

A1

- 3B Strontium has 38 protons and electrons. If this isotope has nucleon number (mass no.) of 90, it must have 52 neutrons.
- 6B $6/12 = 0.5\text{mol C}$. From eqn, $0.5\text{mol C} \rightarrow 0.5\text{ mol CO}_2$. Mass = $0.5 \times 44 = 22\text{g}$
- 8A Acid is in excess, so zinc is the limiting reactant. Since 2nd expt has twice the amount of zinc, the amount produced would be twice the amount. The rate of reaction would also be doubled as twice amount of zinc particles are reacting concurrently.
- 10D Remember the trend down group I : mp/bp decreases, density increases, reactivity increases (more metallic).
- 12D Mg is used for sacrificial protection of underground water/oil pipe. Zn is for ship hull.
- 13B Good electrical conductivity of aluminium is useful when Al is used to make overhead cables. As cooking utensils, only good heat conductivity is important here.
- 15D Natural gas is mainly METHANE, and some ethane.
- 17A If alkane is in liquid state at room temperature and pressure, it must consist of larger molecules. Large alkane molecules become smaller alkanes and alkenes like ethene through cracking process. *The aluminium oxide is acting as a catalyst.* (Remember!)

A2

- 6D 0.1mol propane produces 0.3mol of carbon dioxide (water is NOT a gas).
0.3mol carbon dioxide = $0.3 \times 24 = 7.2\text{dm}^3$
- 7B Since it is exothermic reaction, the temperature of solution will increase. Excess alkalis will dilute the mixture and causes the temperature of solution to return to room temperature.
- 15D Cracking is used to meet the demand of smaller molecules. Smaller molecules burn readily so they are used as fuel.
- 16A Complete combustion produce carbon dioxide and water only.

A3

- 5B $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$
 $12/24 = 0.5\text{ mol Mg}$ produces 0.25mol O_2 . Mass of $\text{O}_2 = 0.25 \times (2 \times 16) = 8.0\text{g}$
- 6B $9.7/97 = 0.1\text{mol ZnS}$ produces 0.1mol SO_2 . Vol of $\text{SO}_2 = 0.1 \times 24\text{dm}^3 = 2.4\text{dm}^3$ at r.t.p.
- 7C Conc acids has higher rate of reaction, so mass loss at higher rate. Since marble chips is the limiting reactant, and both expts have same conditions so amount of products must be the same.
- 12A The higher the carbon content in steel, the harder and brittle the steel.
- 14C Unpolluted air contains nitrogen, oxygen, carbon dioxide, water vapour and noble gas (argon).
- 17D Only alkene members have same empirical formula.

A4

- 3D Copper does not react (dissolve in) aqueous acids. Sodium chloride is soluble in water or any aqueous solution as aqueous solutions contains water.
- 4B $6/12 = 0.5\text{mol C}$. From eqn, $0.5\text{mol C} \rightarrow 0.5\text{ mol CO}_2$. Mass = $0.5 \times 44 = 22\text{g}$
- 5A $2\text{Cu} : 1\text{O} \Rightarrow 2 \times 64 : 16$. Hence, 64:8
- 6C When 4mol/dm^3 is used instead of 2mol/dm^3 , the rate of reaction will increase, so time taken decrease.
- 12C Look for test-tube that shows most bubbles formed.
- 14A The reaction flask contains air before the reaction starts. When hydrogen gas is produced, some of these air would be flushed into the test-tube.
- 15D Ammonia is alkaline gas. Sulfur dioxide (SO_2), sulfur dioxide (SO_3), nitrogen dioxide (NO_2) are acidic gases. Nitrogen monoxide (NO), carbon monoxide (CO), N_2 , O_2 , H_2 , CH_4 are all neutral gases. Chlorine bleaches.
- 17A The alcohol in wine is ethanol. Oxidation of ethanol produces ethanoic acid, CH_3COOH .
- remove Q18

