

|             |               |                  |
|-------------|---------------|------------------|
| Surname     | Centre Number | Candidate Number |
| Other Names |               | 0                |



**GCSE**

4782/01

**SCIENCE B**

**UNIT 2: Science and Life in the Modern World  
FOUNDATION TIER**

P.M. TUESDAY, 10 June 2014

1 hour

| For Examiner's use only |              |              |
|-------------------------|--------------|--------------|
| Question                | Maximum Mark | Mark Awarded |
| 1.                      | 6            |              |
| 2.                      | 9            |              |
| 3.                      | 7            |              |
| 4.                      | 9            |              |
| 5.                      | 13           |              |
| 6.                      | 7            |              |
| 7.                      | 9            |              |
| <b>Total</b>            | <b>60</b>    |              |

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**ADDITIONAL MATERIALS**

In addition to this paper you may require a calculator and ruler.

**INSTRUCTIONS TO CANDIDATES**

Use black ink or black ball-point pen.

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 pages 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 that assessment will take into account the quality of written communication used in your answer to question 7(b).

A periodic table is printed on page 16.

Answer all questions.

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1. (a) Complete the following table. [2]

| Element   | Symbol | Metal or non-metal |
|-----------|--------|--------------------|
| copper    | Cu     | metal              |
| sulphur   | .....  | non-metal          |
| potassium | K      | .....              |

- (b) Use the Periodic Table on page 16 to answer the following question.  
Give the symbol **or** name of an element in the same **group** as potassium. [1]

.....

- (c) The following table describes the properties of element **X** and element **Y**.

| Property                        | Element X | Element Y |
|---------------------------------|-----------|-----------|
| Melting point (°C)              | 1538      | 115       |
| Electrical conductivity (units) | 8         | 0         |
| Density (g/cm <sup>3</sup> )    | 8         | 2         |
| Thermal conductivity (units)    | 10        | 0.1       |

- (i) Place a tick (✓) in the box next to the one correct statement below. [1]

**X** and **Y** are both metals

**X** and **Y** are both non-metals

**X** is a metal and **Y** is a non-metal

**X** is a non-metal and **Y** is a metal

- (ii) Use the information in the table to give **two** reasons for your choice. [2]

1. ....

2. ....

2. 'Be treatwise' is a new way to label treats like chocolate and sweets. The information below is from a chocolate bar, the 'Choco Crunch Bar'.

**Choco Crunch Bar**

|                      |                  |              |                    |                |
|----------------------|------------------|--------------|--------------------|----------------|
| Calories<br>185 kcal | Sugars<br>25.7 g | Fat<br>7.0 g | Saturates<br>5.0 g | Salt<br>0.28 g |
| 9.0%<br>GDA          | 26%<br>GDA       | 10%<br>GDA   | 25%<br>GDA         | 5%<br>GDA      |

- (a) Use the information above to answer the following questions for the 'Choco Crunch Bar'.

- (i) State the **two** food groups that have the highest percentage of GDA (Guided Daily Amount). [2]

1. ....
2. ....

- (ii) The 'Choco Crunch Bar' has 5.0 g of saturates which is 25% of your GDA. Calculate the total GDA for saturates. [2]

..... g

- (b) The 'Choco Fruit Bar' has been made as a healthy alternative option to the 'Choco Crunch Bar'.

**Choco Fruit Bar**

|                      |                  |              |                    |                |
|----------------------|------------------|--------------|--------------------|----------------|
| Calories<br>150 kcal | Sugars<br>18.7 g | Fat<br>5.0 g | Saturates<br>3.0 g | Salt<br>0.28 g |
| 7.5%<br>GDA          | 19%<br>GDA       | 7.1%<br>GDA  | 15%<br>GDA         | 5%<br>GDA      |

- (i) Give **two** reasons why the 'Choco Fruit Bar' is healthier. [2]

1. ....
2. ....

(ii) Calculate the total number of calories in **two** 'Choco Fruit Bars'.

[1]

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..... kcal

(iii) Later in the day a student goes running. Running uses 15 kcal of energy per minute. For how long must the student run to use the energy in both 'Choco Fruit Bars'?

[2]

..... minutes

|   |
|---|
|   |
| 9 |

3. The picture below is of a chromosome taken from a human white blood cell.



(a) (i) State the **total** number of chromosomes found in a human white blood cell. [1]

.....

(ii) Name the part of the cell where you would find the chromosomes. [1]

.....

(iii) Name the part of the chromosome that contains genetic information. [1]

.....

