

Surname	Centre Number	Candidate Number
Other Names		0



**GCSE**

0236/02

**SCIENCE  
HIGHER TIER  
CHEMISTRY 1**

A.M. TUESDAY, 12 June 2012

45 minutes

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	7	
2.	8	
3.	6	
4.	4	
5.	4	
6.	5	
7.	7	
8.	6	
9.	3	
<b>Total</b>	<b>50</b>	

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### ADDITIONAL MATERIALS

In addition to this paper you will need a calculator and a ruler.

### INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.  
Do not use gel pen or correction fluid.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

If you run out of space, use the continuation page at the back of the booklet, taking care to number the question(s) correctly.

### INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

The Periodic Table is printed on the back cover of the examination paper and the formulae for some common ions on the inside of the back cover.

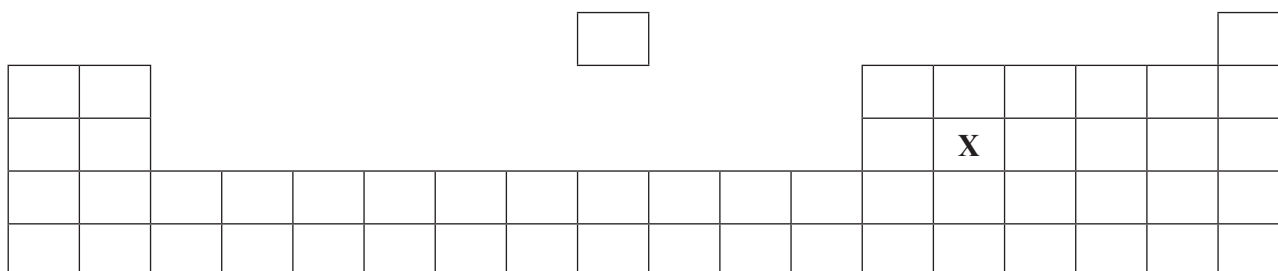


J U N 1 2 0 2 3 6 0 2 0 1

Answer **all** questions.

1. The following diagram shows an outline of the Periodic Table of Elements.

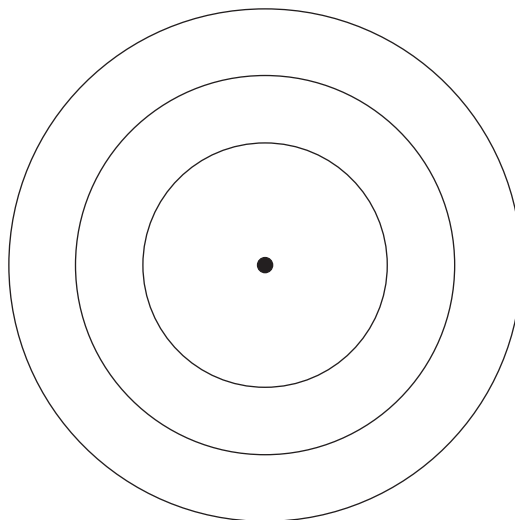
You may find the Periodic Table shown on the back page of this examination paper useful in answering this question.



(a) Using the letters **A-E**, show the position of the following elements on the diagram above. [5]

- A** – the most reactive alkali metal
- B** – the least reactive halogen
- C** – the gas used to fill weather balloons
- D** – the element that reacts with sodium to produce sodium chloride
- E** – the element with electronic structure 2,8,2

(b) Complete the diagram below to show the electronic structure of the element shown in position **X** in the table above. [1]



(c) State how the electronic structure can be used to determine an element's atomic number. [1]