A5

- 3A Note that option C is a trick. Protons are NOT found outside nucleus, can't be in electron shell.
- 6C For ice to melt to water, it must absorb heat energy, so it is an endothermic process.
- 7B Note that the y-axis is the RATE of carbon dioxide produced. Rate increases gradually to about 40°C and then drops drastically to 0 after 56°C . Reason being that yeast will die at high temperature, so fermentation of sugar stops.
- 9C Salt will not react with acids, unless it is a precipitation reaction. eg. $\text{Pb}(\text{NO}_3)_2(\text{aq}) + 2\text{HCl}(\text{aq}) \rightarrow \text{PbCl}_2(\text{s}) + 2\text{HNO}_3(\text{aq})$
- 10A The number of electrons used in bonding is also the VALENCY. (not valence electrons which are outershell electrons)

- 15C Carbon monoxide binds permanently with blood (forms stable compound), preventing blood from carrying oxygen, resulting in headache or death.

A6

- 1C Substance 1 is brittle – could be glass. It is likely to be a gas at room temperature.

6B
$$\frac{52 \times 2}{52 \times 2 + 16 \times 3} \times 76 = 52\text{g}$$

- 10C Group O are NON-METALS. Group I + chlorides = ionic chlorides, not COVALENT. Elements becomes less metallic (or more non-metallic) from left to right across a period. Elements becomes more metallic DOWN a group. More metallic means greater ease of losing electrons.
- 11B By knowing that Caesium is a metal in group I does not directly imply that caesium is more reactive than sodium. Only when we refer to the periodic table, seeing that caesium is BELOW sodium, then we can conclude that caesium is more reactive. In this qn, we are assuming we look at the periodic table.
- 14C Respiration, combustion and rusting requires oxygen.
- 15C Oxygen is more soluble in water than nitrogen, hence the air expelled from water has higher percentage of oxygen.
- 16D NPK fertilisers are not in syllabus. Treat this as a question to test mole concept. Find the mixture that has same number of atoms for N, P and K. Mixture D has 2N, 2P and 2K.
- 18D Alkenes must contain C=C bond. 3 is cyclobutane, it is NOT alkene.
- 19D Addition of steam converts alcohols to carboxylic acid, they must have same number of carbon atoms.
- remove Q17

A7

- 1C Not all molecules of the same kind move with same speed. Speed depends on the kinetic energy of individual particles. But we know they all move randomly at high speed.
- 6A Note the unit for the volume. $1\text{dm}^3 = 1000\text{cm}^3$ Conc of A: $0.1/0.1 = 1\text{mol/dm}^3$, the rest 0.1mol/dm^3
- 12A The metal that reacts rapidly with steam but very slowly with cold water **should be MAGNESIUM**. However, there is no such option. *Calcium is next best answer BUT calcium reacts READILY with cold water, and violently with steam. Note: Hot magnesium reacts violently with steam to form magnesium oxide (a white powder) and hydrogen gas. A bright white glow is produced during the reaction. Red-hot iron reacts slowly with steam to form iron oxide and hydrogen gas. The iron must be heated constantly in order for the reaction to proceed.*
- 13C Z is a very reactive metal, because the oxides of top 5 most reactive metals (K, Na, Ca, Mg, Zn) are **not** reduced by carbon. Y is the least reactive metal because it does not react with acid. Only metals below hydrogen (Cu, Ag, Au) do not react with acids to produce hydrogen gas.
- 18D Ethanol oxidise by oxygen with the help of microorganism in air to form sour ethanoic acid.
- remove Q15

A8

- 3D X is a positive ion when it has electronic configuration of 2.8.8. It has already lose 1, 2 or 3 electrons so it must have more than 18 electrons to begin with.
- 4C Sodium is a group I metal so it loses 1 valence electron by undergoing oxidation.
- 5B $16/2 = 8\text{ mol H}_2$, $16/32 = 0.5\text{mol O}_2$. Since O_2 is limiting reactant, it will determine the amount of water produced. 0.5 mol O_2 produces $1\text{ mol H}_2\text{O}$, which is 18.0g .
- 10C Ammonium salt + base → ammonia gas which is the only alkaline gas that turn moist red litmus blue.
- 11A X has lower boiling point means it is a smaller molecule which is above bromine. It will displace bromine from its salt solution.
- 17C carbon monoxide can burn to form carbon dioxide. carbon dioxide will NOT burn, that is why it is used in fire extinguishers.
- remove Q16

A9

- 2D X:2.1 is a group I element. It will react with cold water to form alkali and hydrogen gas.
- 5A $64\text{g of Cu} = 1\text{ mol}$. $8\text{g of O} = 0.5\text{ mol}$ so formula : Cu_2O
- 10B Brass = copper + zinc and Bronze = copper + tin
- 11D If a metal reacts slowly with cold water, it should be less reactive than calcium but more reactive than magnesium. So, option A, B and C are out.
- 15A Calcium carbonate reacts and remove acid but it will not dissolve in water to affect the pH as it is neutral.

