



**BOTSWANA EXAMINATIONS COUNCIL**  
Botswana General Certificate of Secondary Education

CANDIDATE  
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**SCIENCE: DOUBLE AWARD**

**0569/03**

Paper 3

**October/November 2019**

**2 hours**

Candidates answer on the Question Paper.

No Additional Materials are required.

**READ THESE INSTRUCTIONS FIRST**

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

Write in dark blue or black pen.

You may use a soft pencil for any diagrams, graphs or rough working.

Do **not** use staples, paper clips, highlighters, glue or correction fluid.

**DO NOT WRITE IN ANY BARCODES.**

Answer **all** questions.

Write your answers in the spaces provided on the Question Paper.

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

You may lose marks if you do not show your working or if you do not use appropriate units.

You may use a calculator.

A copy of the Periodic Table is printed on page 20.

| For Examiner's Use |  |
|--------------------|--|
| 1                  |  |
| 2                  |  |
| 3                  |  |
| 4                  |  |
| 5                  |  |
| 6                  |  |
| 7                  |  |
| 8                  |  |
| 9                  |  |
| 10                 |  |
| 11                 |  |
| 12                 |  |
| 13                 |  |
| 14                 |  |
| <b>Total</b>       |  |

This document consists of **18** printed pages and **2** blank pages.



1 (a) Define the term *speed*.

..... [1]

(b) Fig. 1.1 shows a speed-time graph of a train.

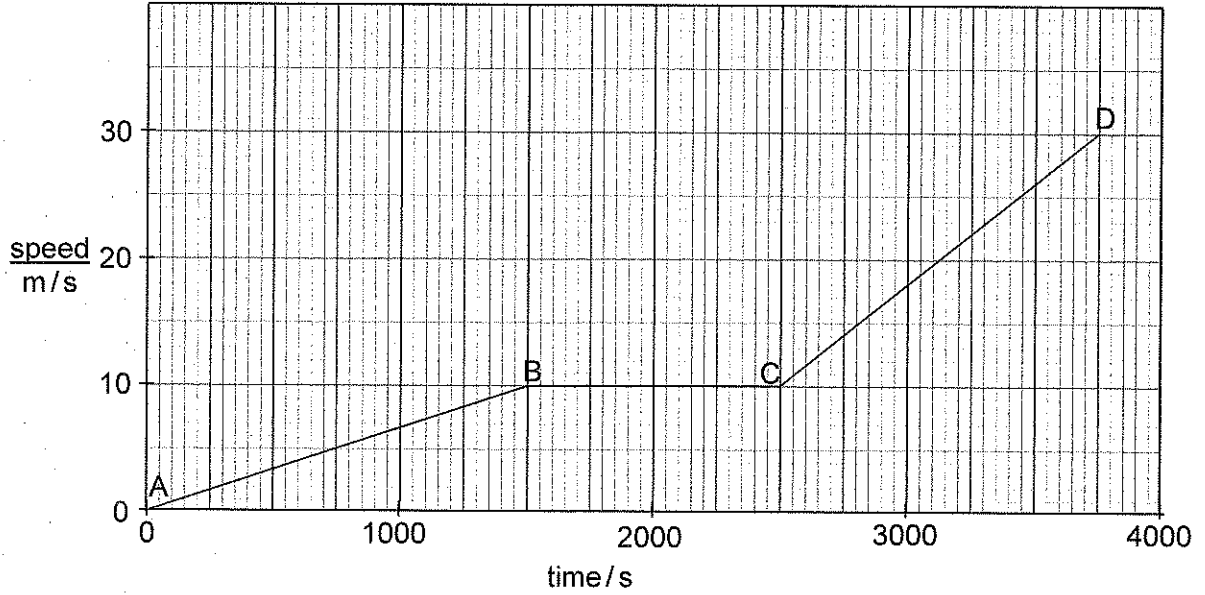


Fig. 1.1

(i) For which part of the graph was the acceleration of the train greatest?  
Explain your answer.

part .....

explanation .....

..... [2]

(ii) Calculate the distance travelled by the train in part CD.

distance = ..... [2]

(iii) Determine the resultant force acting on the train in part BC.  
Explain your answer.

resultant force = ..... N

explanation .....

..... [2]

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2 (a) Define *moment of a force*.

.....  
 .....

[1]

(b) Fig. 2.1 shows a uniform metre rule of mass 0.15 kg pivoted at the 20.0 cm mark. The rule is balanced by the tension in a string at the 80.0 cm mark as shown.

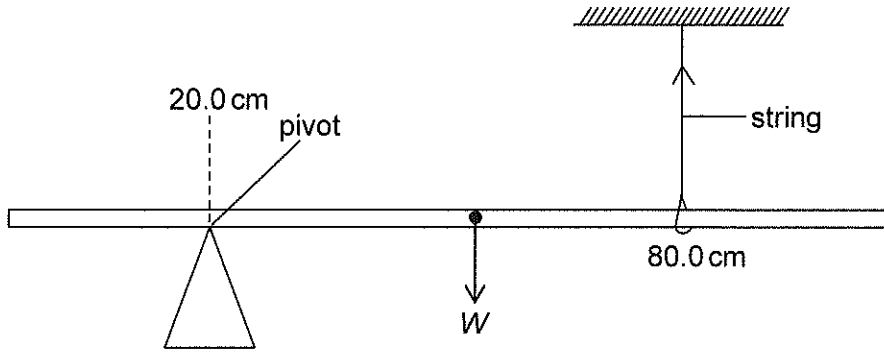


Fig. 2.1

Calculate

(i) the weight  $W$  of the rule, ( $g = 10 \text{ N/kg}$ )

$W = \dots\dots\dots \text{N}$  [2]

(ii) the tension on the string.

tension =  $\dots\dots\dots \text{N}$  [2]

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3 Fig. 3.1 shows a thermostat for an electric appliance.

