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**CHEMISTRY**

**5070/11**

Paper 1 Multiple Choice

**May/June 2014**

**1 hour**

Additional Materials: Multiple Choice Answer Sheet  
Soft clean eraser  
Soft pencil (type B or HB is recommended)

\* 2 5 5 0 2 1 6 8 4 5 \*



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**READ THESE INSTRUCTIONS FIRST**

Write in soft pencil.

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

Write your name, Centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.

**DO NOT WRITE IN ANY BARCODES.**

There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A, B, C** and **D**.

Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

**Read the instructions on the Answer Sheet very carefully.**

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

Any rough working should be done in this booklet.

A copy of the Periodic Table is printed on page 16.

Electronic calculators may be used.

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This document consists of **13** printed pages and **3** blank pages.

1 Which statement is **not** correct?

- A Air is a mixture.
- B Ammonia is a compound.
- C Methane is a compound.
- D Sea water is a compound.

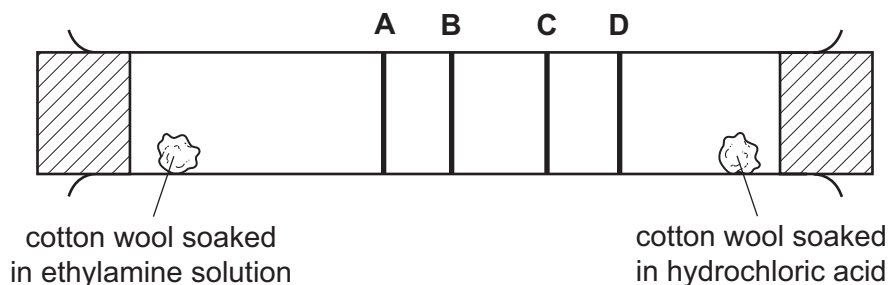
2 A radioactive isotope of carbon has more nucleons than the non-radioactive isotope,  $^{12}_6\text{C}$ .

How many protons, neutrons and electrons could there be in this **radioactive** isotope of carbon?

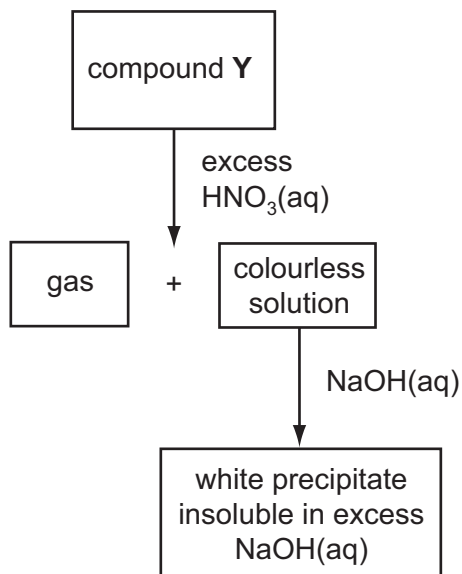
|          | protons | neutrons | electrons |
|----------|---------|----------|-----------|
| <b>A</b> | 6       | 6        | 6         |
| <b>B</b> | 6       | 8        | 6         |
| <b>C</b> | 8       | 6        | 8         |
| <b>D</b> | 8       | 8        | 8         |

3 Ethylamine gas,  $\text{C}_2\text{H}_5\text{NH}_2$ , and hydrogen chloride gas,  $\text{HCl}$ , react together to form a white solid, ethylamine hydrochloride.

At which position in the tube would a ring of solid white ethylamine hydrochloride form?



- 4 The scheme shows a sequence of reactions starting from compound Y.



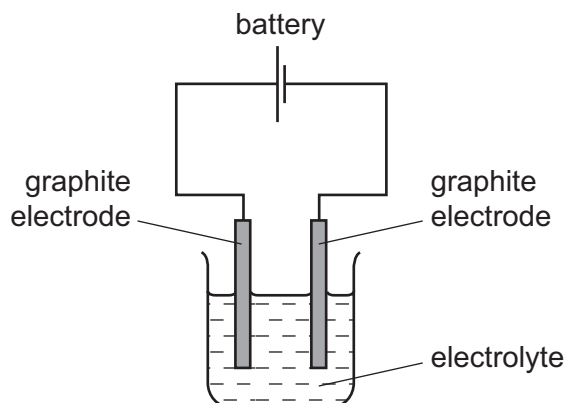
What could the compound Y be?

