

**Chemistry**  
**Higher level**  
**Paper 1**

Tuesday 8 May 2012 (afternoon)

1 hour

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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 **[40 marks]**.

**EXAMPLE**



4 pages

2212–6113  
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**The Periodic Table**

1 2 3 4 5 6 7 0

Atomic number		Element																																	
Relative atomic mass																																			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
H 1.01	He 4.00	Li 6.94	Be 9.01	B 10.81	C 12.01	N 14.01	O 16.00	F 19.00	Ne 20.18	Na 22.99	Mg 24.31	Al 26.98	Si 28.09	P 30.97	S 32.06	Cl 35.45	Ar 39.95	K 39.10	Ca 40.08	Sc 44.96	Ti 47.90	V 50.94	Cr 52.00	Mn 54.94	Fe 55.85	Co 58.93	Ni 58.71	Cu 63.55	Zn 65.37	Ga 69.72	Ge 72.59	As 74.92	Se 78.96	Br 79.90	Kr 83.80
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57 †	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86
Rb 85.47	Sr 87.62	Y 88.91	Zr 91.22	Nb 92.91	Mo 95.94	Tc 98.91	Ru 101.07	Rh 102.91	Pd 106.42	Ag 107.87	Cd 112.40	In 114.82	Sn 118.69	Sb 121.75	Te 127.60	I 126.90	Xe 131.30	Cs 132.91	Ba 137.34	La 138.91	Hf 178.49	Ta 180.95	W 183.85	Re 186.21	Os 190.21	Ir 192.22	Pt 195.09	Au 196.97	Hg 200.59	Tl 204.37	Pb 207.19	Bi 208.98	Po (210)	At (210)	Rn (222)
87	88	89 ‡																																	
Fr (223)	Ra (226)	Ac (227)																																	

†

58	59	60	61	62	63	64	65	66	67	68	69	70	71
Ce 140.12	Pr 140.91	Nd 144.24	Pm 146.92	Sm 150.35	Eu 151.96	Gd 157.25	Tb 158.92	Dy 162.50	Ho 164.93	Er 167.26	Tm 168.93	Yb 173.04	Lu 174.97

‡

90	91	92	93	94	95	96	97	98	99	100	101	102	103
Th 232.04	Pa 231.04	U 238.03	Np (237)	Pu (242)	Am (243)	Cm (247)	Bk (247)	Cf (251)	Es (254)	Fm (257)	Md (258)	No (259)	Lr (260)

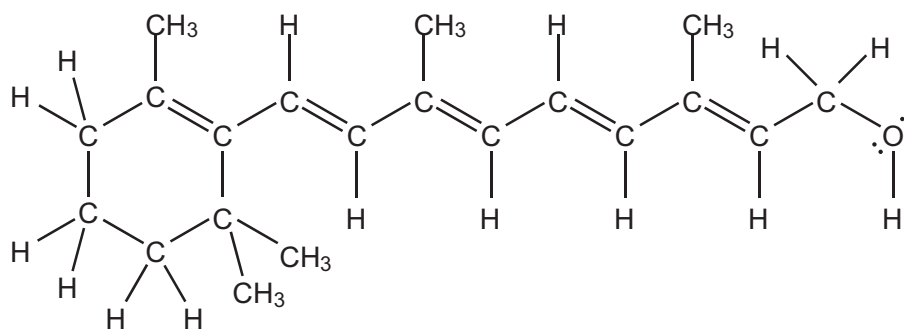
1. During which process is there a **decrease** in the entropy of the system?
- A.  $\text{Ag(s)} + 2\text{H}^+(\text{aq}) + \text{NO}_3^-(\text{aq}) \rightarrow \text{Ag}^+(\text{aq}) + \text{H}_2\text{O(l)} + \text{NO}_2(\text{g})$
- B.  $\text{Ba(OH)}_2(\text{s}) \rightarrow \text{BaO(s)} + \text{H}_2\text{O(g)}$
- C.  $\text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g}) \rightarrow \text{PCl}_5(\text{g})$
- D.  $\text{H}_2\text{O(s)} \rightarrow \text{H}_2\text{O(l)}$
2. What is the IUPAC name of  $(\text{CH}_3)_2\text{CHCOCH}_3$ ?
- A. 3,3-dimethylpropan-2-one
- B. 3-methylbutan-2-one
- C. 2-methylbutan-3-one
- D. 3-methylbutanal
3. In the electromagnetic spectrum, which will have the shortest wavelength **and** the greatest energy?

	Shortest wavelength	Greatest energy
A.	ultraviolet	ultraviolet
B.	infrared	infrared
C.	ultraviolet	infrared
D.	infrared	ultraviolet

4. Which are appropriate units for the rate of a reaction?
- A.  $\text{mol dm}^{-3} \text{ s}^{-1}$
- B.  $\text{mol dm}^{-3} \text{ s}$
- C.  $\text{mol dm}^{-3}$
- D. s

**EXAMPLE**

5. Retinol (vitamin A) contains a total of **5** double bonds and **46** single bonds.



Which statements are correct?

- I. There are 51  $\sigma$  and 5  $\pi$  bonds.
  - II. The oxygen atom is  $sp^3$  hybridized.
  - III. Retinol is a primary alcohol.
- A. I and II only
- B. I and III only
- C. II and III only
- D. I, II and III
6. Which graph represents a reaction that is second order with respect to X for the reaction  $X \rightarrow \text{products}$ ?