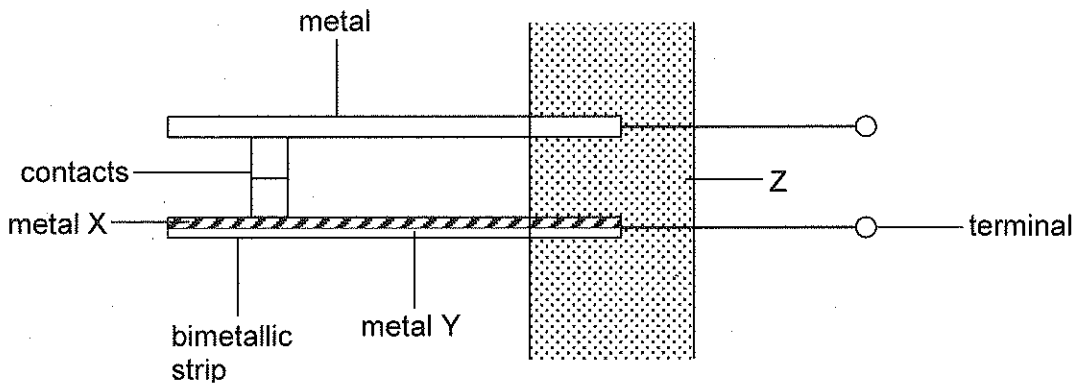


Fig. 3.1

(a) State the purpose of the thermostat.

..... [1]

(b) State one electrical appliance that uses a thermostat.

..... [1]

(c) Describe how the thermostat in Fig. 3.1 works.

.....  
.....  
.....  
..... [3]

(d) Suggest a reason why material Z must be an insulator.

.....  
..... [1]

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4 (a) Define the term *refractive index*.

.....  
.....

[1]

(b) Fig. 4.1 shows a fish O at the bottom of a pond and its image I when viewed from outside the pond.

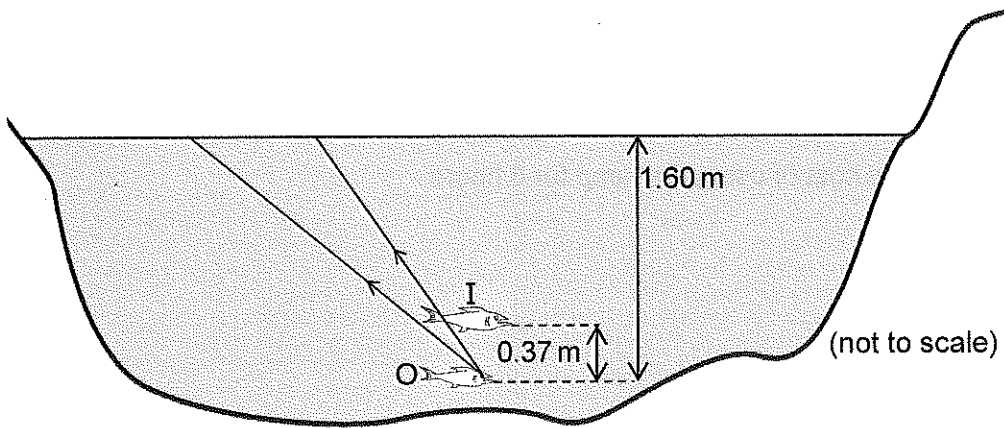


Fig. 4.1

(i) On Fig. 4.1, complete the path of the rays to show how the image I of the fish is formed.

[2]

(ii) Calculate the refractive index of water.

refractive index = ..... [3]

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5 A 60W lamp is connected to a 240V mains supply and is switched on for 8 hours.

(a) Calculate

(i) the current in the lamp when it is switched on,

current = .....A [2]

(ii) the resistance of the lamp.

resistance = ..... $\Omega$  [2]

(b) The cost of electrical energy is P0.80 per kWh.

Determine the cost of using the lamp for 8 hours.

cost = P ..... [3]

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- 6 (a) State the name of **one** naturally occurring radioactive material.

..... [1]

- (b) State **one** danger of being exposed to radioactive emissions.

..... [1]

- (c) A Geiger-Muller tube detects some radiation when placed in a classroom that has no radioactive source nearby.

State the name of this radiation.

..... [1]

- 7 Choose from the list a substance that fits each given description.  
Each substance may be used **once**, **more than once** or **not at all**.

**ammonia      carbon monoxide      nitrogen**

**rubidium      chlorine      lead**

Which substance

- (a) is used as a reducing agent in the blast furnace?

..... [1]

- (b) is a gas produced from a catalytic converter?

..... [1]

- (c) is used for making nitric acid?

..... [1]

- (d) is in period 5 of the Periodic Table?

..... [1]

- (e) reacts with water to form an alkaline solution?

..... [1]



- 8 Equal volumes of water samples W, X and distilled water are tested for hardness before and after boiling using a soap solution of the same concentration. The results are shown in Table 8.1.

Table 8.1

| sample          | number of drops of soap solution needed to form lather |               |
|-----------------|--|---------------|
|                 | before boiling   | after boiling |
| W               | 15   | 15            |
| X               | 45   | 10            |
| distilled water | 10   | 10            |

- (a) State **two** physical properties of pure water.

1 .....

2 .....

[2]

- (b) (i) State the type of hardness found in sample X. Give a reason for your answer.

type .....

reason .....

[2]

- (ii) Suggest how the hardness in sample W can be removed.

..... [1]

- (c) Describe how the presence of carbon dioxide in the atmosphere contributes to the presence of hardness in water.

.....

.....

.....

..... [3]

- (d) Draw a 'dot and cross' diagram to show the bonding in a water molecule ( $H_2O$ ).

[2]



9 Ethane,  $C_2H_6$ , and ethene,  $C_2H_4$ , are hydrocarbons.

(a) (i) State the name of the homologous series to which ethene belongs.

..... [1]

(ii) State the name of a compound with four carbon atoms which belong to the same homologous series as ethene.

..... [1]

(b) Draw the structural formula for ethane.

[1]

(c) Describe a test that can be used to distinguish between ethane and ethene and state the observation made.

test .....

.....

observation with ethane .....

.....

observation with ethene .....

.....

[3]

(d) Ethane can be produced from ethene in the presence of a catalyst at  $180^\circ C$ .

(i) State the name of the reaction that produces ethane from ethene.

..... [1]

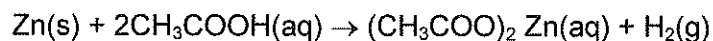
(ii) Suggest a catalyst that can be used for the reaction.

..... [1]



- 10 Excess zinc metal is added to  $200 \text{ cm}^3$  of  $0.500 \text{ mol/dm}^3$  ethanoic acid to form zinc ethanoate,  $(\text{CH}_3\text{COO})_2\text{Zn}$  and hydrogen gas.