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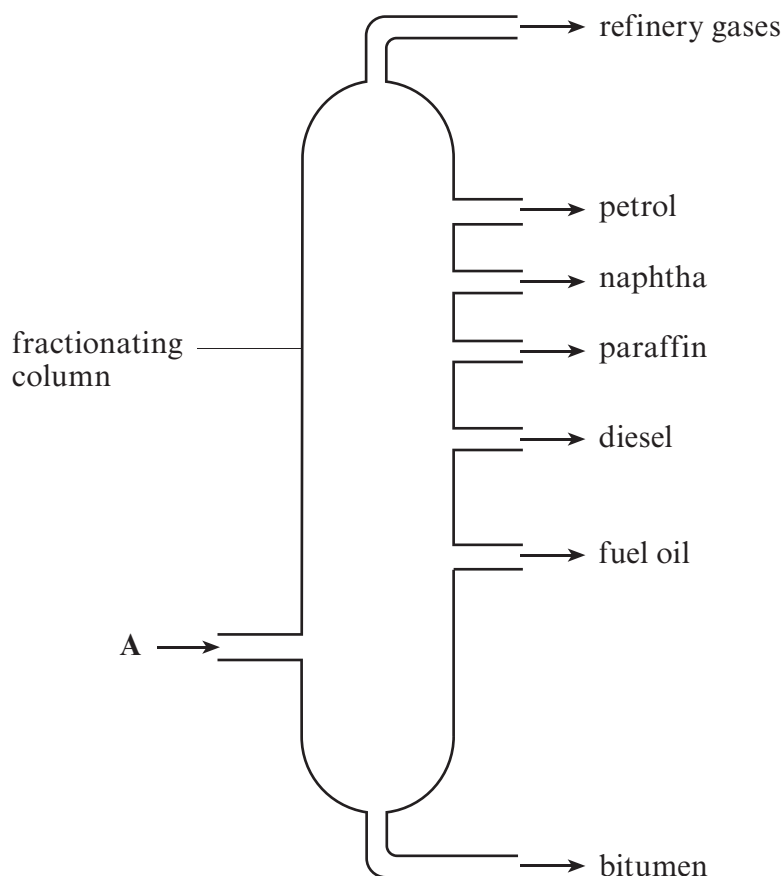
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2. (a) Crude oil is a mixture of compounds called hydrocarbons which can be separated into fractions in a fractionating column as shown below.



- (i) Name the elements present in all hydrocarbons. [1]  
 ..... and .....
- (ii) State what must happen [1]  
 I. to the crude oil before it enters the column at point A,  
 ..... [1]  
 II. in order to collect the fractions as liquids. [1]  
 .....
- (iii) Give the name of this process. [1]  
 .....



(iv) Explain why petrol is collected above diesel in the fractionating column. [2]

.....

.....

(b) The following graph shows how the average price of crude oil changed between 1998 and 2008.



(i) State the trend in oil price over this period. [1]

.....

(ii) Suggest a reason for this trend. [1]

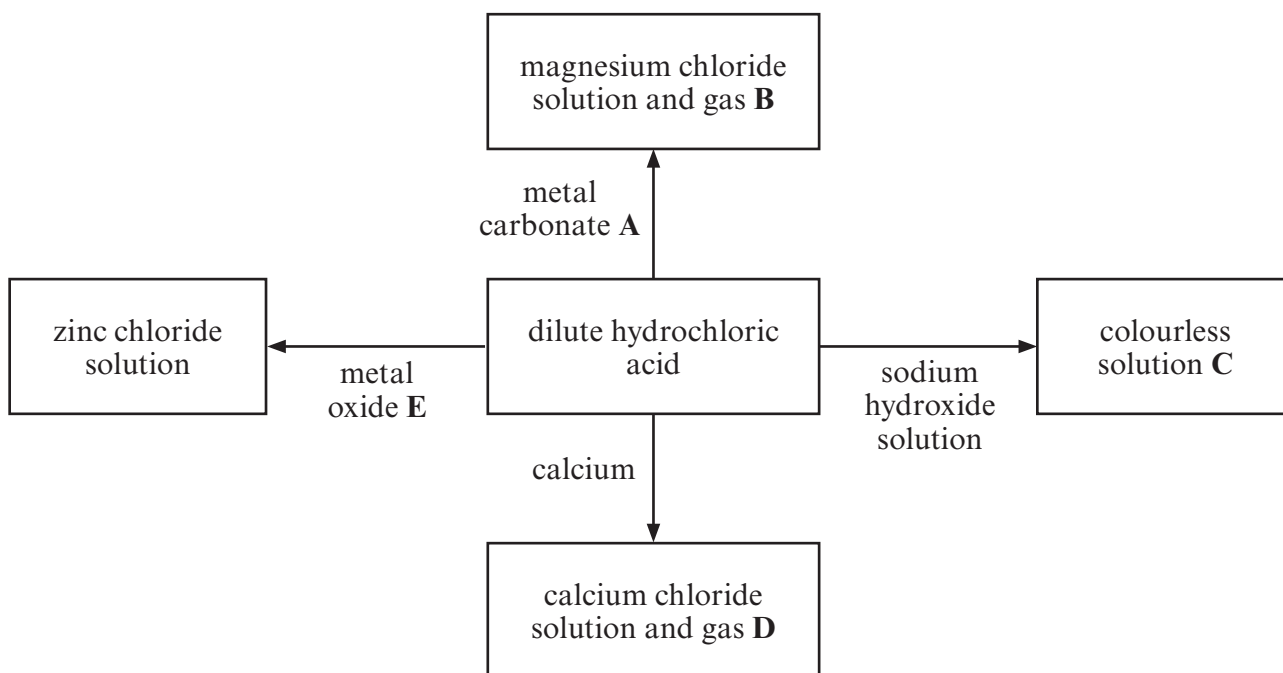
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3. (a) The diagram below shows some reactions of dilute hydrochloric acid.