(b) (i) Cystic fibrosis is an inherited disease. We can predict the chance of a person suffering from this disease using a Punnett square. Complete the Punnett square to show the cross between two heterozygous parents. [1]

|        |   | Mother |       |
|--------|---|--------|-------|
|        |   | B      | b     |
| Father | B | .....  | ..... |
|        | b | .....  | ..... |

(ii) What is the genotype of the cystic fibrosis sufferer? [1]

.....

(iii) **Circle** the correct answer which shows the percentage chance of these parents producing a baby with cystic fibrosis: [1]

0%      25%      50%      100%

(c) State **one** piece of advice that may be offered to these parents by a genetic counsellor. [1]

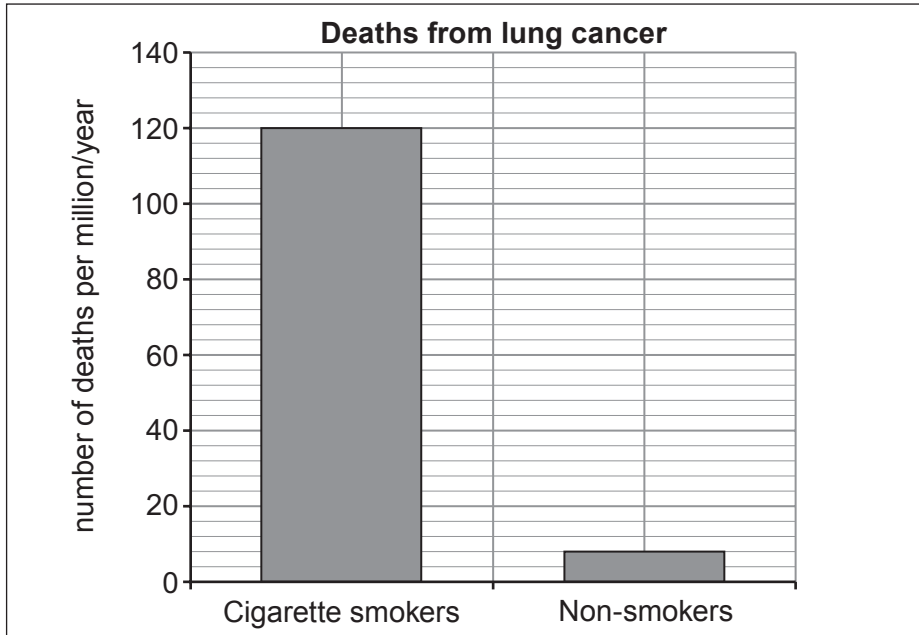
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4. (a) Use the terms below to complete the following sentences about the harmful effects of smoking. [4]

high blood pressure    oxygen    nitrogen    addictive  
kidneys                    lungs    cancer

- (i) People find it difficult to give up smoking because nicotine is .....
  - (ii) Nicotine narrows the arteries and causes .....
  - (iii) Tar coats the lining of the ..... making them less able to take in oxygen.
  - (iv) Carbon monoxide is a poisonous gas which combines with red blood cells making them unable to carry ..... around the body.
- (b) Lung cancer is one of the most common diseases associated with smoking. The graph below gives information about the number of deaths from lung cancer for people aged 50-70 years old.



Use the information in the bar chart to answer the following questions.

- (i) How many deaths per million per year are recorded for smokers? [1]  
.....
- (ii) A recent survey shows that 13 million people smoke in the UK. Calculate how many of those smoking, you expect to die per year from lung cancer. [2]

..... people

(c) State **two** ways in which the government in the UK has helped to reduce smoking. [2]

- 1. ....  
.....
- 2. ....  
.....

|   |
|---|
|   |
| 9 |

5. Neutralisation reactions occur when acids and alkali react together. Metals can also neutralise acids. The general equation for the reaction between a metal and acid is given by:



- (a) Complete the word equation for the reaction below. [2]

magnesium + hydrochloric acid  $\longrightarrow$  ..... + .....

- (b) Kate is studying the reaction between hydrochloric acid and the metal magnesium.

In her experiment she:

1. measured 25 cm<sup>3</sup> dilute hydrochloric acid at 20 °C with a measuring cylinder;
2. added the acid to a conical flask;
3. added 1 g of magnesium to the acid and started a stop watch;
4. measured the total volume of gas every 20 seconds.

The results of her experiment are shown below.

