

**CHEMISTRY**

**5070/12**

Paper 1 Multiple Choice

**October/November 2014**

**1 hour**

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



**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.

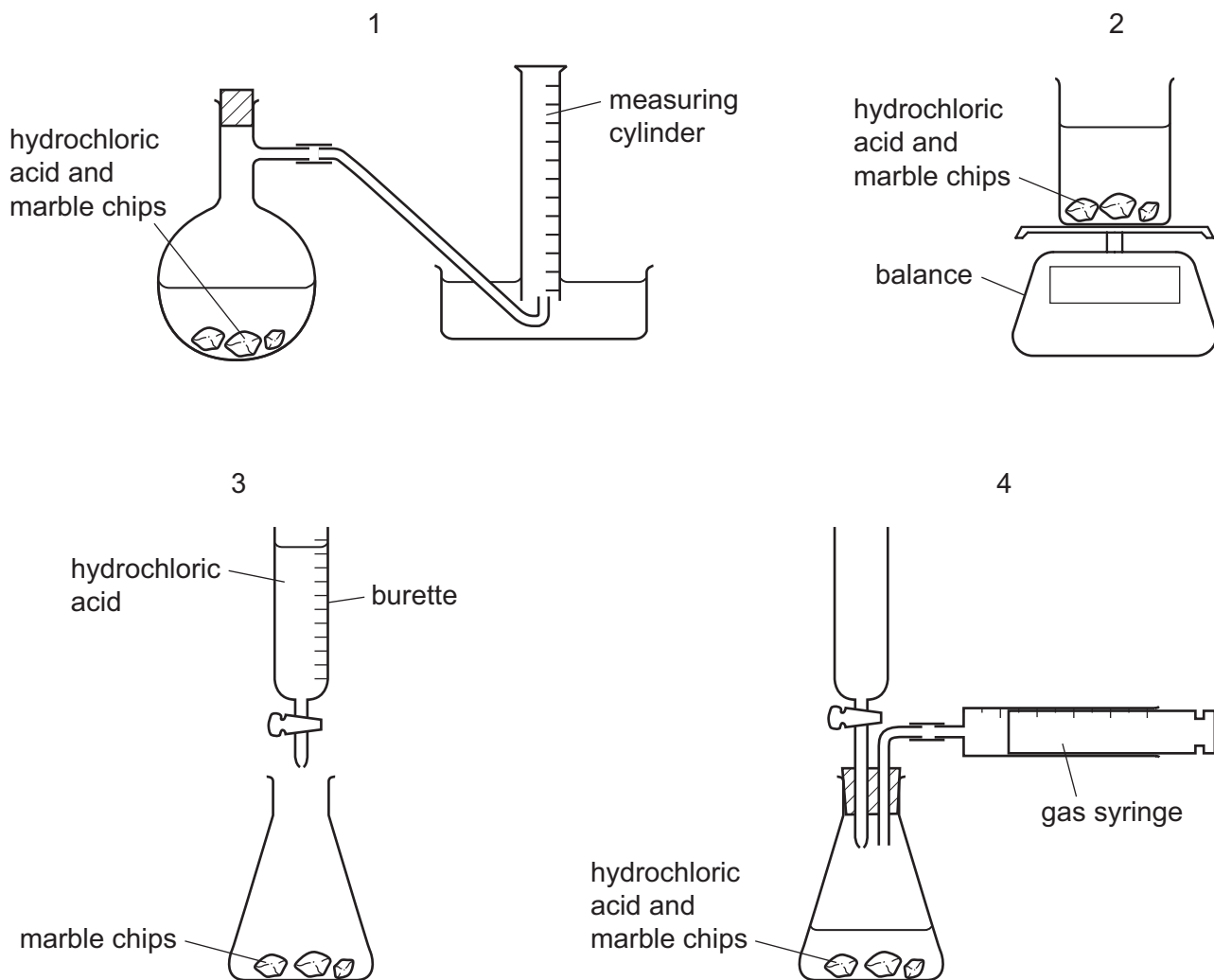
Electronic calculators may be used.

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

- 1 A student wants to carry out an experiment to follow the rate of the reaction between hydrochloric acid and marble chips.



Which diagrams show apparatus that is suitable for this experiment?



