

# EXAMINATIONS COUNCIL OF ZAMBIA

Examination for School Certificate Ordinary Level

## Chemistry Paper 1 Multiple Choice

5070/1

Friday

4 NOVEMBER 2016

**Additional Materials:**

- Electronic calculator (non programmable) and/or Mathematical tables
- Multiple Choice Answer Sheet
- Soft clean eraser
- Soft pencil (type B or HB is recommended)

**Time 1 hour**

### Instructions to Candidates

**Do not open this question paper until you are told to do so.**

Look at the left hand side of your answer sheet. Ensure that your name, the school/centre name and subject paper are **printed**. Also ensure that the subject code, paper number, centre code, your examination number and the year are printed and shaded. Do not change the already printed information.

There are **forty** questions in 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 provided.

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

### Information for Candidates

Each correct answer will score one mark.

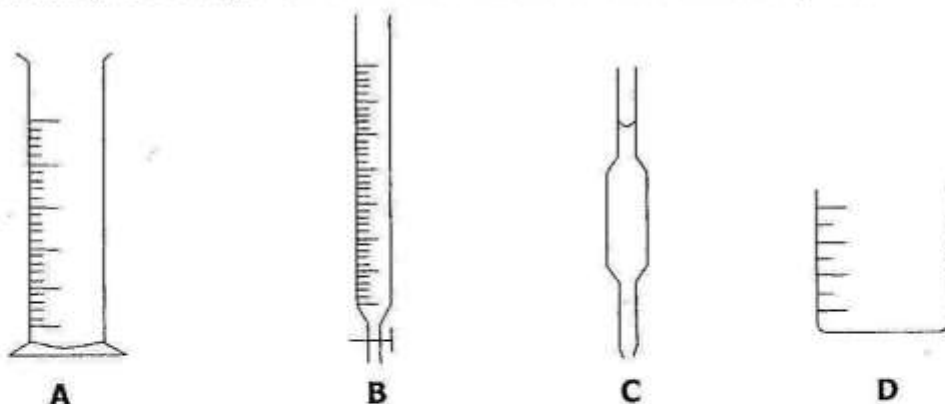
Any rough working should be done in this question paper.

The **Periodic Table** is printed on page 12.

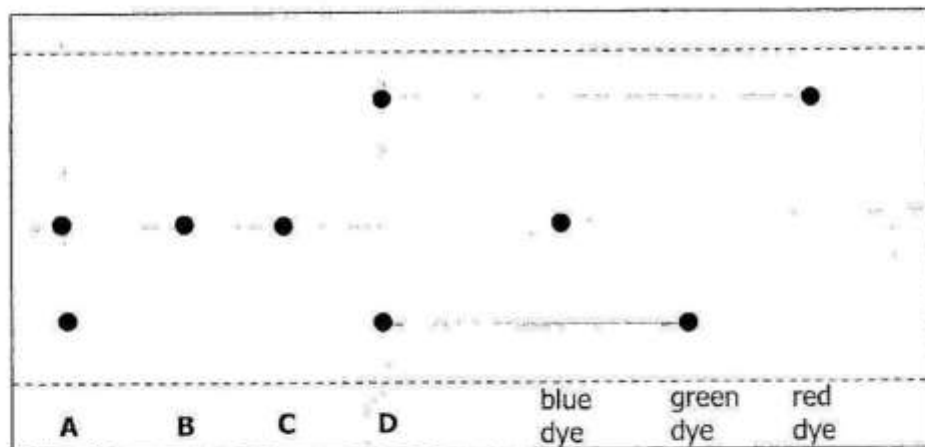
**Cell phones are not allowed in the examination room.**



- 1 What are the basic units of matter in water?
  - A Atoms
  - B Electrons
  - C Ions
  - D Molecules
- 2 Which of the following is **not** a change of state?
  - A Condensation
  - B Filtration
  - C Sublimation
  - D Vaporization
- 3 Which piece of apparatus can be used to measure accurately 15.6cm<sup>3</sup> of solution?