The equation for the reaction is:



- (a) Calculate the number of moles in  $200 \text{ cm}^3$  of  $0.500 \text{ mol/dm}^3$  ethanoic acid.

moles = ..... [2]

- (b) (i) Calculate the number of moles of hydrogen gas,  $\text{H}_2$ , that are produced from the reaction.

moles = ..... [2]

- (ii) Use your answer to (b)(i) to calculate the volume of hydrogen produced from the reaction at room temperature and pressure. [volume of 1 mole of gas at r.t.p. =  $24 \text{ dm}^3$ ]

volume = ..... [2]

- (c) (i) A gas is produced when dilute ethanoic acid reacts with zinc.

State **one** observation that will be made.

..... [1]

- (ii) The experiment was repeated using dilute hydrochloric acid of the same concentration.

State and explain the difference that will be made on the observation between the two reactions.

difference ..... [1]

explanation .....

.....

.....

[2]



11 Fig. 11.1 shows the diagram of a human circulatory system with blood vessels **m**, **n**, **o** and **p**.

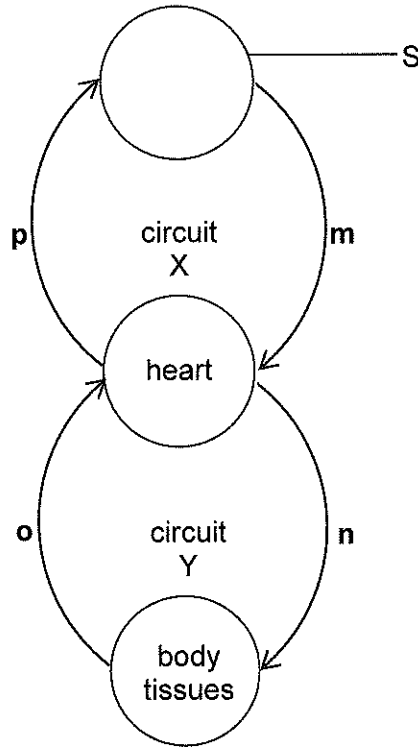


Fig. 11.1

(a) (i) On Fig. 11.1, identify the part labelled S.

..... [1]

(ii) State the names of the circuits labelled X and Y.

circuit X .....

circuit Y .....

[2]

(iii) On Fig. 11.1, which **two** letters represent blood vessels carrying deoxygenated blood?

..... [1]

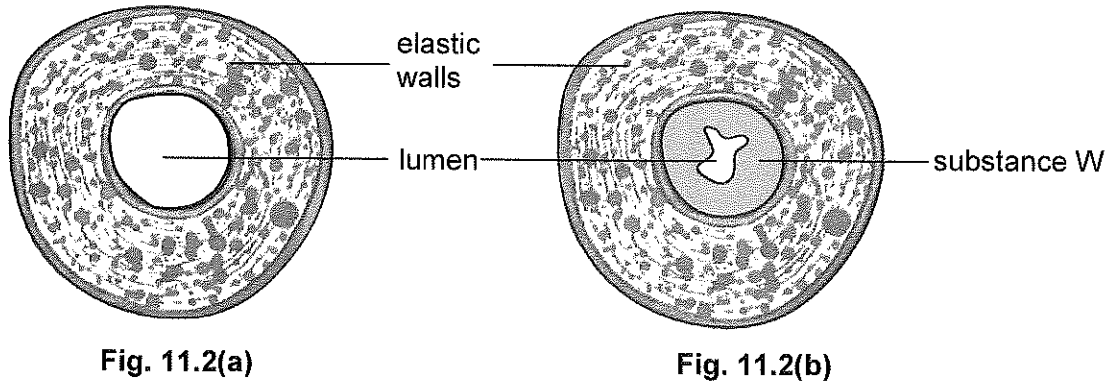
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(b) Fig. 11.2(a) shows a cross-section of a blood vessel taken from a healthy heart of a human being.

Fig. 11.2(b) shows a cross-section of the same blood vessel taken from an unhealthy heart of a human being.



**Fig. 11.2(a)**

**Fig. 11.2(b)**

- (i) State the name of the blood vessel in Fig. 11.2(a).  
 ..... [1]
- (ii) State the name of substance W in Fig. 11.2(b).  
 ..... [1]
- (iii) State the name of the disease that is caused by the condition shown in Fig. 11.2(b).  
 ..... [1]
- (iv) Describe the effect of the condition shown in Fig. 11.2(b).  
 .....  
 .....  
 .....  
 .....  
 ..... [3]

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12 Fig.12.1 shows a set-up used to investigate the necessity of carbon dioxide for photosynthesis.

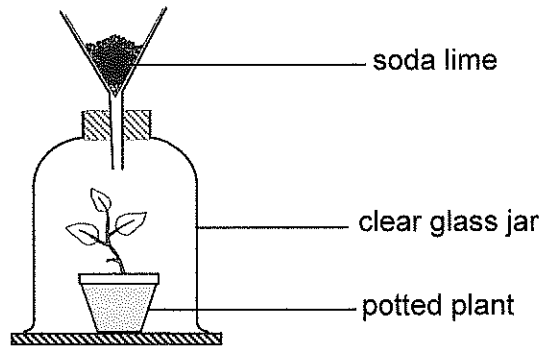


Fig. 12.1

(a) State the purpose of soda lime.

..... [1]

(b) Write a word equation for photosynthesis.

.....  
..... [1]

(c) State **one** factor, other than carbon dioxide, that is required for photosynthesis to take place.

..... [1]

(d) Fig. 12.2 is a graph showing the amount of oxygen released by the plant in Fig. 12.1.

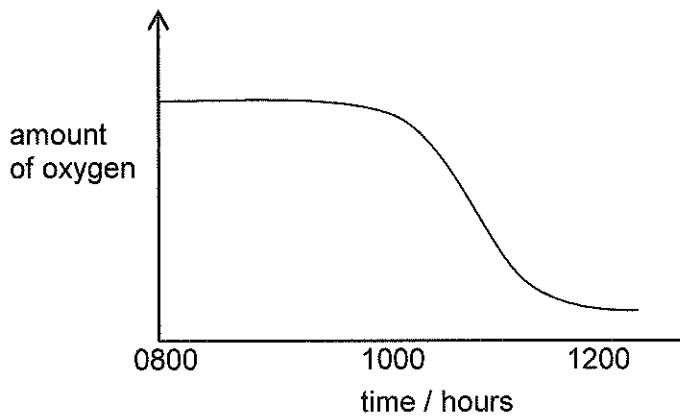


Fig. 12.2

Explain the shape of the graph from 0800 to 1200 hours.

.....  
.....  
.....  
..... [3]

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13 Fig.13.1 shows an illustration of the nervous pathway through neurones G, H and I.