- A** 1 and 2 only    **B** 1 and 3 only    **C** 1 and 4 only    **D** 1, 2 and 4
- 2 Solutions of lead(II) nitrate and potassium iodide are mixed together in the preparation of lead(II) iodide.

Which method can be used to separate the lead(II) iodide from the mixture?

- A** crystallisation  
**B** distillation  
**C** evaporation  
**D** filtration

- 3 A small amount of aqueous copper(II) sulfate is put into a test-tube. A few drops of aqueous ammonia are added to the test-tube. Then an excess of aqueous ammonia is added to the test-tube.

What are the two observations?

	few drops of aqueous ammonia	excess aqueous ammonia
<b>A</b>	light blue precipitate	dark blue solution
<b>B</b>	light blue precipitate	light blue precipitate
<b>C</b>	dark blue solution	dark blue solution
<b>D</b>	dark blue solution	light blue precipitate

- 4 An atom of element Z has 14 neutrons and 13 protons.

It forms a positive ion.

How many electrons does the ion of Z have?

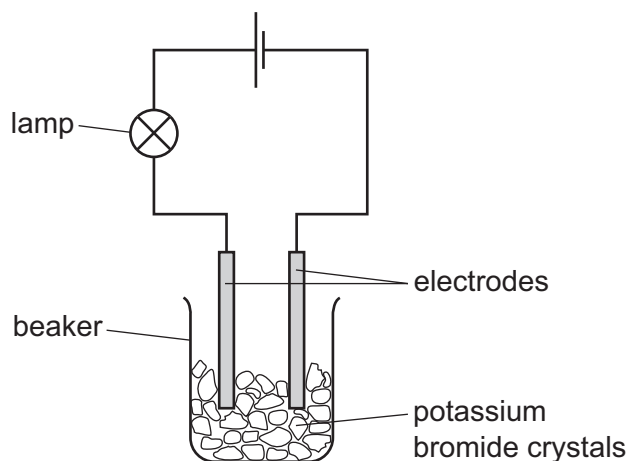
- A** 10                      **B** 13                      **C** 14                      **D** 27
- 5 Which gas is **neither** an element **nor** a compound?
- A** ammonia  
**B** chlorine  
**C** air  
**D** carbon monoxide
- 6 Why does ammonia gas diffuse faster than hydrogen chloride gas?
- A** Ammonia has a higher boiling point than hydrogen chloride.  
**B** Ammonia is a base, hydrogen chloride is an acid.  
**C** The ammonia molecule contains more atoms than a hydrogen chloride molecule.  
**D** The relative molecular mass of ammonia is smaller than that of hydrogen chloride.

- 7 The compound formed between elements X and Y is ionic.

Which statement about elements X and Y is correct?

- A** X and Y are both at the left-hand side of the Periodic Table.  
**B** X and Y are both at the right-hand side of the Periodic Table.  
**C** X and Y are both transition elements.  
**D** X is at the opposite side of the Periodic Table from element Y.

- 8 The experiment shown is used to test potassium bromide crystals.



The lamp does not light.

Distilled water is then added to the beaker and the lamp lights.

Which statement explains these results?

- A** Electrons are free to move in the solution when potassium bromide dissolves.
- B** Metal ions are free to move when potassium bromide melts.
- C** Metal ions are free to move when potassium reacts with water.
- D** Oppositely charged ions are free to move in the solution when potassium bromide dissolves.
- 9 How many electrons are used in covalent bonding in the  $N_2$  molecule?
- A** 2                      **B** 4                      **C** 6                      **D** 10
- 10 Propene,  $CH_3CH=CH_2$ , has a very low boiling point because of the weakness of the
- A** C–C bond.
- B** C=C bond.
- C** C–H bond.
- D** intermolecular forces.
- 11 What is the empirical formula of a compound containing 12g of carbon, 2g of hydrogen and 16g of oxygen only?
- A** CHO                      **B**  $CHO_2$                       **C**  $CH_2O$                       **D**  $C_2HO$