17D Physical properties changes gradually within a homologous series as molecular mass increases.

A10

6B When the temperature of solution drops, it means that energy is absorbed into the reacting particles.

8D HCl, H₂SO₄ and HNO₃ has pH 1 to 2.

9A Al₂O₃ is amphoteric oxide so it reacts with both acids and alkalis.

10D Bromine is below chlorine, so it will NOT displace chloride from its salt.

16C NH₃ becomes N₂ => oxidised by losing H.

17B Carbon dioxide is an ACIDIC gas. it reacts with alkali Ca(OH)₂

18D Only ALKENES members have same empirical formula. Empirical formula is the simple ratio of elements.
eg. C₂H₄ = CH₂, C₄H₈ = CH₂

19A X has -OH (hydroxyl gp) and C=C (carbon-carbon double bond).

remove Q15

A11

3A Acid is in excess. Powdered CaCO₃ results in higher initial rate of reaction but it will NOT produce different amount of products, hence the final mass will be the same.

5C Electronic configuration of C:2.8.2 so it will give away 2 valence electrons to form +2 charge ion.

6C $8/40 = 0.2$ mol NaOH. Conc = $0.2/0.1 = 2.0$ mol/dm³

7D When a metal becomes an ion, it loses its valence electrons and undergoes oxidation.

8A Barium ions forms white ppt (BaSO₄) with H₂SO₄. Chloride ions form white ppt (AgCl) with AgNO₃.

9B Mg(NO₃)₂ is a salt. A salt cannot be used to produce another salt unless it is precipitation.

remove Q11 and Q15.

A12

1B Fractional distillation is used to separate 2 or more liquids with different boiling points.

There is NO correct answer, so (B) distillation is the best choice here.

2A X:2.1, Y:2.7, Z:2.8 so X transfer 1 valence electron to Y to form X⁺ and Y⁻, XY is ionic compound.

6D Light ENERGY is absorbed since it is photographic film.

7A Calcium carbonate is not a reducing agent. CO, C and H₂ are reducing agent.

9C Iron (II) chloride is a salt, it can be produced by reacting iron with hydrochloric acid.
Remember : Copper (II) salts cannot be produced by reacting copper metal with acid.

10A Al³⁺ ions reacts with NaOH to produce white precipitate formed, soluble in excess.

Al³⁺ ions reacts with aqueous ammonia to produce white precipitate formed, INSOLUBLE in excess.

11C Group VII elements receive ONE electron to form X⁻ ions, so it has more electrons than protons.

12B Iron displaces X, so X must be lower than iron.

13D If oxygen and steam reacts with iron to form the SAME product and oxygen is an element, steam must have the oxygen component in it. It is either a compound or mixture containing oxygen.

16B Ammonium salts + base to form ammonia gas.

remove Q17

A13

6C Basic oxide reacts only with acid. Acidic oxide reacts only with base.

Amphoteric oxide (PbO, Al₂O₃ & ZnO) reacts with both acids and bases.

8A One H⁺ ion is moved from NH₄⁺ to OH⁻.

11B CuO + H₂ → Cu + H₂O & CuO + O₂ → no reaction.

12C Group O is non-metal. Group I form ionic compound with oxygen. Group VII elements are less metallic than group II elements. So C is the only possible answer.

13A Good electrical conductor in solid state is a key property for ALL metals, and one non-metal, carbon.

14B Mg is not used for coating, it is ATTACHED to provide sacrificial protection.

15D 20% of air is oxygen. When used in oxidation of iron, only 80% of original volume left.

16A Ethene undergoes hydration to form ethanol, which then undergoes oxidation to form ethanoic acid.

20B Combustion of any hydrocarbon produces water and carbon dioxide.

remove Q7 and Q18