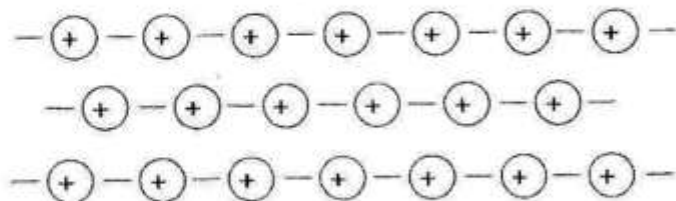
- 4 The diagram below shows a chromatogram obtained using solutions **A**, **B**, **C** and **D** on one side and the dyes blue, green and red on the other side.



Which of the solutions **A**, **B**, **C** and **D** contains green and red dyes only?

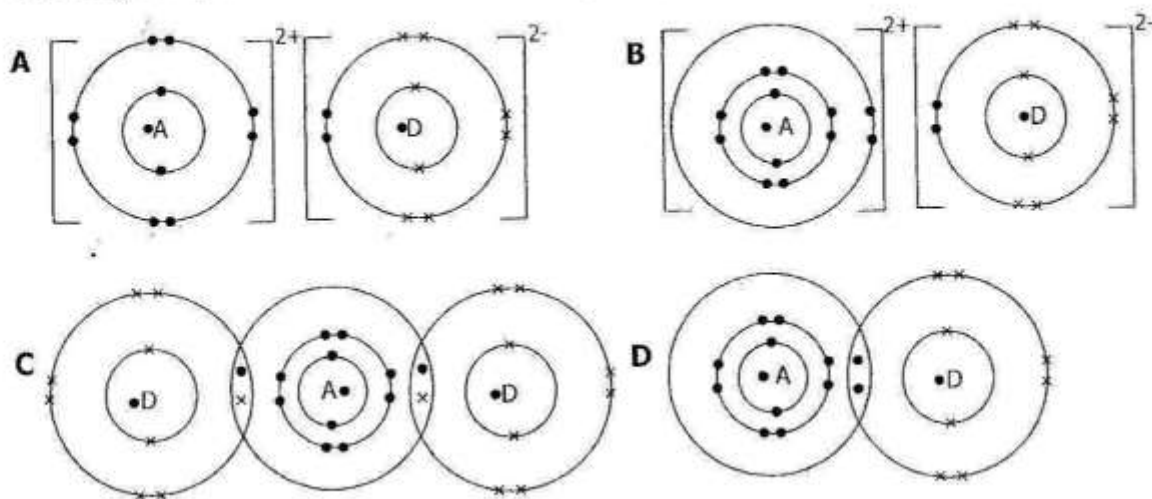
- 5 The mixture which contains elements only is ...
  - A air.
  - B brass.
  - C mineral water.
  - D seawater.

- 6 The structure below represents a solid substance at r.t.p.



Which of the following substances is likely to have the structure above?

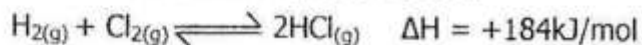
- A Aluminium  
 B Calcium  
 C Lithium  
 D Magnesium
- 7 Elements **A** and **D** have atomic numbers 12 and 8 respectively. When **A** and **D** react together, the structure of the resulting compound is ...



- 8 Which of the following common substances contains ethanoic acid?
- A Cooking oil  
 B Dish washing liquid  
 C Jik  
 D Vinegar
- 9 Which one of the following substances will neutralize both dilute hydrochloric acid and aqueous ammonia solutions?
- A Aluminium hydroxide  
 B Copper (II) hydroxide  
 C Iron (II) hydroxide  
 D Magnesium hydroxide