- 12 What is the correct equation for the reaction taking place at the negative electrode when magnesium chloride is electrolysed using inert electrodes?
- A  $Cl^- \rightarrow Cl + e^-$   
B  $2Cl^- \rightarrow Cl_2 + 2e^-$   
C  $Mg^+ + e^- \rightarrow Mg$   
D  $Mg^{2+} + 2e^- \rightarrow Mg$
- 13 Which fertiliser contains the greatest percentage by mass of nitrogen?
- A  $(NH_4)_2HPO_4$   $M_r = 132$   
B  $(NH_4)_2SO_4$   $M_r = 132$   
C  $NH_4NO_3$   $M_r = 80$   
D  $CO(NH_2)_2$   $M_r = 60$
- 14 A volume of ethane,  $C_2H_6$ , at r.t.p. has a mass of 20 g.  
What is the mass of an equal volume of propene,  $C_3H_6$ , at r.t.p.?
- A 20 g                      B 21 g                      C 28 g                      D 42 g
- 15 Which of these processes are both endothermic?
- A combustion, cracking  
B combustion, fermentation  
C cracking, photosynthesis  
D fermentation, photosynthesis
- 16 Ethanol is produced by the fermentation of glucose from sugar cane. In some countries ethanol is used as a fuel.  
Which statements are correct?
- 1 Sugar cane is a non-renewable (finite) resource.  
2 When sugar cane is growing it removes carbon dioxide from the atmosphere.
- A 1 only  
B 2 only  
C both 1 and 2  
D neither 1 nor 2

17 Which row correctly classifies the oxides in the table?

	carbon dioxide	copper(II) oxide	zinc oxide
<b>A</b>	acidic	amphoteric	basic
<b>B</b>	acidic	basic	amphoteric
<b>C</b>	acidic	neutral	amphoteric
<b>D</b>	basic	neutral	neutral

18 Sulfur is burnt in air.

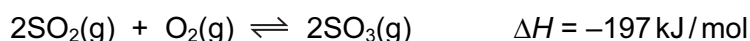
Which statement about this reaction is correct?

- A** The gas formed turns aqueous potassium dichromate(VI) from green to orange.
- B** The product is used as a food preservative.
- C** The reaction is endothermic.
- D** The reaction is reversible.

19 Which method is used to obtain chlorine from aqueous sodium chloride?

- A** crystallisation
- B** distillation
- C** electrolysis
- D** filtration

20 The equation shows the reaction for the formation of sulfur trioxide using a catalyst.



Which change in reaction conditions would produce more sulfur trioxide?

- A** adding more catalyst
- B** decreasing the pressure
- C** increasing the temperature
- D** removing some sulfur trioxide

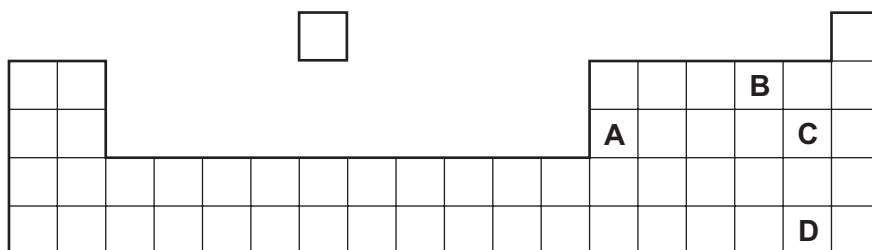
21 How many of these salts are soluble in water?



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

22 The positions of four elements are shown on the outline of part of the Periodic Table.

Which element is a solid non-metal at r.t.p.?



23 Which statements about fertilisers containing nitrates are correct?

- 1 They increase plant growth.
- 2 Nitrates dissolve in water.
- 3 Eutrophication is caused by nitrates from farmland entering rivers.
- 4 If nitrates are applied to alkaline soils they produce ammonia gas.

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

24 Which is a property of the element molybdenum,  ${}_{42}^{96}\text{Mo}$ ?

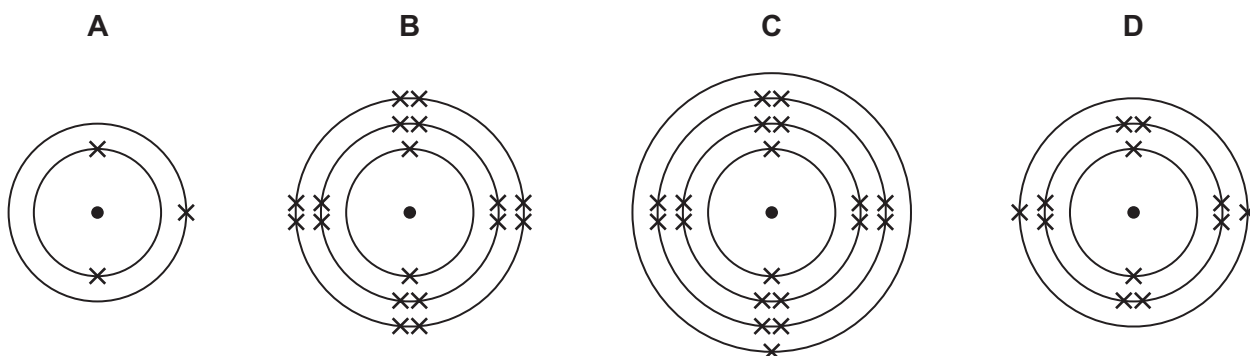
- A low density
- B low melting point
- C forms white or colourless compounds
- D has more than one oxidation state