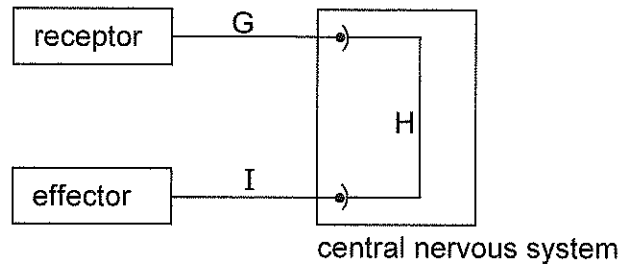


Fig. 13.1

(a) (i) State the names of the neurones labelled G and H on Fig. 13.1.

G .....

H .....

[2]

(ii) On Fig. 13.1, use arrows to show the direction of nerve impulses.

[1]

(b) State **two** functions of the spinal cord.

1 .....

2 .....

[2]

(c) Coordination in the human body is done by both the nervous system and the hormonal system.

(i) Define the term *hormone*.

.....

..... [1]

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14 Fig.14.1 shows the structure of the skin. The skin is involved in homeostasis.

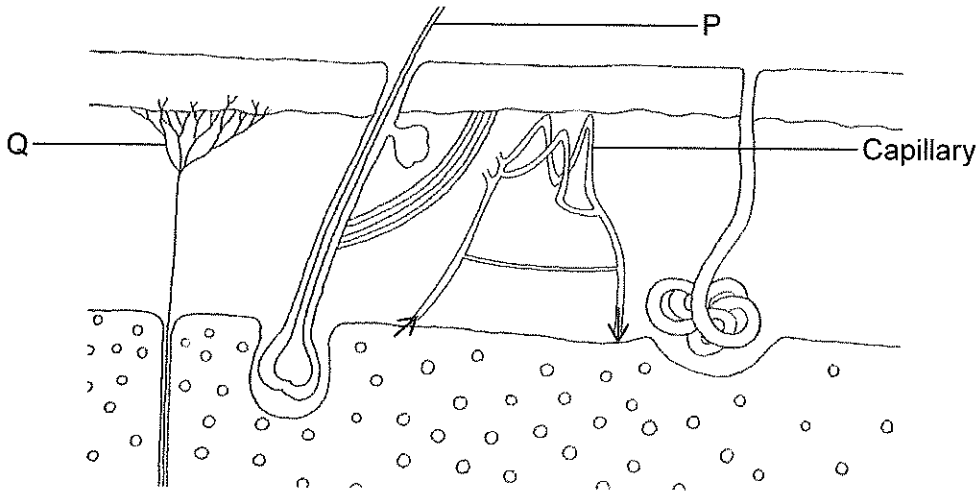


Fig. 14.1

(a) Define the term *homeostasis*.

..... [1]

(b) Identify the structures labelled P and Q on Fig. 14.1.

P .....

Q .....

[2]

(c) Fig. 14.2(a) and 14.2(b) show the state of arterioles and capillaries under different environmental conditions.

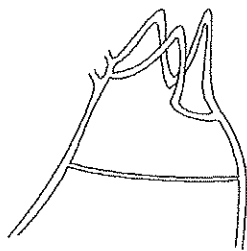


Fig. 14.2(a)

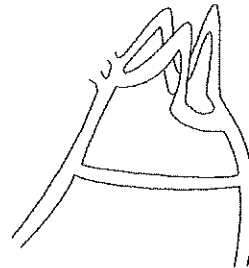


Fig. 14.2(b)

Suggest the environmental condition that resulted in the state of arterioles and capillaries shown in Fig. 14.2(a) and 14.2(b).

condition in Fig. 14.2(a).....

condition in Fig. 14.2(b).....

[1]

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(d) Describe how temperature is regulated by the arterioles in Fig. 14.2(b).

.....

.....

.....

.....

..... [3]

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**DATA SHEET**  
**The Periodic Table of the Elements**

