium 75	190 Os osmium 76	192 Ir iridium 77	195 Pt platinum 78	197 Au gold 79	201 Hg mercury 80	204 Tl thallium 81	207 Pb lead 82	209 Bi bismuth 83	[209] Po polonium 84	[210] At astatine 85	[222] Rn radon 86							
[223] Fr francium 87	[226] Ra radium 88	[227] Ac* actinium 89	[261] Rf rutherfordium 104	[262] Db dubnium 105	[266] Sg seaborgium 106	[264] Bh bohrium 107	[277] Hs hassium 108	[268] Mt meitnerium 109	[271] Ds darmstadtium 110	[272] Rg roentgenium 111	Elements with atomic numbers 112-116 have been reported but not fully authenticated													

* The lanthanoids (atomic numbers 58-71) and the actinoids (atomic numbers 90-103) have been omitted.

The relative atomic masses of copper and chlorine have not been rounded to the nearest whole number.