- A aluminium sulfate  
 B calcium carbonate  
 C copper(II) carbonate  
 D zinc carbonate
- 5 Which electronic configurations represent three metallic elements in the same period of the Periodic Table?

|          | element 1 | element 2 | element 3  |
|----------|-----------|-----------|------------|
| <b>A</b> | 2, 8, 7   | 2, 8, 8   | 2, 8, 1    |
| <b>B</b> | 2, 1      | 2, 8, 1   | 2, 8, 8, 1 |
| <b>C</b> | 2, 2      | 2, 3      | 2, 4       |
| <b>D</b> | 2, 8, 1   | 2, 8, 2   | 2, 8, 3    |

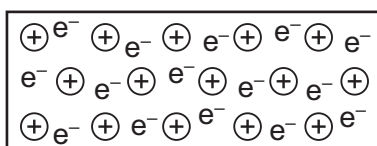
- 6 Which molecule has the **largest** number of electrons involved in covalent bonds?
- A C<sub>2</sub>H<sub>4</sub>      B CO<sub>2</sub>      C CH<sub>3</sub>OH      D N<sub>2</sub>

- 7 Graphite is often used as the electrodes in the electrolysis of solutions.



Which particles are involved in the conduction of electricity by graphite?

- A** electrons only  
**B** negative ions only  
**C** positive ions and electrons  
**D** positive ions and negative ions
- 8 Element *X* has a lattice of positive ions and a 'sea of electrons'.



Which property will *X* have?

- A** It conducts electricity by the movement of ions and electrons.  
**B** It has a high melting point.  
**C** It is decomposed by an electric current.  
**D** It is not malleable.
- 9 An element, *E*, forms a hydride,  $EH_4$ , which contains 90.0% by mass of *E*.  
 If the relative atomic mass of hydrogen is 1, what is the relative atomic mass of *E*?
- A** 9                      **B** 36                      **C** 86                      **D** 90
- 10 A piece of chalk has a mass of 23.0g. Chalk is impure calcium carbonate. When analysed, the chalk is found to contain 0.226 moles of pure calcium carbonate.  
 $[M_r: CaCO_3, 100]$

What is the percentage purity of the piece of chalk?

- A** 0.983%              **B** 1.02%              **C** 77.0%              **D** 98.3%

11 Aqueous potassium iodide, KI(aq), can be used as a test reagent in redox reactions.

Iodide ions are readily .....X..... . A positive result for the test is when the solution changes colour from .....Y..... to .....Z..... .

Which words correctly complete gaps X, Y and Z?

|          | X        | Y          | Z          |
|----------|----------|------------|------------|
| <b>A</b> | oxidised | brown      | colourless |
| <b>B</b> | oxidised | colourless | brown      |
| <b>C</b> | reduced  | brown      | colourless |
| <b>D</b> | reduced  | colourless | brown      |

12 Which element is **most** likely to be used as an industrial catalyst?

- A** Na                      **B** Ni                      **C** Pb                      **D** Sr

13 Which solution containing one mole per dm<sup>3</sup> of the compound would have the lowest pH?

- A** ethanoic acid  
**B** hydrochloric acid  
**C** sodium chloride  
**D** sodium hydrogencarbonate

14 Which statement about oxides is correct?

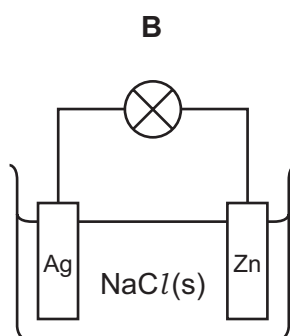
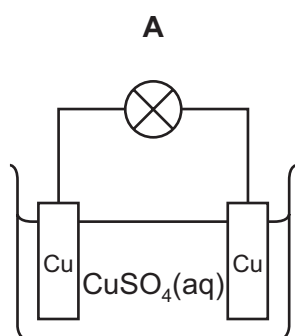
- A** A basic oxide is an oxide of a non-metal.  
**B** Acidic oxides contain ionic bonds.  
**C** An amphoteric oxide contains a metal.  
**D** Basic oxides are always gases.