Give the chemical name for

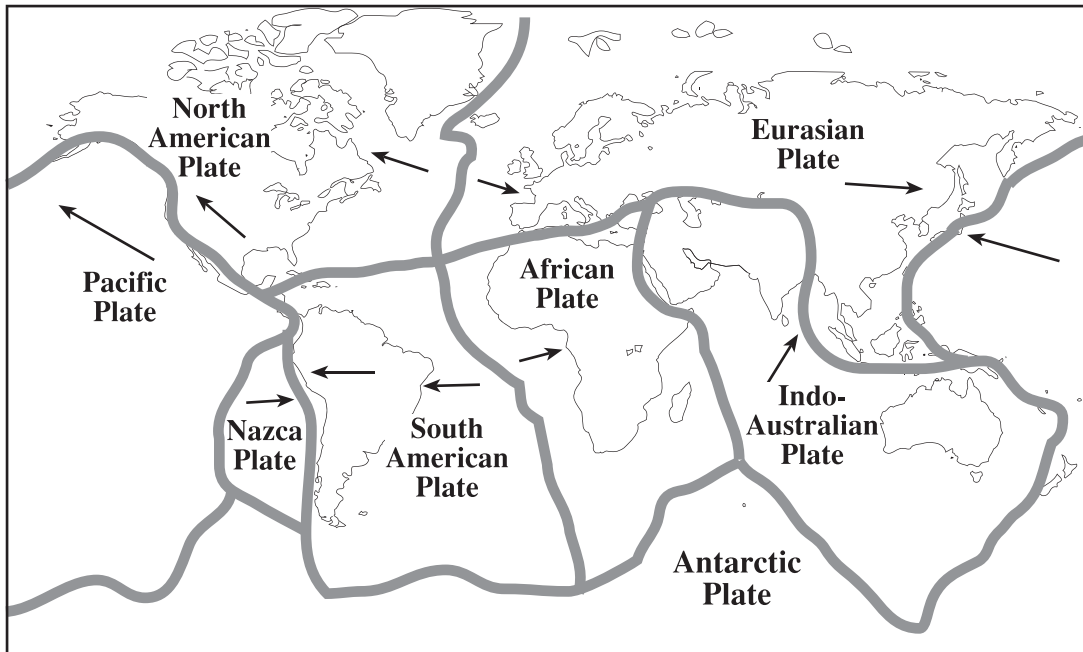
- (i) metal carbonate **A**, ..... [1]
- (ii) gas **B**, ..... [1]
- (iii) colourless solution **C**, ..... [1]
- (iv) gas **D**, ..... [1]
- (v) metal oxide **E**, ..... [1]
- (b) When magnesium chloride reacts with sodium hydroxide, a white precipitate of magnesium hydroxide is formed.

Use the **table of common ions** on the **inside of the back cover of this examination paper** to give the chemical formula of magnesium hydroxide. [1]

*Formula of magnesium hydroxide* .....