|  |   | Group                                  |  |  |  |  |  |  |  |  |  |  |
|--|---|--|--|--|--|--|--|--|--|--|--|--|
| I                                      | II                                      | III                                    | IV                                     | V                                      | VI                                     | VII                                    | 0                                      |  |  |  |  |  |
| 7<br><b>Li</b><br>Lithium<br>3         | 9<br><b>Be</b><br>Beryllium<br>4        | 11<br><b>B</b><br>Boron<br>5           | 12<br><b>C</b><br>Carbon<br>6          | 13<br><b>Al</b><br>Aluminium<br>13     | 14<br><b>N</b><br>Nitrogen<br>7        | 15<br><b>O</b><br>Oxygen<br>8          | 16<br><b>F</b><br>Fluorine<br>9        | 17<br><b>Ne</b><br>Neon<br>10          | 19<br><b>F</b><br>Fluorine<br>9        | 35.5<br><b>Cl</b><br>Chlorine<br>17    | 40<br><b>Ar</b><br>Argon<br>18         | 4<br><b>He</b><br>Helium<br>2          |
| 23<br><b>Na</b><br>Sodium<br>11        | 24<br><b>Mg</b><br>Magnesium<br>12      | 27<br><b>Al</b><br>Aluminium<br>13     | 28<br><b>Si</b><br>Silicon<br>14       | 29<br><b>Zn</b><br>Zinc<br>30          | 31<br><b>P</b><br>Phosphorus<br>15     | 32<br><b>S</b><br>Sulphur<br>16        | 33<br><b>Cl</b><br>Chlorine<br>17      | 34<br><b>Ar</b><br>Argon<br>18         | 35<br><b>Br</b><br>Bromine<br>35       | 36<br><b>Kr</b><br>Krypton<br>36       | 38<br><b>K</b><br>Potassium<br>19      | 39<br><b>Ca</b><br>Calcium<br>20       |
| 37<br><b>Rb</b><br>Rubidium<br>37      | 38<br><b>Sr</b><br>Strontium<br>38      | 40<br><b>Ca</b><br>Calcium<br>20       | 41<br><b>Nb</b><br>Niobium<br>41       | 42<br><b>Mo</b><br>Molybdenum<br>42    | 43<br><b>Tc</b><br>Technetium<br>43    | 44<br><b>Ru</b><br>Ruthenium<br>44     | 45<br><b>Rh</b><br>Rhodium<br>45       | 46<br><b>Pd</b><br>Palladium<br>46     | 47<br><b>Ag</b><br>Silver<br>47        | 48<br><b>Cd</b><br>Cadmium<br>48       | 49<br><b>In</b><br>Indium<br>49        | 50<br><b>Tl</b><br>Thallium<br>81      |
| 55<br><b>Cs</b><br>Caesium<br>55       | 56<br><b>Ba</b><br>Barium<br>56         | 57<br><b>La</b><br>Lanthanum<br>57     | 58<br><b>Ce</b><br>Cerium<br>58        | 59<br><b>Pr</b><br>Praseodymium<br>59  | 60<br><b>Nd</b><br>Neodymium<br>60     | 61<br><b>Pm</b><br>Promethium<br>61    | 62<br><b>Sm</b><br>Samarium<br>62      | 63<br><b>Eu</b><br>Europium<br>63      | 64<br><b>Gd</b><br>Gadolinium<br>64    | 65<br><b>Tb</b><br>Terbium<br>65       | 66<br><b>Dy</b><br>Dysprosium<br>66    | 67<br><b>Ho</b><br>Holmium<br>67       |
| 87<br><b>Fr</b><br>Francium<br>87      | 88<br><b>Ra</b><br>Radium<br>88         | 89<br><b>Ac</b><br>Actinium<br>89      | 90<br><b>Th</b><br>Thorium<br>90       | 91<br><b>Pa</b><br>Protactinium<br>91  | 92<br><b>U</b><br>Uranium<br>92        | 93<br><b>Np</b><br>Neptunium<br>93     | 94<br><b>Pu</b><br>Plutonium<br>94     | 95<br><b>Am</b><br>Americium<br>95     | 96<br><b>Cm</b><br>Curium<br>96        | 97<br><b>Bk</b><br>Berkelium<br>97     | 98<br><b>Cf</b><br>Californium<br>98   | 99<br><b>Es</b><br>Einsteinium<br>99   |
| 133<br><b>Cs</b><br>Caesium<br>55      | 137<br><b>Ba</b><br>Barium<br>56        | 139<br><b>La</b><br>Lanthanum<br>57    | 140<br><b>Ce</b><br>Cerium<br>58       | 141<br><b>Pr</b><br>Praseodymium<br>59 | 144<br><b>Nd</b><br>Neodymium<br>60    | 150<br><b>Sm</b><br>Samarium<br>62     | 152<br><b>Eu</b><br>Europium<br>63     | 157<br><b>Gd</b><br>Gadolinium<br>64   | 162<br><b>Dy</b><br>Dysprosium<br>66   | 165<br><b>Ho</b><br>Holmium<br>67      | 169<br><b>Tm</b><br>Thulium<br>69      | 173<br><b>Yb</b><br>Ytterbium<br>70    |
| 187<br><b>Ir</b><br>Iridium<br>77      | 188<br><b>Re</b><br>Rhenium<br>75       | 189<br><b>Os</b><br>Osmium<br>76       | 192<br><b>Ir</b><br>Iridium<br>77      | 195<br><b>Pt</b><br>Platinum<br>78     | 196<br><b>Au</b><br>Gold<br>79         | 201<br><b>Hg</b><br>Mercury<br>80      | 204<br><b>Pb</b><br>Lead<br>82         | 207<br><b>Po</b><br>Polonium<br>84     | 209<br><b>Bi</b><br>Bismuth<br>83      | 210<br><b>At</b><br>Astatine<br>85     | 211<br><b>Rn</b><br>Radon<br>86        | 212<br><b>Fr</b><br>Francium<br>87     |
| 226<br><b>Ra</b><br>Radium<br>88       | 227<br><b>Ac</b><br>Actinium<br>89      | 232<br><b>Th</b><br>Thorium<br>90      | 238<br><b>U</b><br>Uranium<br>92       | 238<br><b>Pu</b><br>Plutonium<br>94    | 238<br><b>Np</b><br>Neptunium<br>93    | 238<br><b>Am</b><br>Americium<br>95    | 238<br><b>Cm</b><br>Curium<br>96       | 238<br><b>Bk</b><br>Berkelium<br>97    | 238<br><b>Cf</b><br>Californium<br>98  | 238<br><b>Es</b><br>Einsteinium<br>99  | 238<br><b>Fm</b><br>Fermium<br>100     | 238<br><b>Md</b><br>Mendelevium<br>101 |