#### Kate's Results

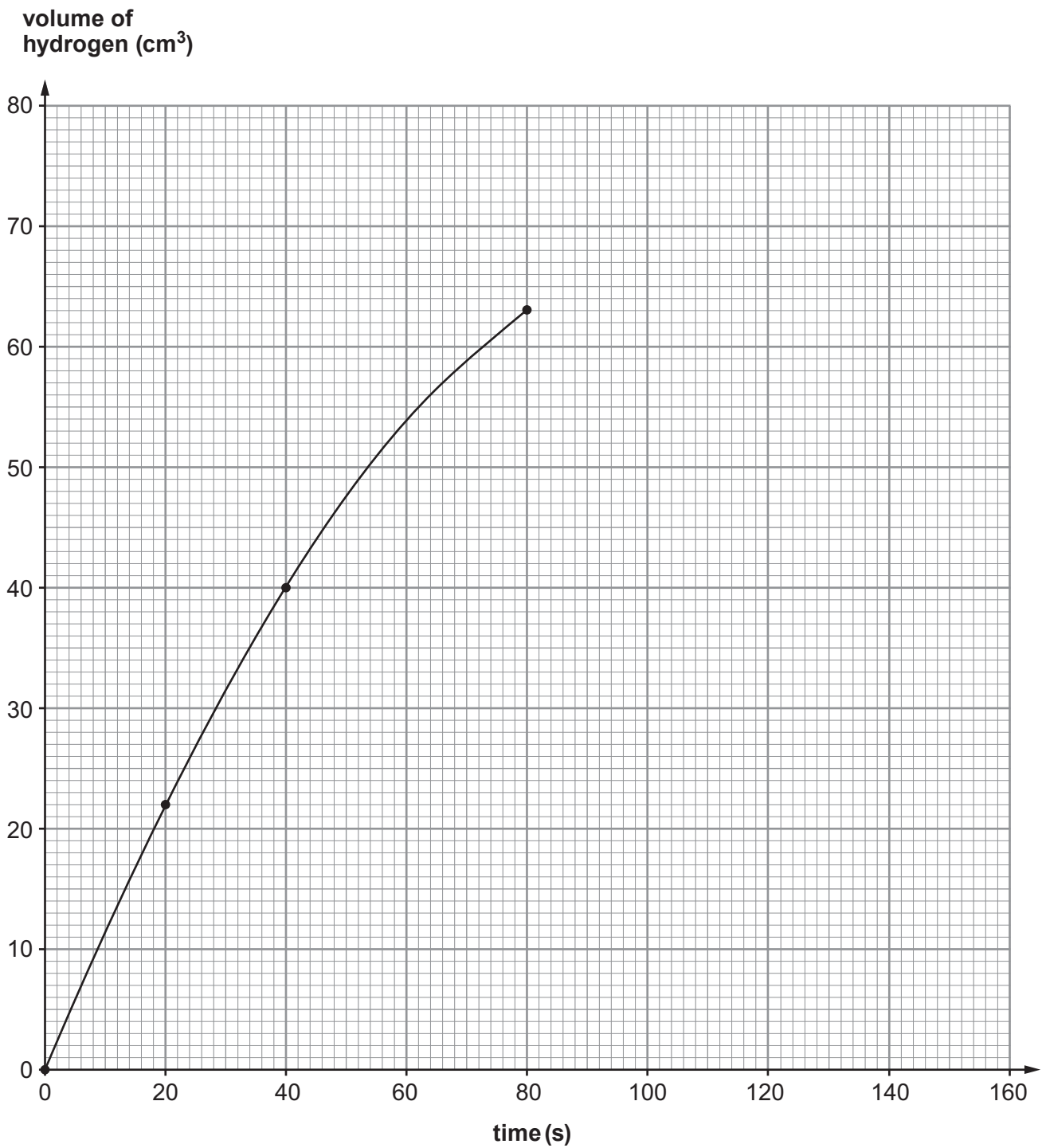
|                                       |   |    |    |    |    |     |     |     |     |
|---------------------------------------|---|----|----|----|----|-----|-----|-----|-----|
| Time (s)                              | 0 | 20 | 40 | 60 | 80 | 100 | 120 | 140 | 160 |
| Volume of hydrogen (cm <sup>3</sup> ) | 0 | 22 | 40 |    | 63 | 68  | 71  | 72  | 72  |



(i) Complete the graph of her results.

[3]

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(ii) Kate has lost her result for 60 s. Use your graph to estimate the volume of gas at 60s. [1]

..... cm<sup>3</sup>

(iii) State **one** way in which Kate can improve the validity of her experiment. [1]

.....