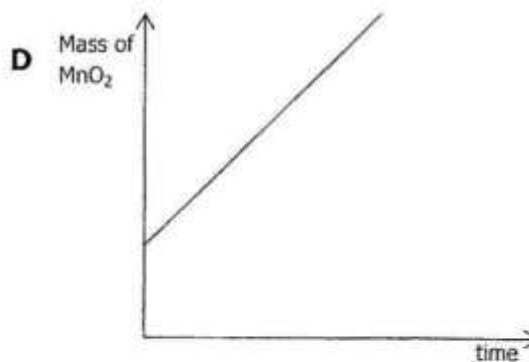
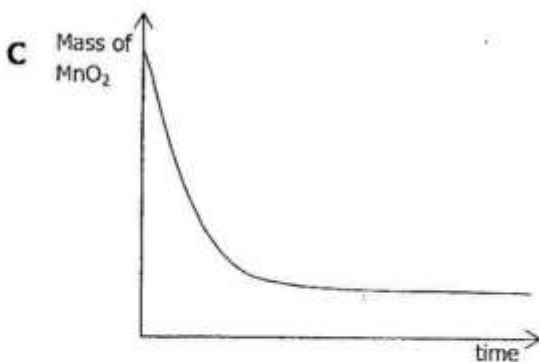
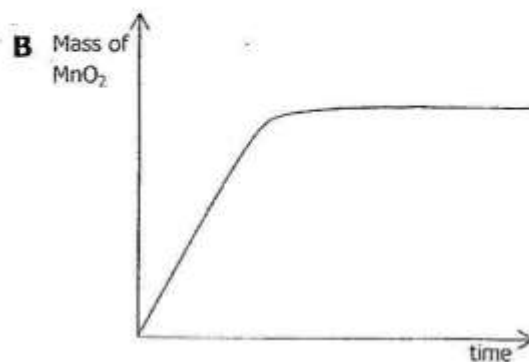
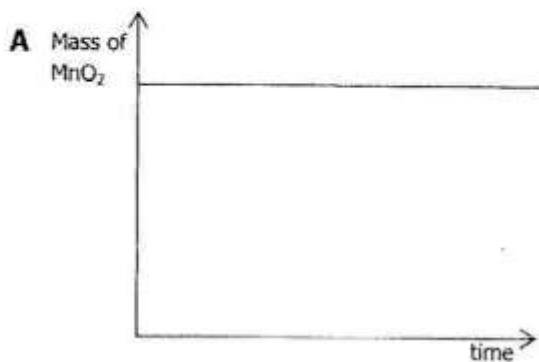
- 10 Which of the following salts cannot be crystallized from an aqueous solution?
- A Barium Chloride
  - B Magnesium Sulphate
  - C Silver Chloride
  - D Sodium Ethanoate
- 11 Which one of the following oxides has a pH of 7?
- A Calcium oxide
  - B Hydrogen oxide
  - C Sodium oxide
  - D Magnesium oxide
- 12 A compound has the empirical formula of  $\text{CH}_2\text{O}$  and a relative molecular mass of 60. What is the molecular formula of this compound?
- A  $\text{C}_2\text{H}_4\text{O}$
  - B  $\text{C}_3\text{H}_4\text{O}_2$
  - C  $\text{C}_3\text{H}_4\text{O}_3$
  - D  $\text{C}_2\text{H}_4\text{O}_2$
- 13 What mass of methane,  $\text{CH}_4$ , occupies the same volume, measured at r.t.p as 11g of carbon dioxide?
- A 4g
  - B 16g
  - C 176g
  - D 264g
- 14 A solution was made by dissolving 14.0g of potassium hydroxide, KOH, to make  $50\text{cm}^3$  of solution. What is the concentration of the solution in  $\text{mol/dm}^3$ ?
- A 0.25
  - B 0.28
  - C 2.5
  - D 5.0
- 15 The equation of a chemical reaction is given below.
- $$\underline{a}\text{P}_4(\text{s}) + \underline{b}\text{KClO}_3(\text{s}) \rightarrow \underline{c}\text{P}_2\text{O}_5(\text{s}) + \underline{d}\text{KCl}(\text{s})$$
- The underlined letters **a**, **b**, **c** and **d** represent numbers used to balance the equation. Which of the following is correct?
- |          | <b>a</b> | <b>b</b> | <b>c</b> | <b>d</b> |
|----------|----------|----------|----------|----------|
| <b>A</b> | 3        | 10       | 6        | 10       |
| <b>B</b> | 3        | 5        | 3        | 5        |
| <b>C</b> | 2        | 3        | 4        | 3        |
| <b>D</b> | 1        | 2        | 2        | 2        |

- 16 One mole of hydrogen gas and one mole of water have an equal number of ...
- A atoms.
  - B electrons.
  - C ions.
  - D molecules.
- 17 Hydrogen and chlorine gases react under suitable conditions as shown in the reversible chemical equation below.

