

1	2	Key										3	4	5	6	7	0				
1 H hydrogen 1		relative atomic mass atomic symbol atomic (proton) number															4 He helium 2				
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 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 relative atomic masses of copper and chlorine have not been rounded to the nearest whole number.

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1. Chemists produce many useful substances, including fuels and plastics, from crude oil. The amount of crude oil in the Earth's crust is limited.

(a)



(source: <http://www.castlereagh.gov.uk>)

Explain why burying plastic waste in landfill sites may cause a problem in years to come.

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(2)

- (b) What problems may occur when crude oil supplies begin to run out?

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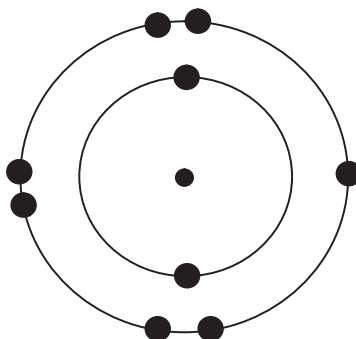
(2)

Q1

(Total 4 marks)



2. (a) An atom consists of a nucleus with electrons in shells around the nucleus.
A diagram of an atom of fluorine is shown.



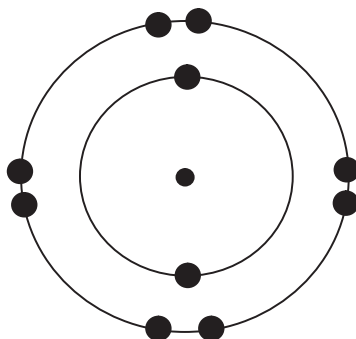
- (i) Write down the electronic configuration of an atom of **chlorine**.

..... (1)

- (ii) What evidence is there in the diagram and in your answer to (i) that both fluorine and chlorine are in the same group?

..... (1)

- (b) A diagram of an atom of neon is shown.



Use this diagram to explain why neon is very unreactive.

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..... (2)

- (c) An atom of an element has 24 electrons, 28 neutrons and 24 protons.

- (i) What is the mass number of this atom? (1)

- (ii) Use the periodic table to identify the element (1)

(Total 6 marks)

Q2

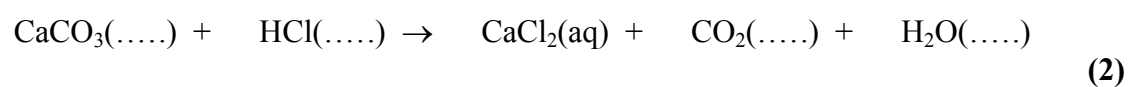


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3. Manna added lumps of calcium carbonate to dilute hydrochloric acid at room temperature.

Calcium chloride, carbon dioxide and water were formed.

- (a) Balance the equation for this reaction and fill in the state symbols.



- (b) Manna repeated the experiment using warmer acid.

He found that the reaction was faster.

Explain, in terms of particles, why the reaction was faster.

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(3)

- (c) Suggest one way in which Manna could have measured the rate of this reaction.

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(1)

(Total 6 marks)

Q3



4. In water molecules, atoms are covalently bonded together.

(a) Draw a dot and cross diagram of a molecule of water.

(2)

(b) Diamond has a giant molecular covalent structure.

The melting point of diamond is much higher than the melting point of water.
Explain why.

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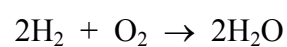
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(2)

(c) Hydrogen can be used as a fuel for spacecraft.

The equation for the combustion of hydrogen is



Calculate the maximum mass of water that can be formed from the combustion of 20 g hydrogen.

(Relative atomic masses: H = 1.00, O = 16.0)

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Answer

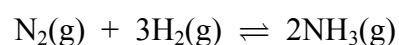
(3)

Q4

(Total 7 marks)



5. In the Haber process, nitrogen reacts with hydrogen to make ammonia.
The equation for the reaction is shown.



- (a) Nitrogen and hydrogen are mixed and left under suitable conditions, until no further change in the amount of each substance occurs.
What substances will be present in the final mixture?
Explain your answer.

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(2)

- (b) (i) The Haber process is carried out at 400°C and 200 atm.
How would the equilibrium amount of ammonia change if the pressure were increased?

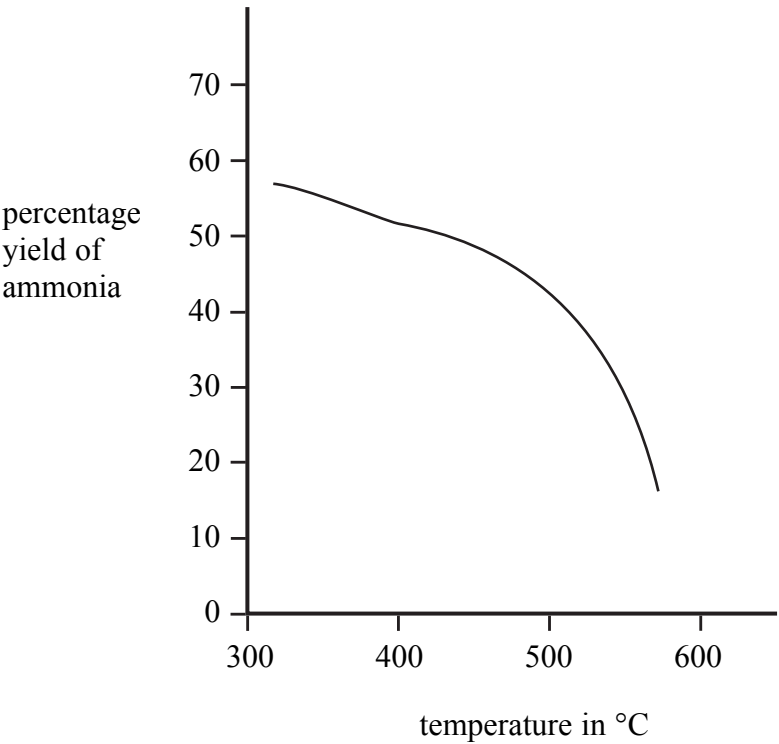
.....
(1)

- (ii) Explain your answer.

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(1)



(c) The graph shows the percentage yield of ammonia at equilibrium at different temperatures under a pressure of 200 atm.



Explain why the temperature of 400°C, and not a higher or lower temperature, is used.

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(3)

Q5

(Total 7 marks)

TOTAL FOR PAPER: 30 MARKS

END