| 287<br><b>Uu</b><br>Ununseptium<br>117 | 288<br><b>Uub</b><br>Ununseptium<br>118 | 289<br><b>Uu</b><br>Ununseptium<br>119 | 290<br><b>Uu</b><br>Ununseptium<br>120 | 291<br><b>Uu</b><br>Ununseptium<br>121 | 292<br><b>Uu</b><br>Ununseptium<br>122 | 293<br><b>Uu</b><br>Ununseptium<br>123 | 294<br><b>Uu</b><br>Ununseptium<br>124 | 295<br><b>Uu</b><br>Ununseptium<br>125 | 296<br><b>Uu</b><br>Ununseptium<br>126 | 297<br><b>Uu</b><br>Ununseptium<br>127 | 298<br><b>Uu</b><br>Ununseptium<br>128 | 299<br><b>Uu</b><br>Ununseptium<br>129 |
| 315<br><b>Uup</b><br>Unpentium<br>115  | 316<br><b>Uuq</b><br>Unquadium<br>116   | 317<br><b>Uuh</b><br>Unhexium<br>117   | 318<br><b>Uu</b><br>Ununseptium<br>120 | 319<br><b>Uu</b><br>Ununseptium<br>121 | 320<br><b>Uu</b><br>Ununseptium<br>122 | 321<br><b>Uu</b><br>Ununseptium<br>123 | 322<br><b>Uu</b><br>Ununseptium<br>124 | 323<br><b>Uu</b><br>Ununseptium<br>125 | 324<br><b>Uu</b><br>Ununseptium<br>126 | 325<br><b>Uu</b><br>Ununseptium<br>127 | 326<br><b>Uu</b><br>Ununseptium<br>128 | 327<br><b>Uu</b><br>Ununseptium<br>129 |
| 343<br><b>Uu</b><br>Untrium<br>113     | 344<br><b>Uu</b><br>Unquadrium<br>114   | 345<br><b>Uu</b><br>Unpentium<br>115   | 346<br><b>Uu</b><br>Unseptium<br>117   | 347<br><b>Uu</b><br>Unseptium<br>118   | 348<br><b>Uu</b><br>Unseptium<br>119   | 349<br><b>Uu</b><br>Unseptium<br>120   | 350<br><b>Uu</b><br>Unseptium<br>121   | 351<br><b>Uu</b><br>Unseptium<br>122   | 352<br><b>Uu</b><br>Unseptium<br>123   | 353<br><b>Uu</b><br>Unseptium<br>124   | 354<br><b>Uu</b><br>Unseptium<br>125   | 355<br><b>Uu</b><br>Unseptium<br>126   |
| 371<br><b>Uu</b><br>Unheptium<br>111   | 372<br><b>Uu</b><br>Unheptium<br>112    | 373<br><b>Uu</b><br>Unheptium<br>113   | 374<br><b>Uu</b><br>Unheptium<br>114   | 375<br><b>Uu</b><br>Unheptium<br>115   | 376<br><b>Uu</b><br>Unheptium<br>116   | 377<br><b>Uu</b><br>Unheptium<br>117   | 378<br><b>Uu</b><br>Unheptium<br>118   | 379<br><b>Uu</b><br>Unheptium<br>119   | 380<br><b>Uu</b><br>Unheptium<br>120   | 381<br><b>Uu</b><br>Unheptium<br>121   | 382<br><b>Uu</b><br>Unheptium<br>122   | 383<br><b>Uu</b><br>Unheptium<br>123   |
| 421<br><b>Uu</b><br>Unnonium<br>109    | 422<br><b>Uu</b><br>Unnonium<br>110     | 423<br><b>Uu</b><br>Unnonium<br>111    | 424<br><b>Uu</b><br>Unnonium<br>112    | 425<br><b>Uu</b><br>Unnonium<br>113    | 426<br><b>Uu</b><br>Unnonium<br>114    | 427<br><b>Uu</b><br>Unnonium<br>115    | 428<br><b>Uu</b><br>Unnonium<br>116    | 429<br><b>Uu</b><br>Unnonium<br>117    | 430<br><b>Uu</b><br>Unnonium<br>118    | 431<br><b>Uu</b><br>Unnonium<br>119    | 432<br><b>Uu</b><br>Unnonium<br>120    | 433<br><b>Uu</b><br>Unnonium<br>121    |
| 471<br><b>Uu</b><br>Undecium<br>107    | 472<br><b>Uu</b><br>Undecium<br>108     | 473<br><b>Uu</b><br>Undecium<br>109    | 474<br><b>Uu</b><br>Undecium<br>110    | 475<br><b>Uu</b><br>Undecium<br>111    | 476<br><b>Uu</b><br>Undecium<br>112    | 477<br><b>Uu</b><br>Undecium<br>113    | 478<br><b>Uu</b><br>Undecium<br>114    | 479<br><b>Uu</b><br>Undecium<br>115    | 480<br><b>Uu</b><br>Undecium<br>116    | 481<br><b>Uu</b><br>Undecium<br>117    | 482<br><b>Uu</b><br>Undecium<br>118    | 483<br><b>Uu</b><br>Undecium<br>119    |
| 521<br><b>Uu</b><br>Untrium<br>105     | 522<br><b>Uu</b><br>Untrium<br>106      | 523<br><b>Uu</b><br>Untrium<br>107     | 524<br><b>Uu</b><br>Untrium<br>108     | 525<br><b>Uu</b><br>Untrium<br>109     | 526<br><b>Uu</b><br>Untrium<br>110     | 527<br><b>Uu</b><br>Untrium<br>111     | 528<br><b>Uu</b><br>Untrium<br>112     | 529<br><b>Uu</b><br>Untrium<br>113     | 530<br><b>Uu</b><br>Untrium<br>114     | 531<br><b>Uu</b><br>Untrium<br>115     | 532<br><b>Uu</b><br>Untrium<br>116     | 533<br><b>Uu</b><br>Untrium<br>117     |
| 571<br><b>Uu</b><br>Unpentium<br>103   | 572<br><b>Uu</b><br>Unpentium<br>104    | 573<br><b>Uu</b><br>Unpentium<br>105   | 574<br><b>Uu</b><br>Unpentium<br>106   | 575<br><b>Uu</b><br>Unpentium<br>107   | 576<br><b>Uu</b><br>Unpentium<br>108   | 577<br><b>Uu</b><br>Unpentium<br>109   | 578<br><b>Uu</b><br>Unpentium<br>110   | 579<br><b>Uu</b><br>Unpentium<br>111   | 580<br><b>Uu</b><br>Unpentium<br>112   | 581<br><b>Uu</b><br>Unpentium<br>113   | 582<br><b>Uu</b><br>Unpentium<br>114   | 583<br><b>Uu</b><br>Unpentium<br>115   |