4. The following diagram shows some of the tectonic plates which make up the Earth's crust.



Use the diagram above to answer parts (a) and (b).

(a) Name **two** plates that are moving towards each other. [1]

..... and .....

(b) Describe how new rock is formed at the boundary between the Eurasian and the North American plates and name the type of rock formed. [3]

.....  
 .....  
 .....

Type of rock formed .....

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5. (a) State what is meant by *nanoscience*.

[1]

.....  
.....

(b) One example of the application of nanoscience is the use of nano-silver particles to coat the inner surfaces of refrigerators. Give the property of nano-silver that explains why it can be used in this way and give another use that depends on this property. [2]

*Property* .....

*Other use* .....

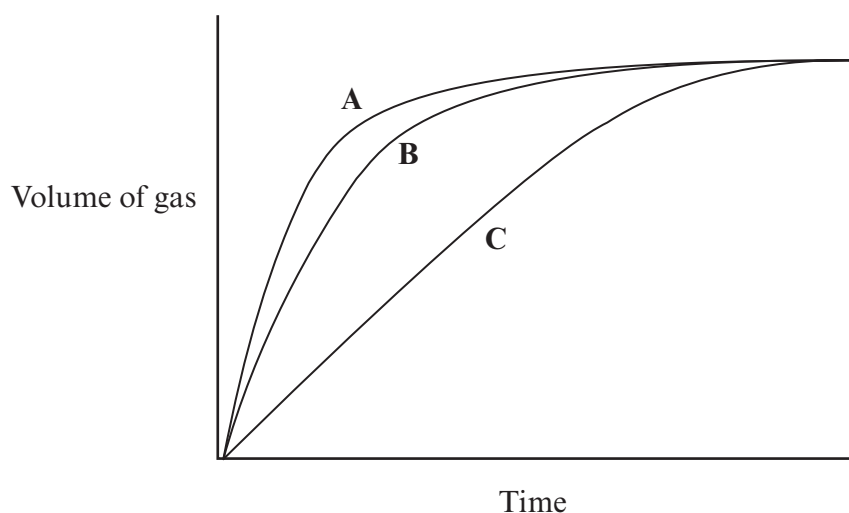
(c) Give **one** reason why some people are concerned about the use of nano-particles such as nano-silver. [1]

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6. Jane studied the rate of the reaction between hydrochloric acid and calcium carbonate. Three different experiments, **A**, **B** and **C**, were carried out using the same mass of calcium carbonate and with the acid in *excess* each time. The volume of gas produced was measured over time. The results of these experiments are shown in the graphs below.



State and explain, using particle theory, **two** factors that may be responsible for the different rates seen above. [5]

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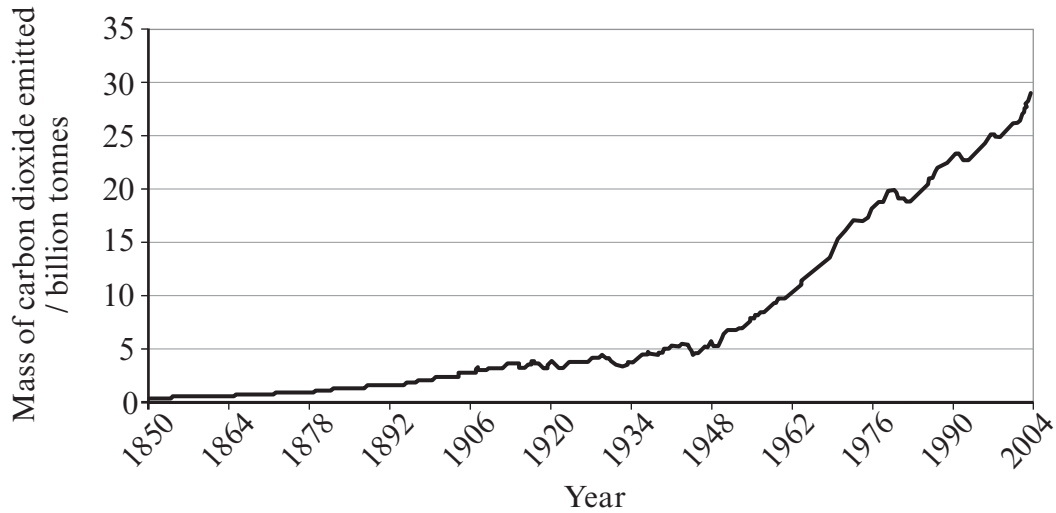
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7. (a) The following graph shows global carbon dioxide emissions between 1850 and 2004.