25 In the Periodic Table, how many periods are needed to accommodate the elements of atomic numbers 1-18?

A 2                      B 3                      C 4                      D 8

26 The diagram shows the arrangement of electrons in the atoms of four different elements.

Which is the **least** reactive of the four elements?



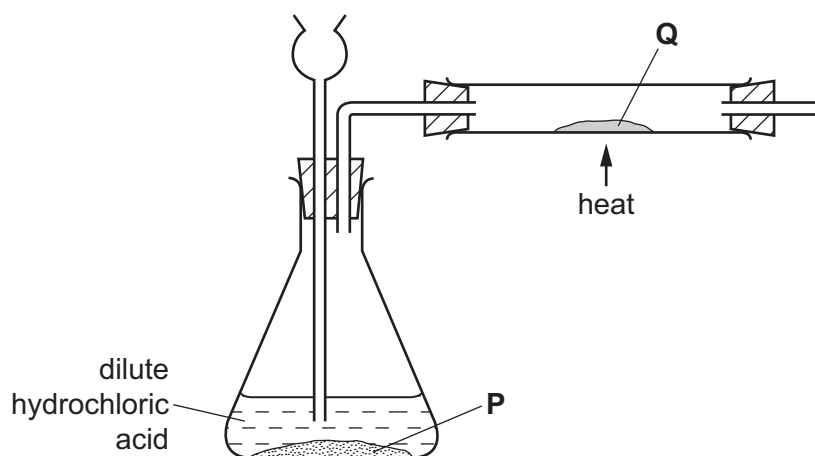
27 A gas **G**

- 1 has no smell,
- 2 is not poisonous,
- 3 reacts with hydrogen at high temperature and pressure.

What is gas **G**?

- A** carbon monoxide
- B** helium
- C** nitrogen
- D** chlorine

28 Substance **P** reacts with dilute hydrochloric acid to produce a gas. This gas reduces substance **Q**.



What are substances **P** and **Q**?

	<b>P</b>	<b>Q</b>
<b>A</b>	copper	copper(II) oxide
<b>B</b>	lead	lead(II) oxide
<b>C</b>	magnesium	zinc oxide
<b>D</b>	zinc	copper(II) oxide



29 Iron rusts when exposed to oxygen in the presence of water.

Which method will **not** slow down the rate of rusting of an iron roof?

- A attaching strips of copper to it
- B coating it with plastic
- C galvanising it with zinc
- D painting it

30 The solid carbonates of three metals, *W*, *X* and *Y*, are heated.

	result
carbonate of <i>W</i>	carbon dioxide given off solid changes colour from green to black
carbonate of <i>X</i>	carbon dioxide given off solid does not change colour
carbonate of <i>Y</i>	carbon dioxide not given off solid does not change colour

Which statements are correct?

- 1 Metal *Y* is more reactive than metal *X*.
- 2 Metal *W* is a transition metal.
- 3 If dilute nitric acid is added to all three carbonates, carbon dioxide is given off from the carbonates of *W* and *X* but not from the carbonate of *Y*.

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

31 Bond breaking is an endothermic process and bond making is an exothermic process.

For which change is it **not** possible, from the equation, to deduce whether the reaction is endothermic or exothermic?