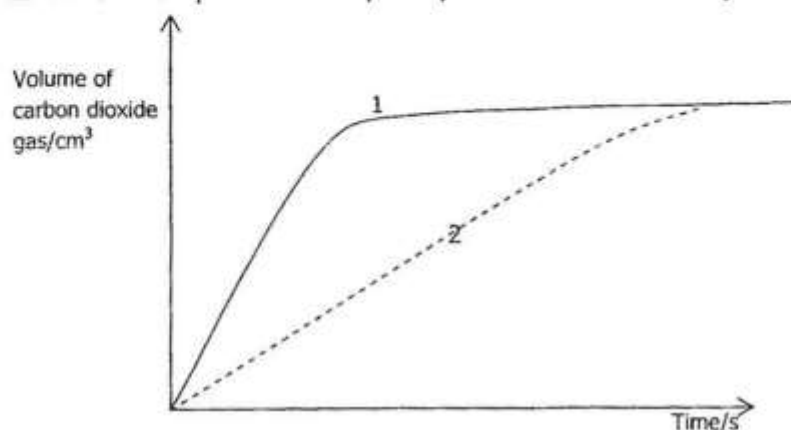


Which one of the following changes will affect the position of the equilibrium?

- A Addition of a catalyst
  - B Change of volume ✓
  - C Increase in temperature
  - D Increase in pressure
- 18 A pupil prepared oxygen gas from potassium chlorate by using manganese (IV) oxide,  $\text{MnO}_2$ , as a catalyst. Which of the following graphs shows how the mass of manganese (IV) oxide changed with time during the reaction?



- 19 Curve 1 shows the volume of carbon dioxide gas given off when 8g of calcium carbonate lumps react completely with excess dilute hydrochloric acid at 20°C.

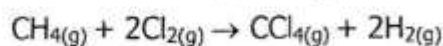


Curve 2 could be produced by using ...

- A 2g of powdered calcium carbonate.
  - B 3g of calcium carbonate lumps.
  - C a lower temperature.
  - D a more concentrated solution of the acid.
- 20 Some bond enthalpy in kJ/mol are shown in the table below.

Bond	C - H	Cl - Cl	C - Cl	H - H
Bond enthalpy in kJ/mol	413	242	346	436

Find the enthalpy change for the reaction below



- A +53.8kJ/mol
  - B -53.8kJ/mol
  - C -120kJ/mol
  - D +120kJ/mol
- 21 Which statement about a catalyst is correct? It ...
- A increases the energy barrier of the reaction.
  - B lowers the energy barrier of the reaction.
  - C increases the bond energy of the reaction.
  - D lowers the bond energy of the reaction.
- 22 An element E, forms coloured compounds which are commonly used as catalysts. In which section of the Periodic Table is element E found?
- A Alkali metals
  - B Halogens
  - C Noble gases
  - D Transition metals

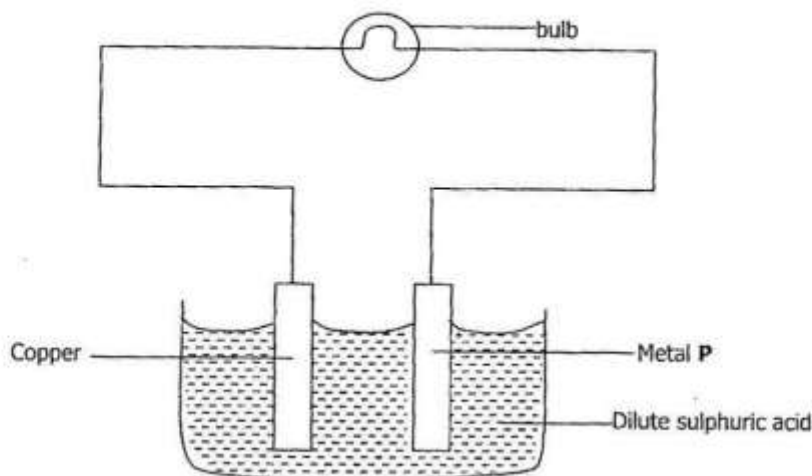
- 23 The diagram below shows an outline of the Periodic Table.