- 15 Bitumen, diesel, naphtha and paraffin (kerosene) are all fractions obtained by the fractional distillation of petroleum.

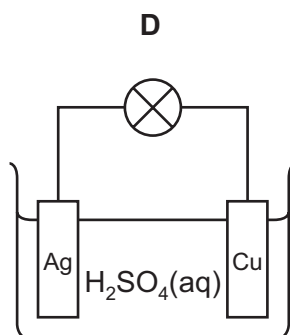
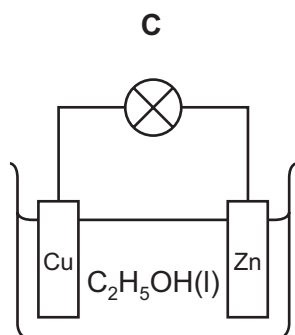
Which row gives a correct use for the named fraction?

|          | fraction | use                         |
|----------|----------|-----------------------------|
| <b>A</b> | bitumen  | a source of polish          |
| <b>B</b> | diesel   | a fuel for aircraft engines |
| <b>C</b> | naphtha  | a fuel for heating          |
| <b>D</b> | paraffin | a fuel for cooking          |

- 16 In which circuit does the bulb light?



key  
 = bulb



- 17 An element is in Period 3 and Group VII of the Periodic Table.

Which statement about this element is correct?

- A** The element will form 1+ ions.
- B** The element will have 3 electrons in its outer shell.
- C** The element will have 7 electrons in its outer shell.
- D** The element will have 7 shells of electrons in its atom.

- 18 The table contains information about the physical properties of the elements chlorine, copper and iron.

| element  | melting point /°C | boiling point /°C |
|----------|-------------------|-------------------|
| chlorine | -101              | W                 |
| copper   | X                 | 2582              |
| iron     | 1539              | Y                 |

In the table above, what are the correct values of W, X and Y?

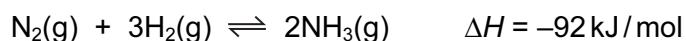
|          | W   | X    | Y    |
|----------|-----|------|------|
| <b>A</b> | -34 | 1083 | 445  |
| <b>B</b> | -34 | 1083 | 2887 |
| <b>C</b> | -34 | 2887 | 445  |
| <b>D</b> | 445 | 2887 | 1083 |

- 19 Petroleum is separated into fractions by fractional distillation.

Which fraction distils off at the highest temperature?

- A** diesel
- B** paraffin (kerosene)
- C** lubricating oils
- D** petrol (gasoline)

- 20 Ammonia is made by a reversible reaction between nitrogen and hydrogen.

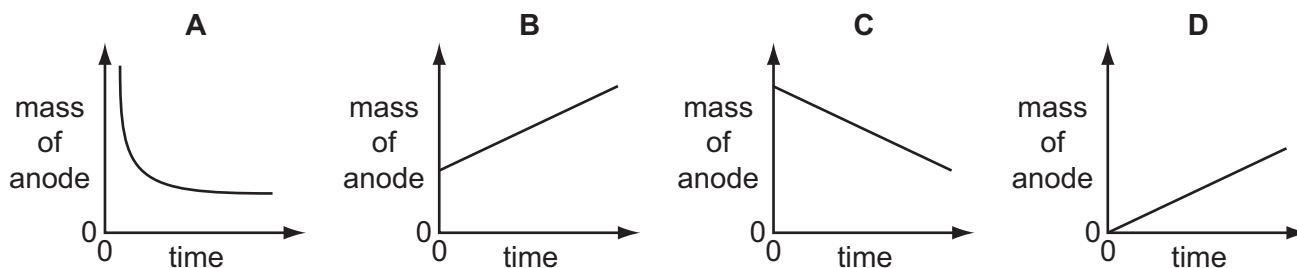


What is the effect of increasing the pressure in this process?