| 621<br><b>Uu</b><br>Unheptium<br>101   | 622<br><b>Uu</b><br>Unheptium<br>102    | 623<br><b>Uu</b><br>Unheptium<br>103   | 624<br><b>Uu</b><br>Unheptium<br>104   | 625<br><b>Uu</b><br>Unheptium<br>105   | 626<br><b>Uu</b><br>Unheptium<br>106   | 627<br><b>Uu</b><br>Unheptium<br>107   | 628<br><b>Uu</b><br>Unheptium<br>108   | 629<br><b>Uu</b><br>Unheptium<br>109   | 630<br><b>Uu</b><br>Unheptium<br>110   | 631<br><b>Uu</b><br>Unheptium<br>111   | 632<br><b>Uu</b><br>Unheptium<br>112   | 633<br><b>Uu</b><br>Unheptium<br>113   |
| 671<br><b>Uu</b><br>Unnonium<br>99     | 672<br><b>Uu</b><br>Unnonium<br>100     | 673<br><b>Uu</b><br>Unnonium<br>101    | 674<br><b>Uu</b><br>Unnonium<br>102    | 675<br><b>Uu</b><br>Unnonium<br>103    | 676<br><b>Uu</b><br>Unnonium<br>104    | 677<br><b>Uu</b><br>Unnonium<br>105    | 678<br><b>Uu</b><br>Unnonium<br>106    | 679<br><b>Uu</b><br>Unnonium<br>107    | 680<br><b>Uu</b><br>Unnonium<br>108    | 681<br><b>Uu</b><br>Unnonium<br>109    | 682<br><b>Uu</b><br>Unnonium<br>110    | 683<br><b>Uu</b><br>Unnonium<br>111    |
| 721<br><b>Uu</b><br>Untrium<br>95      | 722<br><b>Uu</b><br>Untrium<br>96       | 723<br><b>Uu</b><br>Untrium<br>97      | 724<br><b>Uu</b><br>Untrium<br>98      | 725<br><b>Uu</b><br>Untrium<br>99      | 726<br><b>Uu</b><br>Untrium<br>100     | 727<br><b>Uu</b><br>Untrium<br>101     | 728<br><b>Uu</b><br>Untrium<br>102     | 729<br><b>Uu</b><br>Untrium<br>103     | 730<br><b>Uu</b><br>Untrium<br>104     | 731<br><b>Uu</b><br>Untrium<br>105     | 732<br><b>Uu</b><br>Untrium<br>106     | 733<br><b>Uu</b><br>Untrium<br>107     |
| 771<br><b>Uu</b><br>Unheptium<br>91    | 772<br><b>Uu</b><br>Unheptium<br>92     | 773<br><b>Uu</b><br>Unheptium<br>93    | 774<br><b>Uu</b><br>Unheptium<br>94    | 775<br><b>Uu</b><br>Unheptium<br>95    | 776<br><b>Uu</b><br>Unheptium<br>96    | 777<br><b>Uu</b><br>Unheptium<br>97    | 778<br><b>Uu</b><br>Unheptium<br>98    | 779<br><b>Uu</b><br>Unheptium<br>99    | 780<br><b>Uu</b><br>Unheptium<br>100   | 781<br><b>Uu</b><br>Unheptium<br>101   | 782<br><b>Uu</b><br>Unheptium<br>102   | 783<br><b>Uu</b><br>Unheptium<br>103   |
| 821<br><b>Uu</b><br>Unnonium<br>87     | 822<br><b>Uu</b><br>Unnonium<br>88      | 823<br><b>Uu</b><br>Unnonium<br>89     | 824<br><b>Uu</b><br>Unnonium<br>90     | 825<br><b>Uu</b><br>Unnonium<br>91     | 826<br><b>Uu</b><br>Unnonium<br>92     | 827<br><b>Uu</b><br>Unnonium<br>93     | 828<br><b>Uu</b><br>Unnonium<br>94     | 829<br><b>Uu</b><br>Unnonium<br>95     | 830<br><b>Uu</b><br>Unnonium<br>96     | 831<br><b>Uu</b><br>Unnonium<br>97     | 832<br><b>Uu</b><br>Unnonium<br>98     | 833<br><b>Uu</b><br>Unnonium<br>99     |
| 871<br><b>Uu</b><br>Untrium<br>83      | 872<br><b>Uu</b><br>Untrium<br>84       | 873<br><b>Uu</b><br>Untrium<br>85      | 874<br><b>Uu</b><br>Untrium<br>86      | 875<br><b>Uu</b><br>Untrium<br>87      | 876<br><b>Uu</b><br>Untrium<br>88      | 877<br><b>Uu</b><br>Untrium<br>89      | 878<br><b>Uu</b><br>Untrium<br>90      | 879<br><b>Uu</b><br>Untrium<br>91      | 880<br><b>Uu</b><br>Untrium<br>92      | 881<br><b>Uu</b><br>Untrium<br>93      | 882<br><b>Uu</b><br>Untrium<br>94      | 883<br><b>Uu</b><br>Untrium<br>95      |
| 921<br><b>Uu</b><br>Unheptium<br>79    | 922<br><b>Uu</b><br>Unheptium<br>80     | 923<br><b>Uu</b><br>Unheptium<br>81    | 924<br><b>Uu</b><br>Unheptium<br>82    | 925<br><b>Uu</b><br>Unheptium<br>83    | 926<br><b>Uu</b><br>Unheptium<br>84    | 927<br><b>Uu</b><br>Unheptium<br>85    | 928<br><b>Uu</b><br>Unheptium<br>86    | 929<br><b>Uu</b><br>Unheptium<br>87    | 930<br><b>Uu</b><br>Unheptium<br>88    | 931<br><b>Uu</b><br>Unheptium<br>89    | 932<br><b>Uu</b><br>Unheptium<br>90    | 933<br><b>Uu</b><br>Unheptium<br>91    |
| 971<br><b>Uu</b><br>Unnonium<br>75     | 972<br><b>Uu</b><br>Unnonium<br>76      | 973<br><b>Uu</b><br>Unnonium<br>77     | 974<br><b>Uu</b><br>Unnonium<br>78     | 975<br><b>Uu</b><br>Unnonium<br>79     | 976<br><b>Uu</b><br>Unnonium<br>80     | 977<br><b>Uu</b><br>Unnonium<br>81     | 978<br><b>Uu</b><br>Unnonium<br>82     | 979<br><b>Uu</b><br>Unnonium<br>83     | 980<br><b>Uu</b><br>Unnonium<br>84     | 981<br><b>Uu</b><br>Unnonium<br>85     | 982<br><b>Uu</b><br>Unnonium<br>86     | 983<br><b>Uu</b><br>Unnonium<br>87     |
| 1021<br><b>Uu</b><br>Untrium<br>71     | 1022<br><b>Uu</b><br>Untrium<br>72      | 1023<br><b>Uu</b><br>Untrium<br>73     | 1024<br><b>Uu</b><br>Untrium<br>74     | 1025<br><b>Uu</b><br>Untrium<br>75     | 1026<br><b>Uu</b><br>Untrium<br>76     | 1027<br><b>Uu</b><br>Untrium<br>77     | 1028<br><b>Uu</b><br>Untrium<br>78     | 1029<br><b>Uu</b><br>Untrium<br>79     | 1030<br><b>Uu</b><br>Untrium<br>80     | 1031<br><b>Uu</b><br>Untrium<br>81     | 1032<br><b>Uu</b><br>Untrium<br>82     | 1033<br><b>Uu</b><br>Untrium<br>83     |
