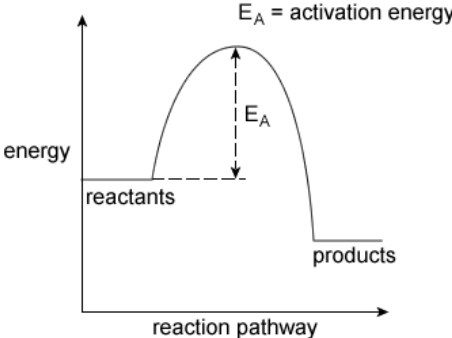




#	Ans	Workings/Remarks
1	A	Crystalline sugar is soluble in water. When the sugar dissolved, the sugar molecules diffuse from a region of higher concentration to a region of lower concentration, until they are evenly distributed throughout the solution.
2	C	Sodium hydroxide reacts only with ammonium compound to give ammonia gas, which could be detected by moist red litmus paper.
3	A	Upon heating, only solid ammonium chloride sublimes into gas, which could be cooled into liquid by the condenser and drained into the beaker.
4	C	Melting occurs at B, a region of mixture of solid and liquid. Boiling occurs at D, a region of mixture of liquid and gas.
5	C	When blue solid X and white solid Y are mixed in water, X would dissolve but not Y. After filtration, X could pass through filter paper but not Y. Thus, X would be collected as filtrate in beaker while Y remains as residue on filter paper.
6	C	A: Element contains isotopes which differ in the number of neutron B: Nucleon number is the sum of the number of protons and neutrons; it could never be less than the proton number C: An example is Hydrogen D: The number of neutrons is independent of the number of electrons. There is a possibility of both being the same number.
7	A	B: Mercury is a liquid at room temperature (e.g. mercury in glass thermometer), implying that its melting point is below 500°C. C: Poly(ethane) is a covalent molecule which does not conduct electricity. D: Sodium chloride is an ionic compound which does not conduct electricity in solid state as the ions are not mobile.
8	A	Y is an element from Group VI, which is a non-metal. Thus it gains an electron from the sodium atom, forming ionic bonds between $Y^{2-}$ and $Na^{+}$ ions.
9	B	Ethanol is a covalent compound, which has low melting and boiling points due to the presence of weak intermolecular forces. It does not conduct electricity in any state due to the absence of charge carrier e.g. ions or electrons.
10	B	Metals form metallic bonding, which is the attraction between positive ions and the sea of electrons. The positive ions are fixed in their lattices; whereas the electrons are mobile and could therefore conduct electricity. Electrolytes are made of ionic compound, which contain ions that could conduct electricity when they are mobile.
11	A	1 mole of substance = $6.02 \times 10^{23}$ of particles e.g. atoms, molecules, ions etc A: Number of mole of carbon atoms = $1/12 = 0.0833$ B: Number of mole of iodine atoms = $1/127 = 0.00787$ C: Number of mole of iron atoms = $1/56 = 0.0179$ D: Number of mole of oxygen atoms = $1/16 = 0.0625$ Greatest number of mole gives rise to the greatest number of atoms.