(iv) Explain what happens to the pH during this reaction. [2]

.....

.....

.....

(v) Predict the volume of hydrogen you would expect to be collected after 200s. Give **one** reason for your answer. [2]

.....

.....

.....

(c) Kate wants to compare the volume of hydrogen given off every 20 seconds if she repeated the experiment with iron instead of magnesium. State **two** variables that need to be controlled to ensure a fair test. [2]

1. ....

2. ....

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6. (a) Complete the following table about the extraction of iron in the blast furnace. [3]  
You will need to use some of the terms and statements in the box below when you complete the table.

- sandstone
- burns to produce carbon dioxide and carbon monoxide
- this ore contains aluminium
- the ore that contains iron
- aluminium oxide
- iron oxide

| Raw material | Chemical name     | The purpose of the raw material                     |
|--------------|-------------------|---|
| limestone    | calcium carbonate | Removes impurities which form the waste called slag |
| hot air      | oxygen            | Allows the coke to burn                             |
| coke         | carbon            | .....<br>.....<br>.....                             |
| haematite    | .....<br>.....    | .....<br>.....<br>.....                             |

- (b) The table below shows information about the materials required for the production of **one tonne** of iron.

Complete the table to calculate the total cost of producing **one** tonne of iron. [2]

| Raw material | Mass needed (tonnes) | Cost per tonne of raw material (£) | Cost in producing one tonne of iron (£) |
|--------------|----------------------|------------------------------------|---|
| iron ore     | 1.75                 | 60                                 | 105                                     |
| coke         | 0.25                 | 120                                | 30                                      |
| limestone    | 0.25                 | 80                                 | 20                                      |
| hot air      | 4.0                  | 2                                  | .....                                   |
|              |                      | Total cost                         | £ .....                                 |

- (c) Aluminium is also extracted from its ore. Explain why aluminium cannot be extracted in a blast furnace using coke (carbon). [2]

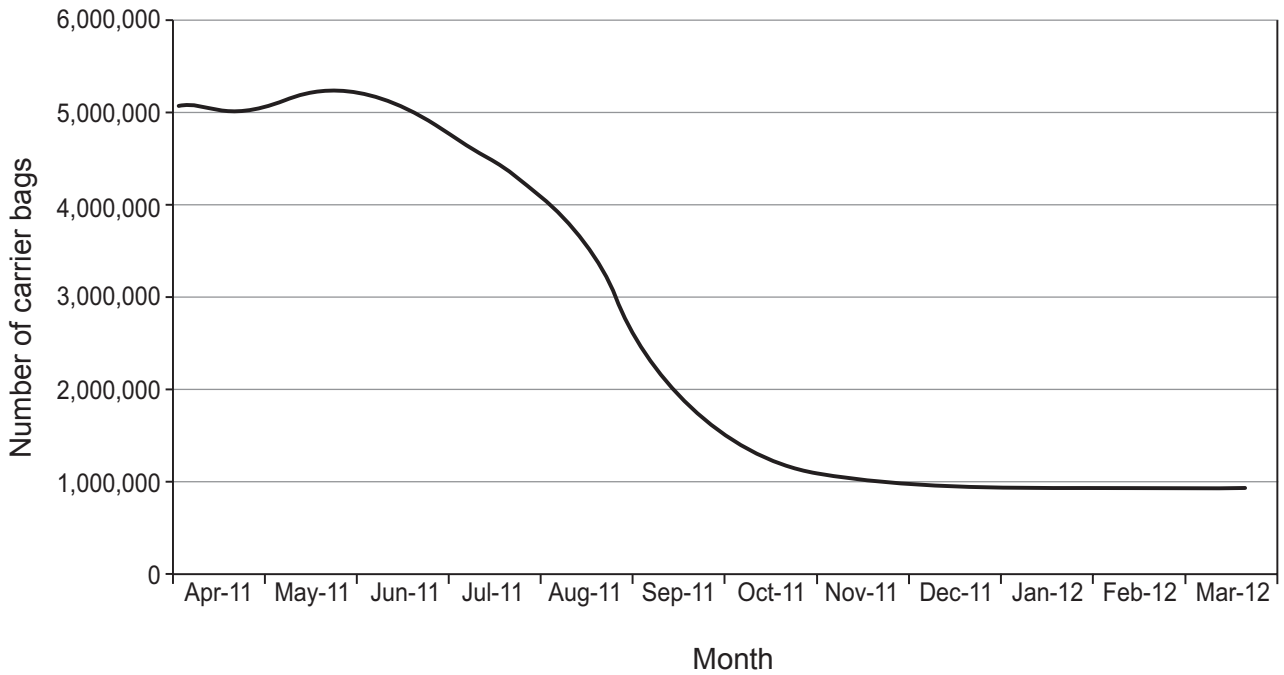
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.....

