MARKSCHEME

May 2026 | Chemistry | Standard Level | Paper 1A

Maximum Marks: 30 **Duration: 1 hour 30 minutes (Combined with 1B)**

Question	Key	Explanation / Reasoning
1	C	For $^{108}_{47}Ag^{+}$: Protons = atomic number = 47. Neutrons = mass number – atomic number = 108 – 47 = 61. Electrons = protons – charge = 47 – 1 = 46.
2	D	The maximum number of electrons in a main energy level n is given by $2n^2$. For $n = 4$, max electrons = $2 \times 4^2 = 2 \times 16 = 32$.
3	A	Bromine ($Z = 35$) fills subshells up to $4p$ following the Aufbau principle: $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^5$.
4	D	$100\ g$ of $CaCO_3$ matches $1\ mol$ ($M = 100\ g\ mol^{-1}$). Every formula unit contains 1 Ca^{2+} ion and 1 CO_3^{2-} ion ($2\ mol$ of ions total). Total ions = $2 \times 6.02 \times 10^{23} = 1.2 \times 10^{24}$.
5	C	In 100g: $52\ g$ C = $4.33\ mol$; $13\ g$ H = $13\ mol$; $35\ g$ O = $2.19\ mol$. Dividing by 2.19 yields a ratio of C_2H_6O, matching the formula of the alcohol (ethanol).
6	A	Barium forms Ba^{2+} ions and nitride is N^{3-}. Charge balancing yields Ba_3N_2.
7	D	Potassium fluoride (KF) is ionic. It is water-soluble, possesses a high melting point, does not conduct as a solid, but conducts efficiently when molten.
8	D	PF_3 has 4 electron domains (3 bonding pairs, 1 lone pair) around the phosphorus atom, producing a tetrahedral domain geometry and a trigonal pyramidal molecular geometry.
9	C	The hydronium ion (H_3O^+, printed as $[H_3O]^-$) has a coordinate bond formed when water shares an oxygen lone pair with an empty orbital of an H^+ ion.
10	A	CH_2Cl_2 (I) and CH_3Cl (II) are asymmetrical polar molecules. CCl_4 (III) is symmetrical, meaning the dipoles cancel out completely (nonpolar).
11	B	Caesium is an alkali metal (Group 1), tungsten is a transition element, iodine is a halogen (Group 17), and krypton is a noble gas (Group 18).

Question	Key	Explanation / Reasoning
12	A	Sodium oxide (Na_2O) is a basic metal oxide that reacts strongly with water to produce the strong alkali base $NaOH$.
13	C	The target molecule contains a tertiary amine (nitrogen attached to three carbon blocks), a hydroxyl group (–OH), and an alkoxy group (–OCH_3).
14	C	2,2-dimethylpropan-1-ol and pentan-2-ol share the molecular formula $C_5H_{12}O$. Pentanal is an aldehyde ($C_5H_{10}O$), making II and III structural isomers.
15	C	The designation "+ heat" indicates an exothermic reaction. This increases surrounding temperature, producing thermodynamically more stable products.
16	D	The balanced equation is: $2\ C_4H_{10} + 13\ O_2 \rightarrow 8\ CO_2 + 10\ H_2O$. The sum of the coefficients is $2 + 13 + 8 + 10 = 33$.
17	A	Target reaction: $C(s) + O_2(g) \rightarrow CO_2(g)$. Inverting step 1 gives $+x$. Half of steps 2 and 3 cancels out the intermediate metal terms, yielding $+x + 0.5y - 0.5z$.
18	B	An increase in temperature shifts the Maxwell–Boltzmann distribution curve peak downward and to the right, showing a higher mean kinetic energy.
19	A	Moles: $Mg = 0.049\ mol$, $HCl = 0.200\ mol$. Stoichiometrically, $0.049\ mol$ Mg consumes $0.098\ mol$ HCl. Mg is fully consumed, leaving excess unreacted $HCl(aq)$ and product $MgCl_2(aq)$ in the vessel.
20	B	Reducing a carboxylic acid (butanoic acid) converts the terminal carboxyl group into a primary alcohol, yielding butan-1-ol.
21	B	Increasing the particle size decreases the active contact surface area, which slows the rate of collision and increases the total completion time.
22	D	Since K increases from 100 to 300 as temperature increases, the forward reaction is endothermic. Because $K > 1$, products are favored over reactants at equilibrium.
23	C	The forward reaction is endothermic ($\Delta H = +320\ kJ\ mol^{-1}$). Increasing temperature drives the equilibrium system forward to counteract the temperature rise.
24	B	Fluorine is highly electronegative; its oxidation number drops from 0 in F_2 to –1 in OF_2. Gaining electrons means it acts as the oxidizing agent.
25	C	Halogen reactivity follows the order $Cl_2 > Br_2 > I_2$. Chlorine can displace bromide (III) and bromine can displace iodide (II), making reactions II and III spontaneous.

Question	Key	Explanation / Reasoning
26	A	In a voltaic system, the more reactive zinc electrode undergoes oxidation at the anode (– sign), while the copper electrode undergoes reduction at the cathode (+ sign).
27	A	Electrolysis of molten $CaBr_2$ drives Ca^{2+} cations to the cathode to form calcium metal, and Br^- anions to the anode to liberate bromine gas.
28	B	Magnesium is a reactive metal positioned above hydrogen in the activity series, allowing it to displace hydrogen gas from hydrochloric acid to produce $MgCl_2(aq)$.
29	D	An electrophile acts as an electron-pair acceptor. Boron trifluoride (BF_3) has an open valence octet, accepting a lone pair from the nucleophile NH_3.
30	A	Hydration of the symmetrical alkene but-2-ene adds $-H$ and $-OH$ across the double bond, creating the secondary alcohol butan-2-ol.