12	A	<p>Number of mole of sulfuric acid = <math>\frac{40}{1000} \times 0.25 = 0.01</math></p> <p>Number of mole of X hydroxide = 0.02</p> <p>Ratio of sulfuric acid to X hydroxide = 1:2</p> <p>Equation for the reaction: <math>\text{H}_2\text{SO}_4 + 2\text{XOH} = \text{X}_2\text{SO}_4 + 2\text{H}_2\text{O}</math></p>
13	B	<p>Copper (II) sulfate is an ionic compound, which dissociates into copper (II) ion and sulfate ion in water.</p> <p><math>\text{H}_2\text{O}</math> is a covalent compound which does not dissociate into ions.</p>
14	D	<p>At an anode (positive electrode) that is reactive, the copper electrode will dissolve (oxidation reaction) when an electric current is passed through. <math>[\text{Cu} \rightarrow \text{Cu}^{2+} + 2\text{e}^-]</math></p> <p><math>\text{Cu}^{2+}</math> ions are continuously discharged into the solution, replacing those that have discharged (reduction reaction) at the cathode. <math>[\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}]</math></p> <p>Hence, the intensity of the blue colour (due to presence of <math>\text{Cu}^{2+}</math> ions) remains unchanged as the number of <math>\text{Cu}^{2+}</math> ions in solution remains unchanged.</p>
15	A	A fuel cell is an electrochemical cell that produces electricity.
16	D	 <p>A catalyst works by lowering the activation energy, which is the energy difference between the reactants and intermediates.</p>
17	C	Higher concentration of reactants increases the rate of reaction and therefore decreases the time taken to complete the reaction.
18	C	<p>Oxidation state of hydrogen in <math>\text{H}^+</math> and <math>\text{H}_2\text{O}</math>: +1</p> <p>Oxidation state of carbon in <math>\text{CO}_3^{2-}</math> and <math>\text{CO}_2</math>: +4</p> <p>Oxidation state of oxygen in <math>\text{CO}_3^{2-}</math> and <math>\text{CO}_2</math>: -2</p> <p>As there is no change in the oxidation state before and after the reaction, there is neither oxidation nor reduction.</p>
19	D	<p>Oxidation: <math>2\text{I}^-</math> (colourless) <math>\rightarrow \text{I}_2</math> (brown) + <math>2\text{e}^-</math></p> <p>Reduction: <math>\text{Cr}^{6+}</math> (orange) + <math>3\text{e}^- \rightarrow \text{Cr}^{3+}</math> (green)</p>
20	D	Precipitation is used to prepare insoluble salt. Silver nitrate is soluble.
21	B	Amphoteric oxide reacts with both acids and bases to form salts and water only. [neutralization]
22	C	<p>A: <math>\text{H}^+</math> ions reacts with <math>\text{OH}^-</math> ions to form <math>\text{H}_2\text{O}</math>, decreasing the number of <math>\text{H}^+</math> ions.</p> <p>B: <math>\text{NaOH} + \text{HCl} \rightarrow \text{NaCl} + \text{H}_2\text{O}</math></p> <p>Since concentration of NaOH and HCl is the same, <math>10\text{cm}^3</math> of NaOH is needed to completely neutralize the acid, before the methyl orange could change colour.</p> <p>D: No insoluble salt is formed. NaCl is soluble.</p>





23	D	C: Alkalis react with ammonium compound, but not ammonia. D: Ammonia is basic; it reacts with acid.
24	D	Going down Group VII, as the number of protons increases, the size of atom increases too due to the presence of more electron shells. This increases the interaction (i.e. Van der Waals forces of attraction between the Group VII molecules), and thereby increasing the melting point.
25	C	X is in Group 0 (noble gas). Y and Z are in Group I and II respectively. Z forms $Z^{2+}$ by losing its two outermost electrons.
26	D	A Group I element loses one electron per atom to achieve electronic structure of a noble gas. Lithium is the least reactive element in Group I. It has the least number of electron shells and therefore the greatest attraction of nucleus on its outermost electron. Thus, it is most difficult for lithium atom to lose an electron to react.
27	B	
28	C	Magnesium is more reactive than iron, and therefore would react with oxygen more readily than iron to form rust.
29	B	
30	D	
31	A	Iron, being more reactive, displaces copper (II) ions and silver ions respectively from their solution, changing into iron ions in the process. Therefore, the mass of iron (atoms) available decreases.
32	A	CO is a neutral oxide and does not react with carbonates. $\text{NO}_2$ , $\text{P}_2\text{O}_5$ and $\text{SO}_2$ are acidic oxides and react with carbonates.
33	B	The thermometer is reading the temperature of the water that has boiled off. In this case, the pure gaseous steam has just undergone its change in state from liquid water, which takes place at $100^\circ\text{C}$ . Note that the thermometer is not reading the temperature of the boiling mixture in the flask, which is higher than $100^\circ\text{C}$ as the presence of calcium chloride (impurity) raises the boiling point of this impure water.
34	D	Fractions of crude oil are made up of hydrocarbons (e.g. alkanes, alkenes etc.) in varying quantities. Those molecules that reach the top of the column would be the smaller molecules (i.e. molecules containing lesser number of carbons) which possess lesser amount of intermolecular forces, and therefore lower boiling points.
35	D	Alkenes react with steam to form alcohol. Butene reacts with steam to form butanol.
36	B	A: $\text{CH}_3\text{OH} \rightarrow \text{HCOOH}$ B: $\text{CH}_3\text{OH} + \text{CH}_3\text{COOH} \rightarrow \text{CH}_3\text{COOCH}_3$ C: $2\text{CH}_3\text{COOH} + \text{Na}_2\text{CO}_3 \rightarrow 2\text{CH}_3\text{COONa} + \text{CO}_2 + \text{H}_2\text{O}$ D: $\text{C}_3\text{H}_8 + 5\text{O}_2 \rightarrow 3\text{CO}_2 + 4\text{H}_2\text{O}$
37	D	





38	A	Isomers are compounds with same molecular formula but different structural formula.
39	D	
40	C	