- A** Less heat is produced.
- B** More ammonia is formed.
- C** More nitrogen is present at equilibrium.
- D** The reaction slows down.

- 21 Aqueous copper(II) sulfate is electrolysed using copper electrodes. The current is constant and the anode (positive electrode) is weighed at regular intervals.

Which graph is obtained when the mass of the anode is plotted against time?



- 22 In the extraction of aluminium by electrolysis, its oxide is dissolved in molten cryolite. Cryolite is a sodium salt.

Aluminium is deposited at the .....1..... and it can be deduced that aluminium is .....2..... sodium in the reactivity series.

Which words correctly complete gaps 1 and 2?

|          | 1             | 2     |
|----------|---------------|-------|
| <b>A</b> | +ve electrode | above |
| <b>B</b> | +ve electrode | below |
| <b>C</b> | -ve electrode | above |
| <b>D</b> | -ve electrode | below |

- 23 Which substance is **not** a raw material used in the manufacture of sulfuric acid?

- A** air
- B** sulfur
- C** sulfur dioxide
- D** water

- 24 A student mixed together aqueous solutions of **Y** and **Z**. A white precipitate formed.

Which could **not** be **Y** and **Z**?

|          | <b>Y</b>          | <b>Z</b>         |
|----------|-------------------|------------------|
| <b>A</b> | hydrochloric acid | silver nitrate   |
| <b>B</b> | hydrochloric acid | sodium nitrate   |
| <b>C</b> | sodium chloride   | lead(II) nitrate |
| <b>D</b> | sodium chloride   | silver nitrate   |



25 Which property would all the hydrogen compounds of the Group VII elements possess?

- A be covalent
- B be solids at room temperature
- C form alkaline aqueous solutions
- D conduct electricity when molten

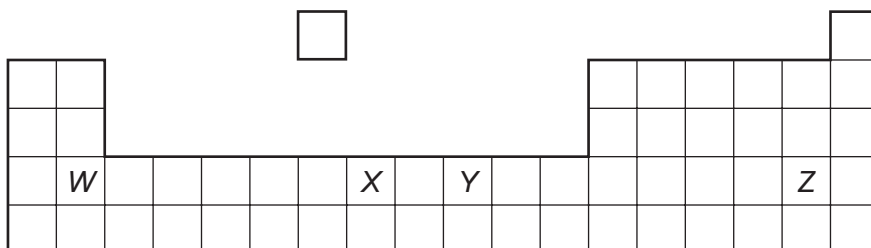
26 Which particle is found in iodine vapour?

- A I
- B I<sup>-</sup>
- C I<sup>+</sup>
- D I<sub>2</sub>

27 What suggests that metal *M* is **not** in Group I of the Periodic Table?

- A *M* has a bright, silvery appearance and is a good conductor of electricity.
- B *M* is hard and difficult to cut.
- C *M* produces an alkaline solution when it reacts with water.
- D *M* produces hydrogen gas when it reacts with water.

28 The diagram shows an outline of part of the Periodic Table.



Which statements are correct?

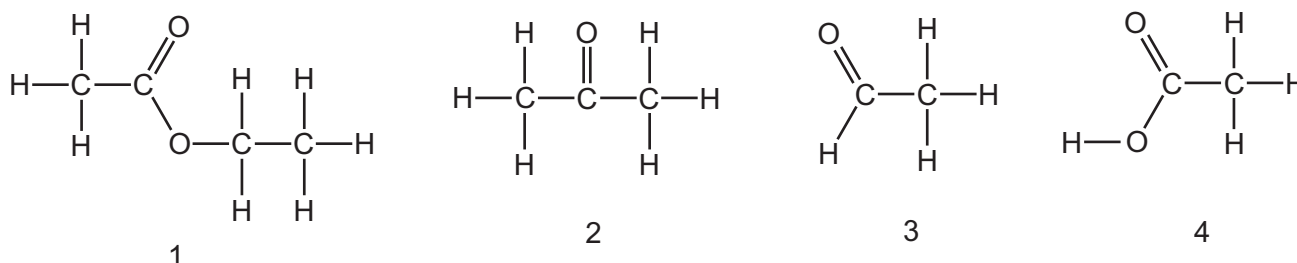
- 1 Elements *W*, *X* and *Y* form coloured compounds.
- 2 Elements *X*, *Y* and *Z* have high melting points.
- 3 Elements *X* and *Y* act as catalysts.