.....

7. On 1 October 2011, Wales became the first UK country to introduce a charge for plastic single-use carrier bags. In the latest estimates from the Welsh Government, they claim that there has been an 80-90% drop in 'plastic single-use' carrier bags.

The following graph shows the decline in the number of 'plastic single use' carrier bags sold in a major supermarket chain in Wales for the period April 2011 – March 2012.



- (a) Use the information in the graph to explain whether the claim made by the Welsh government is valid. [3]

.....

.....

.....

.....

.....



# Periodic Table of the Elements

element name  
atomic number  
symbol

|   |                             |                              |                              |                              |                             |                              |                              |                             |                            |
|---|-----------------------------|------------------------------|------------------------------|------------------------------|-----------------------------|------------------------------|------------------------------|-----------------------------|----------------------------|
| 1 | 2                           | 3                            | 4                            | 5                            | 6                           | 7                            | 0                            |                             |                            |
| 1 | lithium<br>3<br><b>Li</b>   | beryllium<br>4<br><b>Be</b>  | hydrogen<br>1<br><b>H</b>    | boron<br>5<br><b>B</b>       | carbon<br>6<br><b>C</b>     | nitrogen<br>7<br><b>N</b>    | oxygen<br>8<br><b>O</b>      | fluorine<br>9<br><b>F</b>   | helium<br>2<br><b>He</b>   |
| 2 | sodium<br>11<br><b>Na</b>   | magnesium<br>12<br><b>Mg</b> | aluminium<br>13<br><b>Al</b> | boron<br>5<br><b>B</b>       | carbon<br>6<br><b>C</b>     | nitrogen<br>7<br><b>N</b>    | oxygen<br>8<br><b>O</b>      | fluorine<br>9<br><b>F</b>   | neon<br>10<br><b>Ne</b>    |
| 3 | Potassium<br>19<br><b>K</b> | calcium<br>20<br><b>Ca</b>   | scandium<br>21<br><b>Sc</b>  | aluminium<br>13<br><b>Al</b> | silicon<br>14<br><b>Si</b>  | phosphorus<br>15<br><b>P</b> | sulfur<br>16<br><b>S</b>     | chlorine<br>17<br><b>Cl</b> | argon<br>18<br><b>Ar</b>   |
| 4 | rubidium<br>37<br><b>Rb</b> | strontium<br>38<br><b>Sr</b> | yttrium<br>39<br><b>Y</b>    | zinc<br>30<br><b>Zn</b>      | gallium<br>31<br><b>Ga</b>  | arsenic<br>33<br><b>As</b>   | selenium<br>34<br><b>Se</b>  | bromine<br>35<br><b>Br</b>  | krypton<br>36<br><b>Kr</b> |
| 5 | caesium<br>55<br><b>Cs</b>  | barium<br>56<br><b>Ba</b>    | lutetium<br>71<br><b>Lu</b>  | Cadmium<br>48<br><b>Cd</b>   | Indium<br>49<br><b>In</b>   | antimony<br>51<br><b>Sb</b>  | tellurium<br>52<br><b>Te</b> | iodine<br>53<br><b>I</b>    | xenon<br>54<br><b>Xe</b>   |
| 6 | francium<br>87<br><b>Fr</b> | radium<br>88<br><b>Ra</b>    | thallium<br>81<br><b>Tl</b>  | mercury<br>80<br><b>Hg</b>   | lead<br>82<br><b>Pb</b>     | bismuth<br>83<br><b>Bi</b>   | polonium<br>84<br><b>Po</b>  | astatine<br>85<br><b>At</b> | radon<br>86<br><b>Rn</b>   |
| 7 |                             |                              | iridium<br>77<br><b>Ir</b>   | gold<br>79<br><b>Au</b>      | platinum<br>78<br><b>Pt</b> | mercury<br>80<br><b>Hg</b>   | thallium<br>81<br><b>Tl</b>  | lead<br>82<br><b>Pb</b>     |                            |
|   |                             |                              | osmium<br>76<br><b>Os</b>    | silver<br>47<br><b>Ag</b>    | nickel<br>28<br><b>Ni</b>   | Copper<br>29<br><b>Cu</b>    | zinc<br>30<br><b>Zn</b>      |                             |                            |
|   |                             |                              | rhenium<br>75<br><b>Re</b>   | gold<br>79<br><b>Au</b>      | platinum<br>78<br><b>Pt</b> | nickel<br>28<br><b>Ni</b>    | Copper<br>29<br><b>Cu</b>    |                             |                            |