- A  $Cl_2(g) \rightarrow 2Cl(g)$
- B  $H_2(g) + Cl_2(g) \rightarrow 2HCl(g)$
- C  $H_2O(g) \rightarrow 2H(g) + O(g)$
- D  $H(g) + Cl(g) \rightarrow HCl(g)$

32 Which row is correct for the reaction of the alkene with steam and a catalyst?

	alkene	product
<b>A</b>	$\text{CH}_3\text{CH}=\text{CH}_2$	$\text{CH}_3\text{CH}(\text{OH})\text{CH}_3$ only
<b>B</b>	$\text{CH}_3\text{CH}_2\text{CH}=\text{CH}_2$	$\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$ only
<b>C</b>	$\text{CH}_3\text{CH}=\text{CHCH}_3$	$\text{CH}_3\text{CH}(\text{OH})\text{CH}_2\text{CH}_3$ only
<b>D</b>	$(\text{CH}_3)_2\text{C}=\text{CH}_2$	$(\text{CH}_3)_2\text{CHCH}_2\text{OH}$ only

33 Why is carbon used in water purification?

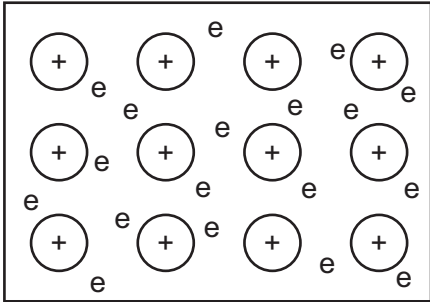
- A** It acts as a filter to remove insoluble solids.
- B** It desalinates the water.
- C** It disinfects the water.
- D** It removes tastes and odours.

34 Which of the statements about the preparation and properties of ammonia is correct?

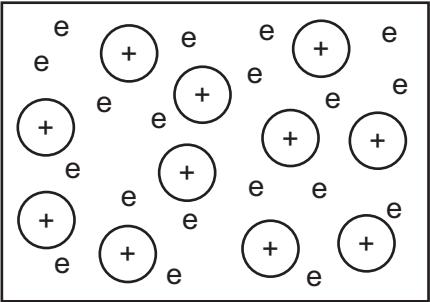
- A** Ammonia is formed when ammonium chloride is heated with an acid.
- B** Ammonia reacts with sodium hydroxide solution to form a salt and water.
- C** Ammonia reacts with water to form hydrogen ions.
- D** A solution of ammonia in water has a pH greater than 7.

35 Which structure represents that of an alloy?

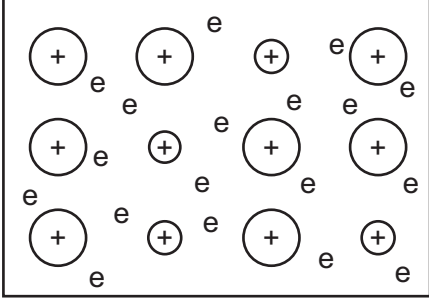
**A**



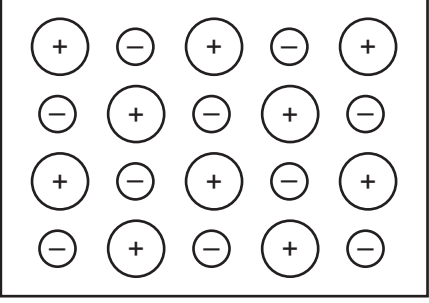
**B**



**C**



**D**



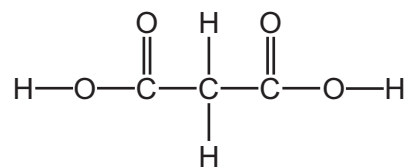
key

(+) (+) positive ions  
 (-) negative ions  
 e electrons

36 Which statement is **not** correct?

- A Carbohydrates, proteins and fats are all natural macromolecules.
- B *Terylene* contains the same linkages as a protein.
- C When a carbohydrate is hydrolysed, sugars are formed.
- D When a protein is hydrolysed, amino acids are formed.

37 Which statements would be true of the compound which has the formula shown?

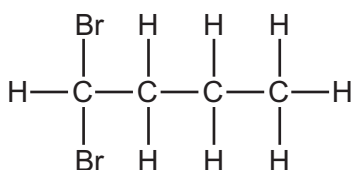


- 1 It would react with excess aqueous sodium hydroxide in a 1 : 1 molar ratio.
- 2 In aqueous solution, it would have a pH of 9.5.
- 3 It would react with an alcohol to form an ester.

