

Suggested Answers to 2019 O level Science Chemistry 5076 5078 Paper 1

Question	Answer	Explanation
21	D	To study the rate of reaction when a piece of magnesium was added to some dilute hydrochloric acid, we can measure the rate of hydrogen gas production per unit time. A conical flask is needed to contain the chemicals, a stopwatch is needed to keep track of the time intervals and a gas syringe is needed to measure the volume of hydrogen gas produced at regular time intervals. Bunsen burner is not required as no heating is involved.
22	С	Since a white precipitate is formed that is soluble in excess aqueous sodium hydroxide, lead or zinc ions could be present. When powdered aluminium is added to the test tube and heated gently, ammonia gas which turns red litmus paper blue is evolved. Thus, nitrate ion is present. Putting the information together and elimination of the options, X would be lead (II) nitrate.
23	С	Since electron number is equal to proton number for an atom, fluorine atom has 9 electrons, and has electron arrangement of 2,7. Question is asking for fluoride ion and hence, fluorine will gain one electron to attain the stable octet electronic configuration having electron arrangement of 2,8.
24	С	Sodium chloride has a giant crystal lattice structure with strong electrostatic forces of attraction between the positive and negative ions. Large amount of energy is needed to overcome the forces of attraction hence, sodium chloride has a high melting point. Option C is not correct.
25	Α	From the 'dot and cross' diagram, we can see that AB ₃ is a covalent compound. Thus, both A and B must be a non-metal. A has a total of 5 valence electrons (the dots) and hence, must belong to group V of the periodic table. B has only one valence electron and yet it forms covalent compound so it has to be hydrogen. Option A is not correct as only the OUTER shell electrons are shown.
26	В	From the chemical formula, we can derive that chromium ion is +3 charge and sulfate ion is -2 charge.
27	D	No. of moles of sodium carbonate= $25.0/1000 \times 0.2 = 0.005$ mol No. of moles of hydrochloric acid= $0.005 \times 2 = 0.01$ mol Volume of acid= $0.01 / 0.1 = 0.1$ dm ³ = 100 cm ³
28	Α	A decrease in temperature corresponds to an endothermic reaction as heat energy is absorbed. We see a gain in energy for the reacting chemicals.
29	С	Question specifically asked for the increase in rate of reaction by INCREASING THE MOVEMENT OF THE PARTICLES. Thus, only an increase in temperature of sulfuric acid will increase the kinetic energy of the sulfuric acid particles, leading to increased frequency of effective collision. All the other options will not affect the movement of the particles but only increases the chance of effective collisions taking place.

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30	С	FeCl ₂ is oxidized as the oxidation state of Fe increases from +2 in FeCl ₂ to +3 in FeCl ₃ . It is a reducing agent as it reduces Cl from 0 in Cl ₂ to to -1 in FeCl ₃ .
31	С	The average rate of reaction can be calculated by dividing the total volume of gas with the time taken. The smallest volume of gas produced per unit time will give the slowest average rate of reaction and thus option C is the answer.
32	В	Since the oxide of element X reacts with acid only but not with the base, it must be a basic oxide. Basic oxide is a metallic oxide. Hence, option B is the answer.
33	С	As the number of electron shells increases, the electrostatic forces of attraction between the positive nuclei and the electrons are weaker and hence, an electron is more easily lost. The other options correspond with the trends given in the table.
34	В	As we go down group VII of the periodic table, colour intensity of the element increases, melting and boiling point increases while reactivity decreases. Since a the bottom, it must be black in colour, solid at room condition and no displacement reaction with a more reactive bromine.
35	D	Y gives no reaction in all 3 reactions hence it must be the least reactive. Z is most reactive as it is the only metal that gives an explosive reaction with dilute acid. Comparing W and X, X reacts more vigorously in all 3 reactions compared to W hence, the order of reactivity is Z>X>W>Y.
36	D	Question is asking for the advantages of recycling metals. Statement 1 talks about how energy is conserved when recycling is done. Statements 3 and 4 talk about metals being a finite resource and the need to recycle and conserve it. Statement 2 talks about the processes involved in recycling metals which is not a reason in favour of recycling metals.
37	А	Dry air comprises of 78% nitrogen, 21% oxygen and 1% other gases with argon as the main constituent.
38	D	By elimination, only option D is correct. Alkane reacts with halogens in the presence of UV light in a substitution reaction. Propane contains 3 carbon atoms. Alkanes have general formula C _n H _{2n+2} . The products of complete combustion are carbon dioxide and water.
39	С	This is an addition polymerization reaction where the double bond breaks and the repeat unit is added across to form a long chain polymer.
40	С	Acidified potassium manganate (VII) is an oxidizing agent and would change colour in presence of a reducing agent. In the given options, only ethanol has the ability to undergo oxidation to give ethanoic acid and hence acts as a reducing agent.

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