The diagram shows an outline of the periodic table with the following elements marked:

- X**: Located in the first column (Group 1), second row from the bottom.
- Y**: Located in the first column (Group 1), third row from the bottom.
- W**: Located in the fourth column (Group 14), second row from the bottom.
- Z**: Located in the eighth column (Group 18), second row from the bottom.

Which of the following statements is correct?

- A** The melting point of **X** is higher than that of **Z**.
- B** **X** and **Z** can react to form a covalent compound **XZ**.
- C** **Y** reacts with oxygen to form an oxide with the formula,  $Y_3O_2$ .
- D** **W** reacts with an acid to form a salt and hydrogen gas.
- 24 An electrochemical cell was made by dipping a copper rod and a rod of metal **P** in dilute sulphuric acid according to the diagram below:

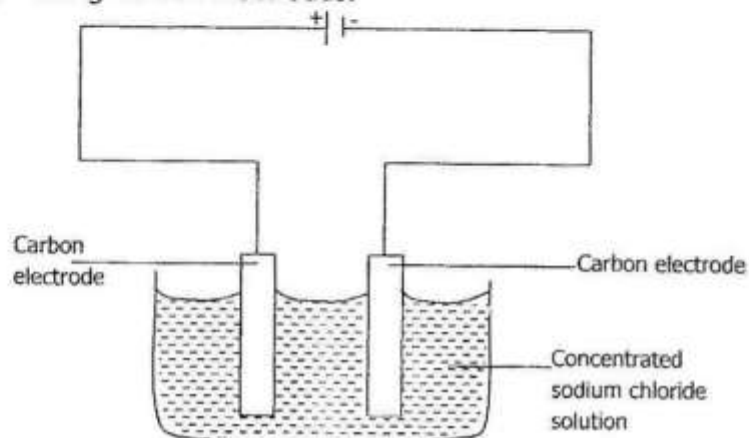


The bulb **did not** light up. What was metal **P**?

- A** Aluminium
- B** Copper
- C** Gold
- D** Zinc
- 25 Dilute copper (II) sulphate solution was electrolyzed using inert electrodes. Find the quantities for the electrode products if 0.2 moles of electrons were used at r.t.p.

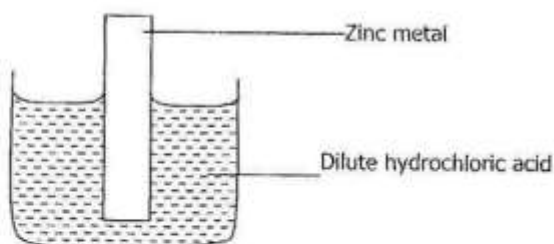
	<b>Cathode</b>	<b>Anode</b>
<b>A</b>	4.8dm <sup>3</sup> of hydrogen gas	1.2dm <sup>3</sup> of oxygen gas
<b>B</b>	2.4dm <sup>3</sup> of hydrogen gas	4.8dm <sup>3</sup> of oxygen gas
<b>C</b>	2.4g of copper	4.8dm <sup>3</sup> of oxygen gas
<b>D</b>	6.4g of copper	1.2dm <sup>3</sup> of oxygen gas

- 26 The apparatus below shows the electrolysis of concentrated sodium chloride solution using carbon electrodes.



What took place at the cathode?

- A Sodium ions were oxidized.
  - B Sodium ions were reduced.
  - C Hydrogen ions were reduced.
  - D Hydrogen ions were oxidized.
- 27 Which of the following is true about mercury? It ...
- A is an insulator.
  - B is an electrolyte.
  - C conducts electricity by the movement of ions.
  - D conducts electricity by movement of electrons.
- 28 Mild steel is an alloy of two elements. What are these elements?
- A Copper and Tin
  - B Copper and Zinc
  - C Iron and Tin
  - D Iron and Carbon
- 29 In the laboratory, an experiment was set up as shown in the diagram below.