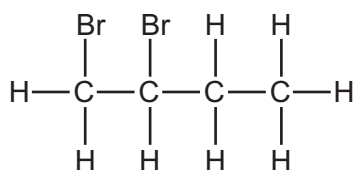
- A 1 only      B 1 and 2      C 2 and 3      D 3 only

38 When butene reacts with bromine, which compound could be made?

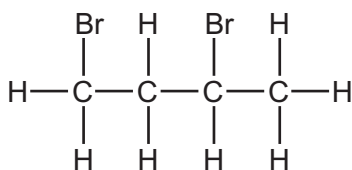
**A**



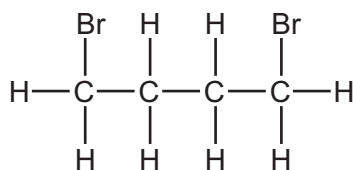
**B**



**C**



**D**



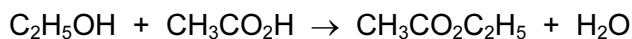
39 Methane is the first member of the alkane series of hydrocarbons. The second member is ethane.

Which statements about ethane are correct?

- 1 Ethane has the formula  $\text{C}_2\text{H}_4$ .
- 2 Ethane has a higher boiling point than that of methane.
- 3 Ethane has the same molecular formula as methane.
- 4 Ethane has chemical properties very similar to those of methane.

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

40 When ethanol reacts with ethanoic acid, the ester ethyl ethanoate is formed.



What is the formula of the ester formed when methanol reacts with butanoic acid,  $\text{C}_3\text{H}_7\text{CO}_2\text{H}$ ?

- A**  $\text{C}_2\text{H}_5\text{CO}_2\text{C}_2\text{H}_5$   
**B**  $\text{C}_3\text{H}_7\text{CO}_2\text{C}_2\text{H}_5$   
**C**  $\text{CH}_3\text{CO}_2\text{C}_3\text{H}_7$   
**D**  $\text{C}_3\text{H}_7\text{CO}_2\text{CH}_3$