- (i) Describe the trend in carbon dioxide emissions between 1850 and 2004. [2]

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- (ii) State what effect this change is likely to have on the average temperature of the Earth's atmosphere. [1]

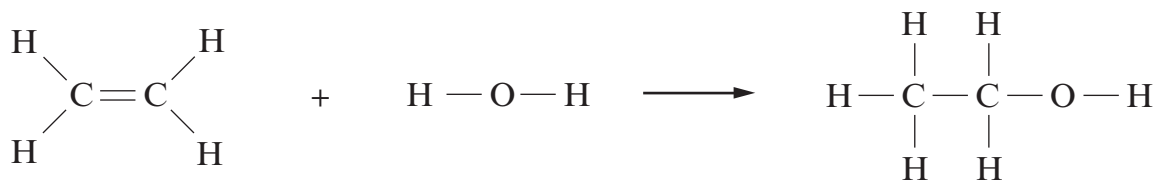
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- (iii) Give **one** consequence of this change in temperature. [1]

.....



- (b) Alternative fuels such as ethanol are becoming increasingly important. One method of producing ethanol is to react a hydrocarbon called ethene with water as shown in the following equation.



This reaction is exothermic and gives out 42 kJ of energy.

- (i) The energy released when forming bonds in the product is 3234 kJ. Calculate the energy needed to break all bonds in the reactants. [1]

.....  
 .....

- (ii) Use your answer in (i) and the bond energies shown in the table below to calculate the amount of energy needed to break a C=C bond. [2]

Bond	Amount of energy needed to break the bond / kJ
C—H	413
O—H	464

*Note: The amount of energy released in making a bond is equal and opposite to that needed to break the bond.*

.....  
 .....



8. Group 1 elements are known as the alkali metals due to the way they react with water.

(a) Describe the observations made when lithium, sodium and potassium react with water. [3]

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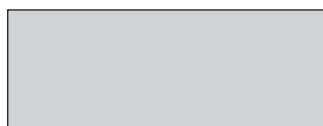
(b) Write a balanced **symbol** equation for the reaction between sodium and water. [3]



9. A technician has three solutions, **A**, **B** and **C**. The solutions are known to be sodium chloride, potassium iodide and silver nitrate but not necessarily in that order.

The following table shows the results obtained when the solutions were added to each other.

Solution	<b>A</b>	<b>B</b>	<b>C</b>
<b>A</b>		white precipitate formed	yellow precipitate formed
<b>B</b>	white precipitate formed		no reaction
<b>C</b>	yellow precipitate formed	no reaction	



not carried out

- (a) Give the meaning of the term *precipitate*. [1]

.....

.....

- (b) Use the results given to identify solutions **A**, **B** and **C**. [2]

**A** .....

**B** .....

**C** .....





**FORMULAE FOR SOME COMMON IONS**

POSITIVE IONS		NEGATIVE IONS	
Name	Formula	Name	Formula
Aluminium	$\text{Al}^{3+}$	Bromide	$\text{Br}^-$
Ammonium	$\text{NH}_4^+$	Carbonate	$\text{CO}_3^{2-}$
Barium	$\text{Ba}^{2+}$	Chloride	$\text{Cl}^-$
Calcium	$\text{Ca}^{2+}$	Fluoride	$\text{F}^-$
Copper(II)	$\text{Cu}^{2+}$	Hydroxide	$\text{OH}^-$
Hydrogen	$\text{H}^+$	Iodide	$\text{I}^-$
Iron(II)	$\text{Fe}^{2+}$	Nitrate	$\text{NO}_3^-$
Iron(III)	$\text{Fe}^{3+}$	Oxide	$\text{O}^{2-}$
Lithium	$\text{Li}^+$	Sulphate	$\text{SO}_4^{2-}$
Magnesium	$\text{Mg}^{2+}$		
Nickel	$\text{Ni}^{2+}$		
Potassium	$\text{K}^+$		
Silver	$\text{Ag}^+$		
Sodium	$\text{Na}^+$		