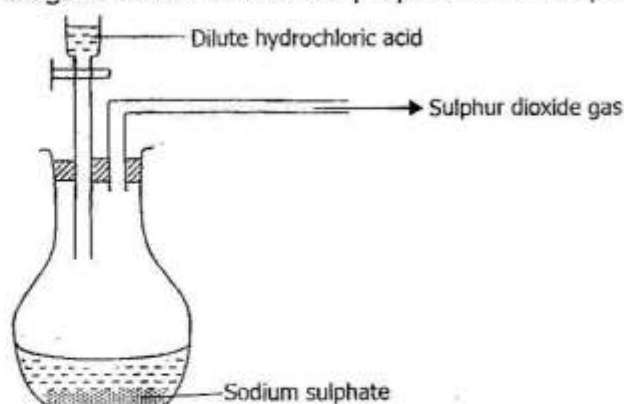


Which of the following is the correct equation for the reaction in the above experiment?

- A  $\text{Zn} + \text{HCl} \rightarrow \text{ZnCl} + \text{H}$
- B  $2\text{Zn} + \text{HCl} \rightarrow 2\text{ZnCl} + \text{H}_2$
- C  $\text{Zn} + 2\text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2$
- D  $\text{Zn} + \text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2$

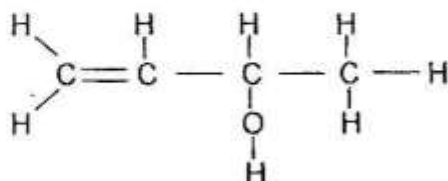


- 30 Which of the following metals forms the least stable nitrate?
- A Aluminium  
 B Copper  
 C Silver  
 D Sodium
- 31 A powdered mixture of metals contains magnesium, copper, iron and zinc. Excess dilute sulphuric acid is added until no more reaction occurs. What is the residue left in the reaction vessel?
- A Copper  
 B Iron  
 C Magnesium  
 D Zinc
- 32 The diagram below shows the preparation of Sulphur dioxide gas.



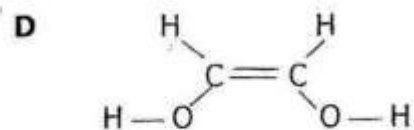
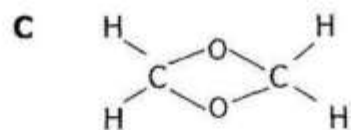
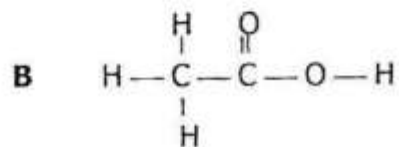
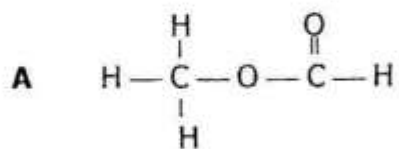
- Which of the following methods can be used to collect Sulphur dioxide gas?
- A Downward displacement of water.  
 B Downward displacement of air.  
 C Upward displacement of air.  
 D Upward delivery of the gas.
- 33 The source of nitrogen used in the manufacture of ammonia using the Haber process is ...
- A fractional distillation of liquid air.  
 B the decomposition of organic matter.  
 C the decomposition of ammonium nitrate.  
 D the electrolysis of water.
- 34 Which of the following fuels is environmental friendly?
- A Coal  
 B Ethanol  
 C Hydrogen  
 D Petrol

- 35 Which method of rust prevention does **not** involve coating the iron or steel object?
- A Alloying
  - B Electroplating
  - C Galvanising
  - D Painting
- 36 Which set of polymers comprises natural polymers?
- A Protein, fats and nylon.
  - B Protein, fats and cellulose.
  - C Protein, cellulose and nylon.
  - D Nylon, cellulose and fats.
- 37 Which type of reaction occurs when glucose is formed from starch?
- A Polymerization
  - B Hydrolysis
  - C Fermentation
  - D Cracking
- 38 A compound has the following structure.



