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**CHEMISTRY**  
**STANDARD LEVEL**  
**PAPER 1**

Thursday 16 May 2013 (afternoon)

45 minutes

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**INSTRUCTIONS TO CANDIDATES**

- Do not open this examination paper until instructed to do so.
- Answer all the questions.
- For each question, choose the answer you consider to be the best and indicate your choice on the answer sheet provided.
- The periodic table is provided for reference on page 2 of this examination paper.
- The maximum mark for this examination paper is [30 marks].

# The Periodic Table

1	2	Atomic number																		3	4	5	6	7	0										
		Element																																	
		Relative atomic mass																																	
1 <b>H</b> 1.01	3 <b>Li</b> 6.94	4 <b>Be</b> 9.01	5 <b>B</b> 10.81	6 <b>C</b> 12.01	7 <b>N</b> 14.01	8 <b>O</b> 16.00	9 <b>F</b> 19.00	10 <b>Ne</b> 20.18	11 <b>Na</b> 22.99	12 <b>Mg</b> 24.31	13 <b>Al</b> 26.98	14 <b>Si</b> 28.09	15 <b>P</b> 30.97	16 <b>S</b> 32.06	17 <b>Cl</b> 35.45	18 <b>Ar</b> 39.95	19 <b>K</b> 39.10	20 <b>Ca</b> 40.08	21 <b>Sc</b> 44.96	22 <b>Ti</b> 47.90	23 <b>V</b> 50.94	24 <b>Cr</b> 52.00	25 <b>Mn</b> 54.94	26 <b>Fe</b> 55.85	27 <b>Co</b> 58.93	28 <b>Ni</b> 58.71	29 <b>Cu</b> 63.55	30 <b>Zn</b> 65.37	31 <b>Ga</b> 69.72	32 <b>Ge</b> 72.59	33 <b>As</b> 74.92	34 <b>Se</b> 78.96	35 <b>Br</b> 79.90	36 <b>Kr</b> 83.80	
37 <b>Rb</b> 85.47	38 <b>Sr</b> 87.62	39 <b>Y</b> 88.91	40 <b>Zr</b> 91.22	41 <b>Nb</b> 92.91	42 <b>Tc</b> 95.94	43 <b>Ru</b> 98.91	44 <b>Tc</b> 101.07	45 <b>Rh</b> 102.91	46 <b>Pd</b> 106.42	47 <b>Ag</b> 107.87	48 <b>Cd</b> 112.40	49 <b>In</b> 114.82	50 <b>Sn</b> 118.69	51 <b>Sb</b> 121.75	52 <b>Te</b> 127.60	53 <b>I</b> 126.90	54 <b>Xe</b> 131.30	55 <b>Cs</b> 132.91	56 <b>Ba</b> 137.34	57 † <b>La</b> 138.91	72 <b>Hf</b> 178.49	73 <b>Ta</b> 180.95	74 <b>W</b> 183.85	75 <b>Re</b> 186.21	76 <b>Os</b> 190.21	77 <b>Ir</b> 192.22	78 <b>Pt</b> 195.09	79 <b>Au</b> 196.97	80 <b>Hg</b> 200.59	81 <b>Tl</b> 204.37	82 <b>Pb</b> 207.19	83 <b>Bi</b> 208.98	84 <b>Po</b> (210)	85 <b>At</b> (210)	86 <b>Rn</b> (222)
87 <b>Fr</b> (223)	88 <b>Ra</b> (226)	89 ‡ <b>Ac</b> (227)	58 <b>Ce</b> 140.12	59 <b>Pr</b> 140.91	60 <b>Nd</b> 144.24	61 <b>Pm</b> 146.92	62 <b>Sm</b> 150.35	63 <b>Eu</b> 151.96	64 <b>Gd</b> 157.25	65 <b>Tb</b> 158.92	66 <b>Dy</b> 162.50	67 <b>Ho</b> 164.93	68 <b>Er</b> 167.26	69 <b>Tm</b> 168.93	70 <b>Yb</b> 173.04	71 <b>Lu</b> 174.97	† <b>Th</b> 232.04	90 <b>Pa</b> 231.04	91 <b>U</b> 238.03	92 <b>Np</b> (237)	93 <b>Pu</b> (242)	94 <b>Am</b> (243)	95 <b>Cm</b> (247)	96 <b>Bk</b> (247)	97 <b>Cf</b> (251)	98 <b>Es</b> (254)	99 <b>Fm</b> (257)	100 <b>Md</b> (258)	101 <b>No</b> (259)	102 <b>Lr</b> (260)	103 <b>Rf</b> (260)				

1. Which contains the largest number of ions?

- A. 1 mol of  $\text{Al}_2(\text{SO}_4)_3$
- B. 1 mol of  $\text{Mg}_3(\text{PO}_4)_2$
- C. 2 mol of  $\text{K}_3\text{PO}_4$
- D. 3 mol of  $\text{NaNO}_3$

2. How many atoms are present in 0.10 mol of  $\text{PtCl}_2(\text{NH}_3)_2$ ?

- A.  $6.0 \times 10^{22}$
- B.  $3.0 \times 10^{23}$
- C.  $6.6 \times 10^{23}$
- D.  $6.6 \times 10^{24}$

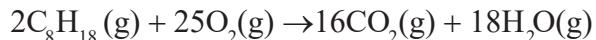
3. Which is the best description of relative atomic mass,  $A_r$ ?

- A. The number of neutrons and protons present in the nucleus of an atom
- B. The average number of neutrons and protons in all isotopes of an element
- C. The weighted mean mass of naturally occurring isotopes of an element compared to the mass of an atom of carbon-12
- D. The weighted mean mass of naturally occurring isotopes of an element compared to  $1/12^{\text{th}}$  of the mass of an atom of carbon-12

4. What mass of carbon dioxide,  $\text{CO}_2(\text{g})$ , in g, is produced when 5.0 g of calcium carbonate,  $\text{CaCO}_3(\text{s})$ , reacts completely with hydrochloric acid,  $\text{HCl}(\text{aq})$ ?



- A. 0.050  
B. 2.2  
C. 4.4  
D. 5.0
5. What volume of carbon dioxide,  $\text{CO}_2(\text{g})$ , in  $\text{dm}^3$ , is produced when 1  $\text{dm}^3$  of octane,  $\text{C}_8\text{H}_{18}(\text{g})$ , undergoes complete combustion?



- A. 1  
B. 4  
C. 8  
D. 9
6. Which is an isotope of  $^{24}\text{Mg}$ ?

- A.  $_{11}^{24}\text{Na}$   
B.  $_{12}^{24}\text{Mg}^{2+}$   
C.  $_{12}^{26}\text{Mg}$   
D.  $_{10}^{22}\text{Ne}$

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