- A 1 only
- B 2 only
- C 3 only
- D 1 and 3 only

- 29 Which of these processes can be used to purify water containing insoluble impurities?
- 1 chlorination
  - 2 desalination
  - 3 distillation
  - 4 filtration
- A 1 and 2      B 2 and 3      C 3 and 4      D 4 only
- 30 Which metal can react rapidly with steam but reacts only **very slowly** with cold water?
- A calcium  
B copper  
C iron  
D potassium
- 31 A hydride is a compound containing **only** two elements, one of which is hydrogen.  
Which element can form the greatest number of different hydrides?
- A carbon  
B chlorine  
C nitrogen  
D oxygen
- 32 What is **not** essential for photosynthesis?
- A carbon dioxide  
B sugar  
C light  
D water
- 33 A liquid reacts with each of sodium carbonate, potassium hydroxide and ethanol.  
What is the liquid?
- A aqueous ammonia  
B ethanoic acid  
C ethyl ethanoate  
D sodium hydroxide

- 34 Which compound, on combustion, **never** forms carbon?
- A carbon monoxide  
 B ethanol  
 C ethene  
 D methane
- 35 Which of the following is **not** a condensation polymer?
- A nylon  
 B poly(ethene)  
 C protein  
 D *Terylene*
- 36 Which statement about the properties of propane and hexane is correct?
- A Propane has a higher boiling point than hexane.  
 B Propane has a higher relative molecular mass than hexane.  
 C Propane has more isomers than hexane.  
 D Propane is more flammable than hexane.
- 37 When a volcano erupts, which gas is produced in significant amounts?
- A carbon monoxide  
 B methane  
 C ozone  
 D sulfur dioxide

38 Four compounds are shown.



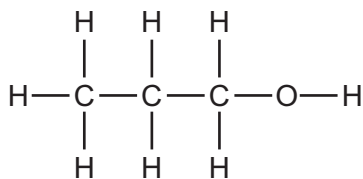
Which pair of compounds have the same empirical formula?

- A 1 and 2      B 1 and 3      C 2 and 3      D 2 and 4

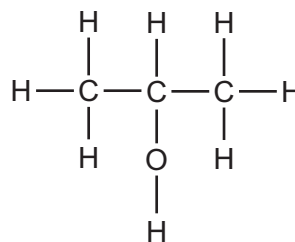
39 Fats, carbohydrates and proteins all contain which chemical elements?

- A carbon, hydrogen and oxygen
- B carbon, hydrogen and nitrogen
- C carbon, hydrogen and sulfur
- D carbon, nitrogen and oxygen

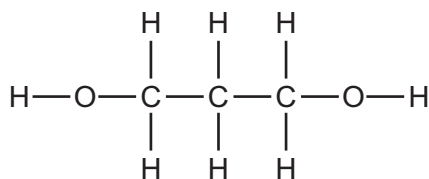
40 The structural formulae of some organic compounds are shown below.



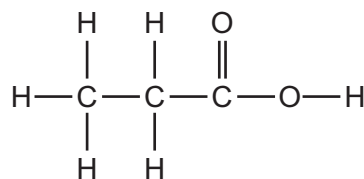
1



2



3



4

Which compounds are alcohols?

