KENDRIYA VIDYALAYA SANGATHAN, LUCKNOW REGION
CUMULATIVE EXAMINATION (2023-24)
CLASS-XI
CHEMISTRY (043)
Marking Scheme

S. No.	Answer/Value point	Marks	Total Marks
1.	(iii) 0.005	1	1
2.	(iv) 1 m	1	1
3.	(iv) 1	1	1
4.	(iii) 9	1	1
5.	(iii) Na < Mg < Al < Si	1	1
6.	(iii) F < Cl > Br > I	1	1
7.	(iv) Elements of a group have same number of shells	1	1
8.	(ii) Chromium	1	1
9.	(iii) O_2^{2-}	1	1
10.	(ii) trigonal planar	1	1
11.	(iii) q = 0, $\Delta T = 0$, w = 0	1	1
12.	(ii) ΔG is positive for a spontaneous reaction	1	1
13.	(ii) Both A and R are true but R is not the correct explanation of A	1	1
14.	(i) Both A and R are true and R is correct explanation of A	1	1
15.	(i) Both A and R are true and R is correct explanation of A	1	1
16.	(i) Both A and R are true and R is correct explanation of A	1	1
17.	Correct definition. Molarity= No. of moles of solute/Vml X 1000 Amount of NaOH= 2g	1+1	2
18.	This is due to the small size of the fluorine atom. As a result of the strong inter-electronic repulsions in fluorine's relatively small 2p orbitals, the incoming electron does not experience much attraction.	2	2
19.	(i) C (ii) Al	1+1	2
20.	Two differences **OR** C-H bond energy per mole=1665/4 kJ/mol=416.2 kJ/mol	2 2	2
21.	Acetone requires less heat to vaporize due to the weak force of attraction between molecules. OR Correct derivation of relation	2	2
22.	$2H_2+O_2 \rightarrow 2H_2O$ According to the balanced equation, 2 moles of hydrogen		3

	react with 1 mole of oxygen. Molar mass of hydrogen = 2 g/mol Molar mass of oxygen = 32 g/mol Moles of hydrogen = 35/2=17.5moles Moles of oxygen = 276/32=8.6moles On comparison with balanced equation, 8.6 moles of oxygen react with 17.2 moles of hydrogen, hence Oxygen is limitimg reagent..	1 1 1	
23.	Molar mass= 142.066g, Na=32.4%, S= 22.6%, O=45.05%	1+1+1	3
24.	frequency=6.91×10^{14} Hz, wavelength=434 nm **OR** (i) Correct shapes (ii) (a) $[Ar]3d^{10}4s^2$ (b) $[Ar]3d^3$	1½ +1½ ½ +½+½+½ 1+1	3
25.	(i) The ion formed after removing one electron from the sodium atom takes on the configuration of an inert gas, neon, whereas Mg retains one electron. As a result, the first ionization energy of Na is lower than that of Mg. High energy is required to remove an electron from a noble gas configuration. (ii) Correct explanation..	1½ 1½	3
26.	ΔG^o= -2.303 RT log K, ΔG^o=-5.744 kJ/mol	3	3
27.	Correct geometry and hybridization	1+1+1	3
28.	(i) Element belonging to nitrogen family (group 15) e.g., nitrogen (ii) Element belonging to alkaline earth family (group 2) e.g., nitrogen (iii) Element belonging to oxygen family (group 16) e.g., oxygen	1 1 1	3
29.	(i) A covalent bond is formed by the overlapping of half-filled atomic orbitals with definite directions, i.e., shared electron pair/pairs are localized between two atoms. As a result, a covalent bond is also known as a directional bond. Since each ion in an ionic compound has an influence in all directions, it is surrounded by a number of oppositely charged ions with no definite direction and, therefore, is non-directional. **OR** (i) Each carbon atom in ethyne is s-p hybridized resulting in a linear structure. (ii) Bond length is inversely proportional to bond order. (iii) When there is a sufficient difference in the	1 1 1	4

	electronegativity of the two atoms, the ionic character is observed in a covalent bond. Ionic character ∝ Electronegativity difference. The following is an order of increasing ionic character C – H < N – H < O – H < F – H (iv) Correct defination	1 1	
30.	(i) No. of electrons ejected out from a metal surface would increase. (ii) Wavelength is inversely proportional to the size of object. Since the tennis ball is bigger in size, hence the wavelength is invisible. (iii) According to de Broglie, wavelength=h/mv So the wavelength=238.5 X 10^{-36} m Since the wavelength is too small to detect, it does not exhibit wave nature. (iv) Correct explanation .	1 1 1 1	4
31.	Criteria for spontaneity dS=dq/T (i) entropy increases (ii) entropy decreases (iii) entropy increases **OR** (i)(a) correct definition (b) correct definition (ii) 49 kJ/mol	1 1 1 1 1 1 1 3	5
32.	(i) Important features of Bohr atomic model of atom (ii) Correct calculation with formula . **OR** (i) (a) 2d (b) 4s (c) 5f (d) 3d (ii) (a) Correct principle (b) Correct principle (c) Correct principle	3 2 2 1 1 1	5
33.	(a) Correct explanation (b) (i) due to lone pair of electrons on oxygen in water molecule whereas there are no lone pair on central atom in case of carbon dioxide. (ii) Correct definition, resonating structures of ozone (iii) Correct lewis structure **OR** (i) Carbon is bonded to three oxygen atoms in carbonate ion. It has double bonds with two oxygen atoms and a single bond with one oxygen. Since bonds are not fixed and show resonance, all C-O bonds have the same length.	2 1 1 1 2+1	5

	Correct resonating structures (ii) Correct definition Due to the difference in electronic environment around the oxygen atom, the bond enthalpies of O-H in C_2H_5OH and water differ.	1 1	