|   |                             |                              | tungsten<br>74<br><b>W</b>   | silver<br>47<br><b>Ag</b>    | platinum<br>78<br><b>Pt</b> | nickel<br>28<br><b>Ni</b>    | Copper<br>29<br><b>Cu</b>    |                             |                            |
|   |                             |                              | tantalum<br>73<br><b>Ta</b>  | rhodium<br>45<br><b>Rh</b>   | platinum<br>78<br><b>Pt</b> | nickel<br>28<br><b>Ni</b>    | Copper<br>29<br><b>Cu</b>    |                             |                            |
|   |                             |                              | niobium<br>41<br><b>Nb</b>   | rhodium<br>45<br><b>Rh</b>   | platinum<br>78<br><b>Pt</b> | nickel<br>28<br><b>Ni</b>    | Copper<br>29<br><b>Cu</b>    |                             |                            |
|   |                             |                              | vanadium<br>23<br><b>V</b>   | rhodium<br>45<br><b>Rh</b>   | platinum<br>78<br><b>Pt</b> | nickel<br>28<br><b>Ni</b>    | Copper<br>29<br><b>Cu</b>    |                             |                            |
|   |                             |                              | titanium<br>22<br><b>Ti</b>  | rhodium<br>45<br><b>Rh</b>   | platinum<br>78<br><b>Pt</b> | nickel<br>28<br><b>Ni</b>    | Copper<br>29<br><b>Cu</b>    |                             |                            |
|   |                             |                              | scandium<br>21<br><b>Sc</b>  | rhodium<br>45<br><b>Rh</b>   | platinum<br>78<br><b>Pt</b> | nickel<br>28<br><b>Ni</b>    | Copper<br>29<br><b>Cu</b>    |                             |                            |
|   |                             |                              | yttrium<br>39<br><b>Y</b>    | rhodium<br>45<br><b>Rh</b>   | platinum<br>78<br><b>Pt</b> | nickel<br>28<br><b>Ni</b>    | Copper<br>29<br><b>Cu</b>    |                             |                            |
|   |                             |                              | zirconium<br>40<br><b>Zr</b> | rhodium<br>45<br><b>Rh</b>   | platinum<br>78<br><b>Pt</b> | nickel<br>28<br><b>Ni</b>    | Copper<br>29<br><b>Cu</b>    |                             |                            |
|   |                             |                              | hafnium<br>72<br><b>Hf</b>   | rhodium<br>45<br><b>Rh</b>   | platinum<br>78<br><b>Pt</b> | nickel<br>28<br><b>Ni</b>    | Copper<br>29<br><b>Cu</b>    |                             |                            |
|   |                             |                              | barium<br>56<br><b>Ba</b>    | rhodium<br>45<br><b>Rh</b>   | platinum<br>78<br><b>Pt</b> | nickel<br>28<br><b>Ni</b>    | Copper<br>29<br><b>Cu</b>    |                             |                            |
|   |                             |                              | strontium<br>38<br><b>Sr</b> | rhodium<br>45<br><b>Rh</b>   | platinum<br>78<br><b>Pt</b> | nickel<br>28<br><b>Ni</b>    | Copper<br>29<br><b>Cu</b>    |                             |                            |
|   |                             |                              | calcium<br>20<br><b>Ca</b>   | rhodium<br>45<br><b>Rh</b>   | platinum<br>78<br><b>Pt</b> | nickel<br>28<br><b>Ni</b>    | Copper<br>29<br><b>Cu</b>    |                             |                            |
|   |                             |                              | beryllium<br>4<br><b>Be</b>  | rhodium<br>45<br><b>Rh</b>   | platinum<br>78<br><b>Pt</b> | nickel<br>28<br><b>Ni</b>    | Copper<br>29<br><b>Cu</b>    |                             |                            |
|   |                             |                              | lithium<br>3<br><b>Li</b>    | rhodium<br>45<br><b>Rh</b>   | platinum<br>78<br><b>Pt</b> | nickel<br>28<br><b>Ni</b>    | Copper<br>29<br><b>Cu</b>    |                             |                            |