- A 1 only
- B 1 and 2 only
- C 1, 2 and 3
- D 4







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

|   |  | Group                               |                                     |                                     |                                      |                                      |                                     |                                       |                                       |                                     |  |                                     |  |                                     |                                    |                                    |                                      |                                      |                                   |                                  |                                   |                                     |                                    |                                   |  |                                  |                                     |                                     |                                     |                                  |                                     |                                       |                                       |                                    |  |                                     |                                       |
|---|--|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|---------------------------------------|---------------------------------------|-------------------------------------|--|-------------------------------------|--|-------------------------------------|------------------------------------|------------------------------------|--------------------------------------|--------------------------------------|-----------------------------------|----------------------------------|-----------------------------------|-------------------------------------|------------------------------------|-----------------------------------|--|----------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|----------------------------------|-------------------------------------|---------------------------------------|---------------------------------------|------------------------------------|--|-------------------------------------|---------------------------------------|
| I   | II                                     | III                                 | IV                                  | V                                   | VI                                   | VII                                  | 0                                   |                                       |                                       |                                     |  | 0                                   |  |                                     |                                    |                                    |                                      |                                      |                                   |                                  |                                   |                                     |                                    |                                   |  |                                  |                                     |                                     |                                     |                                  |                                     |                                       |                                       |                                    |  |                                     |                                       |
|   |  | 1<br><b>H</b><br>Hydrogen<br>1      |                                     |                                     |                                      |                                      |                                     |                                       |                                       |                                     |  |                                     | 4<br><b>He</b><br>Helium<br>2          |                                     |                                    |                                    |                                      |                                      |                                   |                                  |                                   |                                     |                                    |                                   |  |                                  |                                     |                                     |                                     |                                  |                                     |                                       |                                       |                                    |  |                                     |                                       |
| 7<br><b>Li</b><br>Lithium<br>3  | 9<br><b>Be</b><br>Beryllium<br>4       |                                     |                                     |                                     |                                      |                                      |                                     |                                       |                                       |                                     |  | 20<br><b>Ne</b><br>Neon<br>10       |  |                                     |                                    |                                    |                                      |                                      |                                   |                                  |                                   |                                     |                                    |                                   |  |                                  |                                     |                                     |                                     |                                  |                                     |                                       |                                       |                                    |  |                                     |                                       |
| 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    | 31<br><b>P</b><br>Phosphorus<br>15  | 32<br><b>S</b><br>Sulfur<br>16       | 35.5<br><b>Cl</b><br>Chlorine<br>17  | 40<br><b>Ar</b><br>Argon<br>18      |                                       |                                       |                                     |  | 84<br><b>Kr</b><br>Krypton<br>36    |  |                                     |                                    |                                    |                                      |                                      |                                   |                                  |                                   |                                     |                                    |                                   |  |                                  |                                     |                                     |                                     |                                  |                                     |                                       |                                       |                                    |  |                                     |                                       |
| 39<br><b>K</b><br>Potassium<br>19   | 40<br><b>Ca</b><br>Calcium<br>20       | 70<br><b>Ga</b><br>Gallium<br>31    | 73<br><b>Ge</b><br>Germanium<br>32  | 75<br><b>As</b><br>Arsenic<br>33    | 79<br><b>Se</b><br>Selenium<br>34    | 80<br><b>Br</b><br>Bromine<br>35     | 84<br><b>Kr</b><br>Krypton<br>36    |                                       |                                       |                                     |  | 131<br><b>Xe</b><br>Xenon<br>54     |  |                                     |                                    |                                    |                                      |                                      |                                   |                                  |                                   |                                     |                                    |                                   |  |                                  |                                     |                                     |                                     |                                  |                                     |                                       |                                       |                                    |  |                                     |                                       |
| 85<br><b>Rb</b><br>Rubidium<br>37   | 88<br><b>Sr</b><br>Strontium<br>38     | 115<br><b>In</b><br>Indium<br>49    | 119<br><b>Sn</b><br>Tin<br>50       | 122<br><b>Sb</b><br>Antimony<br>51  | 128<br><b>Te</b><br>Tellurium<br>52  | 127<br><b>I</b><br>Iodine<br>53      | 131<br><b>Xe</b><br>Xenon<br>54     |                                       |                                       |                                     |  | 209<br><b>Rn</b><br>Radon<br>86     |  |                                     |                                    |                                    |                                      |                                      |                                   |                                  |                                   |                                     |                                    |                                   |  |                                  |                                     |                                     |                                     |                                  |                                     |                                       |                                       |                                    |  |                                     |                                       |