| 1071<br><b>Uu</b><br>Unheptium<br>67   | 1072<br><b>Uu</b><br>Unheptium<br>68    | 1073<br><b>Uu</b><br>Unheptium<br>69   | 1074<br><b>Uu</b><br>Unheptium<br>70   | 1075<br><b>Uu</b><br>Unheptium<br>71   | 1076<br><b>Uu</b><br>Unheptium<br>72   | 1077<br><b>Uu</b><br>Unheptium<br>73   | 1078<br><b>Uu</b><br>Unheptium<br>74   | 1079<br><b>Uu</b><br>Unheptium<br>75   | 1080<br><b>Uu</b><br>Unheptium<br>76   | 1081<br><b>Uu</b><br>Unheptium<br>77   | 1082<br><b>Uu</b><br>Unheptium<br>78   | 1083<br><b>Uu</b><br>Unheptium<br>79   |
| 1121<br><b>Uu</b><br>Unnonium<br>63    | 1122<br><b>Uu</b><br>Unnonium<br>64     | 1123<br><b>Uu</b><br>Unnonium<br>65    | 1124<br><b>Uu</b><br>Unnonium<br>66    | 1125<br><b>Uu</b><br>Unnonium<br>67    | 1126<br><b>Uu</b><br>Unnonium<br>68    | 1127<br><b>Uu</b><br>Unnonium<br>69    | 1128<br><b>Uu</b><br>Unnonium<br>70    | 1129<br><b>Uu</b><br>Unnonium<br>71    | 1130<br><b>Uu</b><br>Unnonium<br>72    | 1131<br><b>Uu</b><br>Unnonium<br>73    | 1132<br><b>Uu</b><br>Unnonium<br>74    | 1133<br><b>Uu</b><br>Unnonium<br>75    |
| 1171<br><b>Uu</b><br>Untrium<br>59     | 1172<br><b>Uu</b><br>Untrium<br>60      | 1173<br><b>Uu</b><br>Untrium<br>61     | 1174<br><b>Uu</b><br>Untrium<br>62     | 1175<br><b>Uu</b><br>Untrium<br>63     | 1176<br><b>Uu</b><br>Untrium<br>64     | 1177<br><b>Uu</b><br>Untrium<br>65     | 1178<br><b>Uu</b><br>Untrium<br>66     | 1179<br><b>Uu</b><br>Untrium<br>67     | 1180<br><b>Uu</b><br>Untrium<br>68     | 1181<br><b>Uu</b><br>Untrium<br>69     | 1182<br><b>Uu</b><br>Untrium<br>70     | 1183<br><b>Uu</b><br>Untrium<br>71     |
| 1221<br><b>Uu</b><br>Unheptium<br>51   | 1222<br><b>Uu</b><br>Unheptium<br>52    | 1223<br><b>Uu</b><br>Unheptium<br>53   | 1224<br><b>Uu</b><br>Unheptium<br>54   | 1225<br><b>Uu</b><br>Unheptium<br>55   | 1226<br><b>Uu</b><br>Unheptium<br>56   | 1227<br><b>Uu</b><br>Unheptium<br>57   | 1228<br><b>Uu</b><br>Unheptium<br>58   | 1229<br><b>Uu</b><br>Unheptium<br>59   | 1230<br><b>Uu</b><br>Unheptium<br>60   | 1231<br><b>Uu</b><br>Unheptium<br>61   | 1232<br><b>Uu</b><br>Unheptium<br>62   | 1233<br><b>Uu</b><br>Unheptium<br>63   |
| 1271<br><b>Uu</b><br>Unnonium<br>47    | 1272<br><b>Uu</b><br>Unnonium<br>48     | 1273<br><b>Uu</b><br>Unnonium<br>49    | 1274<br><b>Uu</b><br>Unnonium<br>50    | 1275<br><b>Uu</b><br>Unnonium<br>51    | 1276<br><b>Uu</b><br>Unnonium<br>52    | 1277<br><b>Uu</b><br>Unnonium<br>53    | 1278<br><b>Uu</b><br>Unnonium<br>54    | 1279<br><b>Uu</b><br>Unnonium<br>55    | 1280<br><b>Uu</b><br>Unnonium<br>56    | 1281<br><b>Uu</b><br>Unnonium<br>57    | 1282<br><b>Uu</b><br>Unnonium<br>58    | 1283<br><b>Uu</b><br>Unnonium<br>59    |
| 1321<br><b>Uu</b><br>Untrium<br>43     | 1322<br><b>Uu</b><br>Untrium<br>44      | 1323<br><b>Uu</b><br>Untrium<br>45     | 1324<br><b>Uu</b><br>Untrium<br>46     | 1325<br><b>Uu</b><br>Untrium<br>47     | 1326<br><b>Uu</b><br>Untrium<br>48     | 1327<br><b>Uu</b><br>Untrium<br>49     | 1328<br><b>Uu</b><br>Untrium<br>50     | 1329<br><b>Uu</b><br>Untrium<br>51     | 1330<br><b>Uu</b><br>Untrium<br>52     | 1331<br><b>Uu</b><br>Untrium<br>53     | 1332<br><b>Uu</b><br>Untrium<br>54     | 1333<br><b>Uu</b><br>Untrium<br>55     |
| 1371<br><b>Uu</b><br>Unheptium<br>39   | 1372<br><b>Uu</b><br>Unheptium<br>40    | 1373<br><b>Uu</b><br>Unheptium<br>41   | 1374<br><b>Uu</b><br>Unheptium<br>42   | 1375<br><b>Uu</b><br>Unheptium<br>43   | 1376<br><b>Uu</b><br>Unheptium<br>44   | 1377<br><b>Uu</b><br>Unheptium<br>45   | 1378<br><b>Uu</b><br>Unheptium<br>46   | 1379<br><b>Uu</b><br>Unheptium<br>47   | 1380<br><b>Uu</b><br>Unheptium<br>48   | 1381<br><b>Uu</b><br>Unheptium<br>49   | 1382<br><b>Uu</b><br>Unheptium<br>50   | 1383<br><b>Uu</b><br>Unheptium<br>51   |
| 1421<br><b>Uu</b><br>Unnonium<br>35    | 1422<br><b>Uu</b><br>Unnonium<br>36     | 1423<br><b>Uu</b><br>Unnonium<br>37    | 1424<br><b>Uu</b><br>Unnonium<br>38    | 1425<br><b>Uu</b><br>Unnonium<br>39    | 1426<br><b>Uu</b><br>Unnonium<br>40    | 1427<br><b>Uu</b><br>Unnonium<br>41    | 1428<br><b>Uu</b><br>Unnonium<br>42    | 1429<br><b>Uu</b><br>Unnonium<br>43    | 1430<br><b>Uu</b><br>Unnonium<br>44    | 1431<br><b>Uu</b><br>Unnonium<br>45    | 1432<br><b>Uu</b><br>Unnonium<br>46    | 1433<br><b>Uu</b><br>Unnonium<br>47    |
| 1471<br><b>Uu</b><br>Untrium<br>31     | 1472<br><b>Uu</b><br>Untrium<br>32      | 1473<br><b>Uu</b><br>Untrium<br>33     | 1474<br><b>U</b>                       |  |  |  |  |  |  |  |  |  |