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

		Group																																																																																					
		I	II	III	IV	V	VI	VII	0																																																																														
		<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; text-align: center;">1 <b>H</b> Hydrogen 1</td> <td colspan="9"></td> </tr> </table>										1 <b>H</b> Hydrogen 1																																																																											
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center;">55 <b>Mn</b> Manganese 25</td> <td style="text-align: center;">56 <b>Fe</b> Iron 26</td> <td style="text-align: center;">59 <b>Co</b> Cobalt 27</td> <td style="text-align: center;">59 <b>Ni</b> Nickel 28</td> <td style="text-align: center;">64 <b>Cu</b> Copper 29</td> <td style="text-align: center;">65 <b>Zn</b> Zinc 30</td> <td style="text-align: center;">70 <b>Ga</b> Gallium 31</td> <td style="text-align: center;">73 <b>Ge</b> Germanium 32</td> <td style="text-align: center;">75 <b>As</b> Arsenic 33</td> <td style="text-align: center;">79 <b>Se</b> Selenium 34</td> <td style="text-align: center;">80 <b>Br</b> Bromine 35</td> <td style="text-align: center;">84 <b>Kr</b> Krypton 36</td> </tr> <tr> <td style="text-align: center;">133 <b>Cs</b> Caesium 55</td> <td style="text-align: center;">137 <b>Ba</b> Barium 56</td> <td style="text-align: center;">88 <b>Sr</b> Strontium 38</td> <td style="text-align: center;">89 <b>Y</b> Yttrium 39</td> <td style="text-align: center;">91 <b>Zr</b> Zirconium 40</td> <td style="text-align: center;">93 <b>Nb</b> Niobium 41</td> <td style="text-align: center;">96 <b>Mo</b> Molybdenum 42</td> <td style="text-align: center;">101 <b>Ru</b> Ruthenium 44</td> <td style="text-align: center;">103 <b>Rh</b> Rhodium 45</td> <td style="text-align: center;">106 <b>Pd</b> Palladium 46</td> <td style="text-align: center;">108 <b>Ag</b> Silver 47</td> <td style="text-align: center;">112 <b>Cd</b> Cadmium 48</td> <td style="text-align: center;">115 <b>In</b> Indium 49</td> <td style="text-align: center;">119 <b>Sn</b> Tin 50</td> <td style="text-align: center;">122 <b>Sb</b> Antimony 51</td> <td style="text-align: center;">128 <b>Te</b> Tellurium 52</td> <td style="text-align: center;">127 <b>I</b> Iodine 53</td> <td style="text-align: center;">131 <b>Xe</b> Xenon 54</td> </tr> <tr> <td style="text-align: center;">226 <b>Ra</b> Radium 88</td> <td style="text-align: center;">227 <b>Ac</b> Actinium 89</td> <td style="text-align: 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7 <b>Li</b> Lithium 3	23 <b>Na</b> Sodium 11	24 <b>Mg</b> Magnesium 12							35.5 <b>Cl</b> Chlorine 17	40 <b>Ar</b> Argon 18																																																																													
39 <b>K</b> Potassium 19	85 <b>Rb</b> Rubidium 37	40 <b>Ca</b> Calcium 20	45 <b>Sc</b> Scandium 21	48 <b>Ti</b> Titanium 22	51 <b>V</b> Vanadium 23	55 <b>Mn</b> Manganese 25	56 <b>Fe</b> Iron 26	59 <b>Co</b> Cobalt 27	59 <b>Ni</b> Nickel 28	64 <b>Cu</b> Copper 29	65 <b>Zn</b> Zinc 30	70 <b>Ga</b> Gallium 31	73 <b>Ge</b> Germanium 32	75 <b>As</b> Arsenic 33	79 <b>Se</b> Selenium 34	80 <b>Br</b> Bromine 35	84 <b>Kr</b> Krypton 36																																																																						
133 <b>Cs</b> Caesium 55	137 <b>Ba</b> Barium 56	88 <b>Sr</b> Strontium 38	89 <b>Y</b> Yttrium 39	91 <b>Zr</b> Zirconium 40	93 <b>Nb</b> Niobium 41	96 <b>Mo</b> Molybdenum 42	101 <b>Ru</b> Ruthenium 44	103 <b>Rh</b> Rhodium 45	106 <b>Pd</b> Palladium 46	108 <b>Ag</b> Silver 47	112 <b>Cd</b> Cadmium 48	115 <b>In</b> Indium 49	119 <b>Sn</b> Tin 50	122 <b>Sb</b> Antimony 51	128 <b>Te</b> Tellurium 52	127 <b>I</b> Iodine 53	131 <b>Xe</b> Xenon 54																																																																						
226 <b>Ra</b> Radium 88	227 <b>Ac</b> Actinium 89	137 <b>Ba</b> Barium 56	139 <b>La</b> Lanthanum 57	178 <b>Hf</b> Hafnium 72	181 <b>Ta</b> Tantalum 73	184 <b>W</b> Tungsten 74	190 <b>Os</b> Osmium 76	192 <b>Ir</b> Iridium 77	195 <b>Pt</b> Platinum 78	197 <b>Au</b> Gold 79	201 <b>Hg</b> Mercury 80	204 <b>Tl</b> Thallium 81	207 <b>Pb</b> Lead 82	209 <b>Bi</b> Bismuth 83	210 <b>Po</b> Polonium 84	210 <b>At</b> Astatine 85	210 <b>Rn</b> Radon 86																																																																						

|  | | 140 **Ce** Cerium 58 | 141 **Pr** Praseodymium 59 | 144 **Nd** Neodymium 60 | 150 **Sm** Samarium 62 | 152 **Eu** Europium 63 | 157 **Gd** Gadolinium 64 | 159 **Tb** Terbium 65 | 162 **Dy** Dysprosium 66 | 165 **Ho** Holmium 67 | 167 **Er** Erbium 68 | 169 **Tm** Thulium 69 | 173 **Yb** Ytterbium 70 | 175 **Lu** Lutetium 71 |  | | |
|  | | 232 **Th** Thorium 90 | 238 **Pa** Protactinium 91 | 238 **U** Uranium 92 | 238 **Np** Neptunium 93 | 238 **Am** Americium 95 | 238 **Cm** Curium 96 | 238 **Bk** Berkelium 97 | 238 **Cf** Californium 98 | 238 **Es** Einsteinium 99 | 238 **Fm** Fermium 100 | 238 **Md** Mendelevium 101 | 238 **No** Nobelium 102 | 238 **Lr** Lawrencium 103 |  | | |

\*58-71 Lanthanoid series  
†90-103 Actinoid series

**Key**  
 a = relative atomic mass  
 X = atomic symbol  
 b = proton (atomic) number

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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