| 133<br><b>Cs</b><br>Caesium<br>55   | 137<br><b>Ba</b><br>Barium<br>56       | 204<br><b>Tl</b><br>Thallium<br>81  | 207<br><b>Pb</b><br>Lead<br>82      | 209<br><b>Bi</b><br>Bismuth<br>83   | 210<br><b>Po</b><br>Polonium<br>84   | 210<br><b>At</b><br>Astatine<br>85   | 210<br><b>Rn</b><br>Radon<br>86     |                                       |                                       |                                     |  | 210<br><b>Rn</b><br>Radon<br>86     |  |                                     |                                    |                                    |                                      |                                      |                                   |                                  |                                   |                                     |                                    |                                   |  |                                  |                                     |                                     |                                     |                                  |                                     |                                       |                                       |                                    |  |                                     |                                       |
| 226<br><b>Ra</b><br>Radium<br>88  | 227<br><b>Ac</b><br>Actinium<br>89     |                                     |                                     |                                     |                                      |                                      |                                     |                                       |                                       |                                     |  | 227<br><b>Ac</b><br>Actinium<br>89  |  |                                     |                                    |                                    |                                      |                                      |                                   |                                  |                                   |                                     |                                    |                                   |  |                                  |                                     |                                     |                                     |                                  |                                     |                                       |                                       |                                    |  |                                     |                                       |
| *58-71 Lanthanoid series<br>†90-103 Actinoid series   |  |                                     |                                     |                                     |                                      |                                      |                                     |                                       |                                       |                                     |  |                                     |  |                                     |                                    |                                    |                                      |                                      |                                   |                                  |                                   |                                     |                                    |                                   |  |                                  |                                     |                                     |                                     |                                  |                                     |                                       |                                       |                                    |  |                                     |                                       |
| <table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <td style="padding: 2px;">a</td> <td style="padding: 2px;"><b>X</b></td> <td style="padding: 2px;">b</td> </tr> </table> <p style="text-align: center; margin-top: 5px;">Key<br/>a = relative atomic mass<br/>X = atomic symbol<br/>b = proton (atomic) number</p>   |  |                                     |                                     |                                     |                                      |                                      |                                     |                                       |                                       |                                     |  | a                                   | <b>X</b>                               | b                                   |                                    |                                    |                                      |                                      |                                   |                                  |                                   |                                     |                                    |                                   |  |                                  |                                     |                                     |                                     |                                  |                                     |                                       |                                       |                                    |  |                                     |                                       |
| a   | <b>X</b>                               | b                                   |                                     |                                     |                                      |                                      |                                     |                                       |                                       |                                     |  |                                     |  |                                     |                                    |                                    |                                      |                                      |                                   |                                  |                                   |                                     |                                    |                                   |  |                                  |                                     |                                     |                                     |                                  |                                     |                                       |                                       |                                    |  |                                     |                                       |
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| 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   | 167<br><b>Er</b><br>Erbium<br>68      | 169<br><b>Tm</b><br>Thulium<br>69     | 173<br><b>Yb</b><br>Ytterbium<br>70 | 175<br><b>Lu</b><br>Lutetium<br>71     |                                     |  |                                     |                                    |                                    |                                      |                                      |                                   |                                  |                                   |                                     |                                    |                                   |  |                                  |                                     |                                     |                                     |                                  |                                     |                                       |                                       |                                    |  |                                     |                                       |
| 232<br><b>Th</b><br>Thorium<br>90   | 238<br><b>Pa</b><br>Protactinium<br>91 | 238<br><b>U</b><br>Uranium<br>92    | 238<br><b>Np</b><br>Neptunium<br>93 | 238<br><b>Pu</b><br>Plutonium<br>94 | 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 | 238<br><b>No</b><br>Nobelium<br>102 | 238<br><b>Lr</b><br>Lawrencium<br>103  |                                     |                                    |                                    |                                      |                                      |                                   |                                  |                                   |                                     |                                    |                                   |  |                                  |                                     |                                     |                                     |                                  |                                     |                                       |                                       |                                    |  |                                     |                                       |

The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.).

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