- Which of the reactions below will this compound undergo?
1. It will react with methanoic acid to form an ester
  2. It will decolourise bromine water rapidly
  3. It will react with an alkali to form a salt
- A 1, 2 and 3
  - B 2 and 3 only
  - C 1 and 2 only
  - D 1 only
- 39 Which of the following plastics is thermally stable?
- A Poly(ethene)
  - B Poly(propene)
  - C Poly(vinylchloride)
  - D Poly(tetrafluoroethene)

- 40 An organic compound, **R**, has an empirical formula,  $\text{CH}_2\text{O}$ . **R** gives out carbon dioxide from marble chips. Which of the following is the structure of compound **R**?



DATA SHEET  
The Periodic Table of the Elements

Group		I	II	III	IV	V	VI	VII	0
7	Li Lithium 3	1	H Hydrogen 1	11	12	14	16	19	20
	9								4
	Be Beryllium 4								He Helium 2
23	Na Sodium 11	24							Ne Neon 10
	Mg Magnesium 12								Ar Argon 18
39	K Potassium 19	40							
	Ca Calcium 20								
	Sc Scandium 21								
	Ti Titanium 22								
	V Vanadium 23								
	Cr Chromium 24								
	Mn Manganese 25								
	Fe Iron 26								
	Co Cobalt 27								
	Ni Nickel 28								
	Cu Copper 29								
	Zn Zinc 30								
	Ga Gallium 31								
	Ge Germanium 32								
	As Arsenic 33								
	Se Selenium 34								
	Br Bromine 35								
	Kr Krypton 36								
85	Rb Rubidium 37	86							
	Sr Strontium 38								
	Y Yttrium 39								
	Zr Zirconium 40								
	Nb Niobium 41								
	Mo Molybdenum 42								
	Tc Technetium 43								
	Ru Ruthenium 44								
	Rh Rhodium 45								
	Pd Palladium 46								
	Ag Silver 47								
	Cd Cadmium 48								
	In Indium 49								
	Sn Tin 50								
	Sb Antimony 51								
	Te Tellurium 52								
	I Iodine 53								
	Xe Xenon 54								
133	Cs Caesium 55	134							
	Ba Barium 56								
	La Lanthanum 57								
	Hf Hafnium 72								
	Ta Tantalum 73								
	W Tungsten 74								
	Re Rhenium 75								
	Os Osmium 76								
	Ir Iridium 77								
	Pt Platinum 78								
	Au Gold 79								
	Hg Mercury 80								
	Tl Thallium 81								
	Pb Lead 82								
	Bi Bismuth 83								
	Po Polonium 84								
	At Astatine 85								
	Rn Radon 86								
87	Fr Francium 87	226							
	Ra Radium 88								
	Ac Actinium 89								

140	Ce Cerium 58	141	Pr Praseodymium 59	142	Nd Neodymium 60	143	Pm Promethium 61	144	Sm Samarium 62	145	Eu Europium 63	146	Gd Gadolinium 64	147	Tb Terbium 65	148	Dy Dysprosium 66	149	Ho Holmium 67	150	Er Erbium 68	151	Tm Thulium 69	152	Yb Ytterbium 70	153	Lu Lutetium 71
232	Th Thorium 90	233	Pa Protactinium 91	234	U Uranium 92	235	Np Neptunium 93	236	Pu Plutonium 94	237	Am Americium 95	238	Cm Curium 96	239	Bk Berkelium 97	240	Cf Californium 98	241	Es Einsteinium 99	242	Fm Fermium 100	243	Md Mendelevium 101	244	No Nobelium 102	245	Lr Lawrencium 103

Key  $\begin{matrix} a \\ X \\ b \end{matrix}$

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

The volume of one mole of any gas is  $24 \text{ dm}^3$  at room temperature and pressure (r.t.p.).

NA =  $6.0 \times 10^{23}$ /mol; 1F = 96500C.

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