1 6

# PERIODIC TABLE OF ELEMENTS

1 2

Group

3 4 5 6 7 0



${}^7_3\text{Li}$ Lithium	${}^9_4\text{Be}$ Beryllium											${}^{19}_9\text{F}$ Fluorine	${}^{20}_{10}\text{Ne}$ Neon				
${}^{23}_{11}\text{Na}$ Sodium	${}^{24}_{12}\text{Mg}$ Magnesium											${}^{35}_{17}\text{Cl}$ Chlorine	${}^{40}_{18}\text{Ar}$ Argon				
${}^{39}_{19}\text{K}$ Potassium	${}^{40}_{20}\text{Ca}$ Calcium	${}^{45}_{21}\text{Sc}$ Scandium	${}^{48}_{22}\text{Ti}$ Titanium	${}^{51}_{23}\text{V}$ Vanadium	${}^{52}_{24}\text{Cr}$ Chromium	${}^{55}_{25}\text{Mn}$ Manganese	${}^{56}_{26}\text{Fe}$ Iron	${}^{59}_{27}\text{Co}$ Cobalt	${}^{59}_{28}\text{Ni}$ Nickel	${}^{64}_{29}\text{Cu}$ Copper	${}^{65}_{30}\text{Zn}$ Zinc	${}^{70}_{31}\text{Ga}$ Gallium	${}^{73}_{32}\text{Ge}$ Germanium	${}^{75}_{33}\text{As}$ Arsenic	${}^{79}_{34}\text{Se}$ Selenium	${}^{80}_{35}\text{Br}$ Bromine	${}^{84}_{36}\text{Kr}$ Krypton
${}^{86}_{37}\text{Rb}$ Rubidium	${}^{88}_{38}\text{Sr}$ Strontium	${}^{89}_{39}\text{Y}$ Yttrium	${}^{91}_{40}\text{Zr}$ Zirconium	${}^{93}_{41}\text{Nb}$ Niobium	${}^{96}_{42}\text{Mo}$ Molybdenum	${}^{99}_{43}\text{Tc}$ Technetium	${}^{101}_{44}\text{Ru}$ Ruthenium	${}^{103}_{45}\text{Rh}$ Rhodium	${}^{106}_{46}\text{Pd}$ Palladium	${}^{108}_{47}\text{Ag}$ Silver	${}^{112}_{48}\text{Cd}$ Cadmium	${}^{115}_{49}\text{In}$ Indium	${}^{119}_{50}\text{Sn}$ Tin	${}^{122}_{51}\text{Sb}$ Antimony	${}^{128}_{52}\text{Te}$ Tellurium	${}^{127}_{53}\text{I}$ Iodine	${}^{131}_{54}\text{Xe}$ Xenon
${}^{133}_{55}\text{Cs}$ Caesium	${}^{137}_{56}\text{Ba}$ Barium	${}^{139}_{57}\text{La}$ Lanthanum	${}^{179}_{72}\text{Hf}$ Hafnium	${}^{181}_{73}\text{Ta}$ Tantalum	${}^{184}_{74}\text{W}$ Tungsten	${}^{186}_{75}\text{Re}$ Rhenium	${}^{190}_{76}\text{Os}$ Osmium	${}^{192}_{77}\text{Ir}$ Iridium	${}^{195}_{78}\text{Pt}$ Platinum	${}^{197}_{79}\text{Au}$ Gold	${}^{201}_{80}\text{Hg}$ Mercury	${}^{204}_{81}\text{Tl}$ Thallium	${}^{207}_{82}\text{Pb}$ Lead	${}^{209}_{83}\text{Bi}$ Bismuth	${}^{210}_{84}\text{Po}$ Polonium	${}^{210}_{85}\text{At}$ Astatine	${}^{222}_{86}\text{Rn}$ Radon
${}^{223}_{87}\text{Fr}$ Francium	${}^{226}_{88}\text{Ra}$ Radium	${}^{227}_{89}\text{Ac}$ Actinium															

Key:

