B.K. BIRLA CENTRE FOR EDUCATION

SARALA BIRLA GROUP OF SCHOOLS
A CBSE DAY-CUM-BOYS' RESIDENTIAL SCHOOL

TERM-1 EXAMINATION 2026-27
CHEMISTRY (043) SET-2 (Answer Key)

Class: XII | Duration : 3 Hrs
Date:07/09/26 | Max. Marks: 70
Name: | Exam Roll No.:

SECTION-A

Q. No. 1 to 12 are multiple-choice questions. Only one of the choices is correct. Select and write the correct choice as well as the answer to these questions.

1. (d) vapour pressure 1

2. (b) 1 1

3. (b) paste of HgO and carbon 1

4. 1
ionic conductance increases and electronic conductance decreases.

5. (a) Zero order reaction 1

6. (b) mol $L^{-1}s^{-1}$ 1

7. (d) Ni^{2+}, Ti^{3+} 1

8. 1
(b) Zn, Cd, Hg

9. (a) Vitamin B12 1

10. 1

(c) 6 and +3

11. 1

(a) Cl_2/UV light

12. (d) $(CH_3)_3C—I$ 1

Question No. 13 to 16 consist of two statements – Assertion (A) and Reason (R). Answer these questions by selecting the appropriate option given below:
A. Both A and R are true, and R is the correct explanation of A.
B. Both A and R are true, and R is not the correct explanation of A.
C. A is true but R is false.
D. A is false but R is true.

13. a 1

14. d. 1

15. b. 1

16. a. 1

SECTION-B

17. 2

- Quantity of a gas that will dissolve in a liquid depends upon the amount of gas present and its solubility coefficient
  - explains why you can breathe compressed air while scuba diving despite 79% Nitrogen
    - N_2 has very low solubility unlike CO_2 (soda cans)
    - dive deep & increased pressure forces more N_2 to dissolve in the blood (nitrogen narcosis)
    - decompression sickness if come back to surface too fast or stay deep too long
- Breathing O_2 under pressure dissolves more O_2 in blood

(b) ions is directly proportional to bpt

18 2

$= -6 \times 96500\ C/mol \times 0.30\ V$
$= -173700\ J/mol$
$= -173.7\ kJ/mol$
$E^\circ_{cell} = 0.059V/n \times \log K_c$
$\log K_c = 0.30\ V \times 6/0.059V$
$= 30.5$

19. (a)The **specific rate of a reaction** (also known as the **rate constant**, \(k\)) is defined as the rate of a chemical reaction when the molar concentration of each reactant is exactly equal to unity 2

(b) The **energy of activation** is defined as the minimum amount of extra energy required by reactant molecules to get converted into products. It acts as an energy barrier that reactants must overcome to undergo a chemical transformation. [1, 2]

OR

Molecularity of reaction	Order of reaction
• The total number of chemical species involved in the rate determining step of a chemical reaction is called molecularity of a reaction. • It is a theoritical parameter. • It is always a positive whole number. • It does not changes with change in temperature and pressure	• The sum of the powers of concentration in the rate law equation is called order of a reaction. • It is an experimental parameter. • It can be positive, negative, zero or even in fraction. • It changes with change in temperature and pressure.

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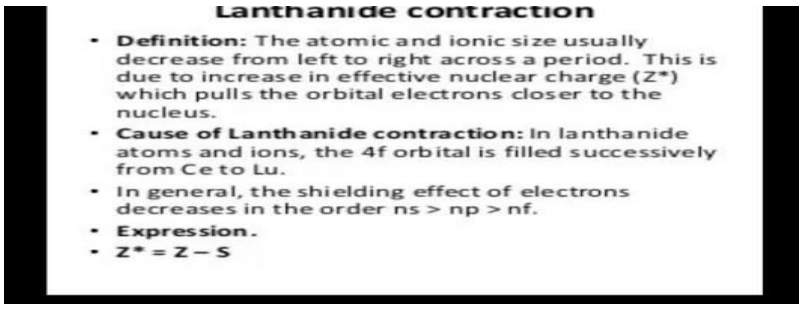
20. 2



21. Bacl2 test ., White ppt for sulphate 2

SECTION-C

22. 3

REVISION SOLUTION 1

SHORT ANSWER TYPE QUESTION

(a) Which of the following factor(s) affect the solubility of a gaseous solute in the fixed volume of liquid solvent? (i) Nature of solute (ii) Temperature (iii) Pressure

(b) Which thing is responsible of low concentration of oxygen in the blood and tissues of people living at high altitude?

(C)Why do gases always tend to be less soluble in liquids as the temperature is raised?

HENRY,S LAW AND ITS APPLICATIONS

Q.1 State Henry's law.
Q.2 Which cold drink you prefer- one chilled or other one at room temperature and why?
Q.3 At the same temperature hydrogen is more soluble in water than Helium. Which of them will have higher value of K_H and why?
Q.4 What is the significance of Henry's Law constant K_H?
Q.5 If N_2 gas is bubbled through water at 293 K, how many millimoles of N_2 gas would dissolve in 1 litre of water? Assume that N_2 exerts a partial pressure of 0.987 bar. Given that Henry's law constant for N_2 at 293 K is 76.48 kbar.
Q.6 Write applications of Henry's law ?
Q.7 H_2S, a toxic gas with rotten egg like smell, is used for the qualitative analysis. If the solubility of H_2S in water at STP is 0.195 m, calculate Henry's law constant
Q.8 Henry's law constant for the molality of methane in benzene at 298 K is 4.27 x 10^5 mm Hg. Calculate the solubility of methane in benzene at 298 K under 760 mm Hg.
Q.9 Henry's law constant for CO_2 in water is 1.67 x 10^8 Pa at 298 K. Calculate the quantity of CO_2 in 500 mL of soda water when packed under 2.5 atm CO_2 pressure at 298 K.

RAOULT,S LAW AND ITS DEVIATION

1. State Raoult's law for the solution containing volatile components. How does Raoult's law become a special case of Henry's law? Write two differences between an ideal solution and a non-ideal solution.
2. What is meant by positive and negative deviations from Raoult's law and how is the sign of $\Delta_{mix}H$ related to positive and negative deviations from Raoult's law?
3. Define an ideal solution and write one of its characteristics.
4. On mixing liquid X and liquid Y, volume of the resulting solution decreases. What type of deviation from Raoult's law is shown by the resulting solution? What change in temperature would you observe after mixing liquids X and Y?
5. The vapour pressure of pure liquids A and B are 450 and 700 mm Hg respectively, at 350 K. Find out the composition of the liquid mixture if total vapour pressure is 600 mm Hg. Also find the composition of the vapour phase.
6. Why is an increase in temperature observed on mixing chloroform and acetone?
7. The graphical representation of vapour pressure of two components system as a function of composition is given alongside. By graphic inspection, answer the following questions:

a. Name the type of deviation from raoult's law

Or

(a) Aquatic animals like fish stay at lower water levels because **warm upper layers hold less dissolved oxygen**, pure substances melt at **sharp fixed temperatures**, and heavy sugar creates a **drying hypertonic state**

(b) The freezing or melting point of a substance is used to test its purity because **pure substances melt or freeze at a fixed, sharp temperature**, whereas **impure substances melt over a wider temperature range and at a lower temperature**

Adding high amounts of sugar preserves fruits by causing **exosmosis**, which draws water out of bacterial cells, leading to their **shrinkage and death**

23. 3

$$\Lambda^0(CH_3COOH)$$
$$= \Lambda^0(CH_3COONa) + \Lambda^0(HCl) - \Lambda^0(NaCl)$$
$$= 90 + 425 - 125$$
$$= 390 \text{ mho cm}^2 \text{ mol}^{-1}$$
$$\alpha = \frac{\Lambda_c^0}{\Lambda_m^0} = \frac{7.8}{390} = 0.02$$

24. 3

If initial concentration $[R]_o$ =100 g
Then final concentration, [R] = 80 % of 100 = 80 g
Given that half life $t_{1/2}$ = 5730 year
Use the formula

$$k = \frac{0.693}{t_{\frac{1}{2}}}$$

Plug the value of $t_{½}$ in this formula we get
k = 0.693/ 5730 years^{-1} = 1.21 x 10 $^{-4}$ years $^{-1}$
Use the formula of first order reaction

$$k = \frac{2.303}{t} \log \frac{[R]_o}{[R]}$$

Plug the values in this formula we get

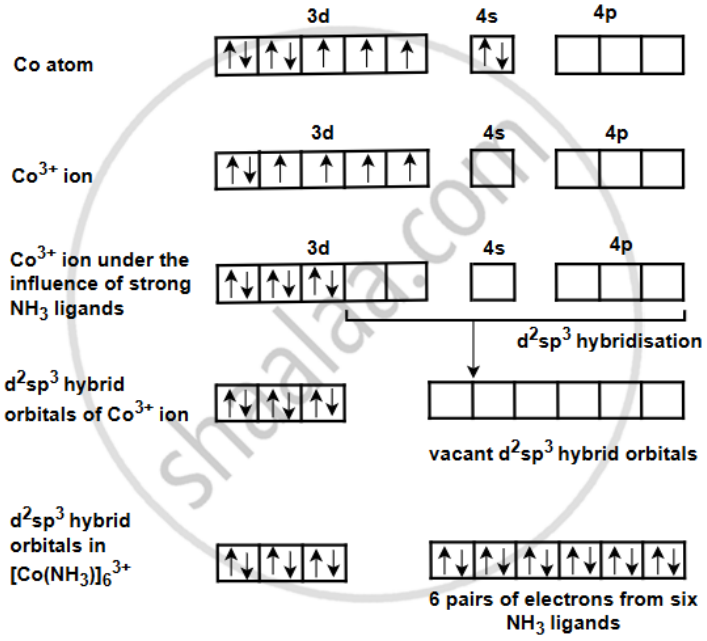
$$1.21\times10^{-4} = \frac{2.303}{t} \log \frac{100}{80}$$

$$t = \frac{2.303}{1.21\times10^{-4}} \log(1.25)$$

t = 1845 years

25. Assign reasons for the following. 3
(a) d ^{1} config
(b) +2 has unpaired electron
(c) Completely filled d orbital

26. 3



27. Write the major product(s) in the following: 3

(a) Sunlight gives sp3 hybridised carbon

(b) Markownikoffs rule foolwed

(c) Sp3 will be breaking

28. Write the structure formula of the following compounds 3
(i) c-c-c-c- Br (ii) c-c(br)-c-c (iii) c-(br)c-©-br

SECTION-D

29. Read the passage carefully and answer the questions 4

The rate law for a chemical reaction relates the reaction rate with the concentrations or partial pressures of the reactants. For a general reaction, $aA + bB \rightarrow C$ with no intermediate steps in its reaction mechanism, meaning that it is an elementary reaction. The rate law is given by $r = k [A]^x [B]^y$ where [A] and [B] express the concentrations of A and B in moles per litre. Exponents x and y vary for each reaction and are determined experimentally. The value of k varies with conditions that affect reaction rate, such as temperature, pressure, surface area, etc. The sum of these exponents is known as overall reaction order. A zero

order reaction has a constant rate that is independent of the concentration of the reactants. A first-order reaction depends on the concentration of only one reactant. A reaction is said to be of second order when the overall order is two. Once we have determined the order of the reaction, we can go back and plug one set of our initial values and solve for k.
Answer the following questions:
(a) 2
(b) increases1

(c)

$$\text{Let, } [x]_0 = 100 \text{ M}, [x]_{100 \text{ min}} = 100 - 60 = 40 \text{ M}$$
$$\text{and} \quad t = 100 \text{ min}$$
$$k = \frac{2.303}{t} \log \frac{x_0}{x} = \frac{2.303}{100} \log \frac{100}{40}$$
$$= 0.02303 \log 2.5$$
$$= 0.02303 \times 0.397 = 0.009 \text{ min}^{-1}$$
$$\text{Time taken to complete 90\% reaction} = ?$$
$$[x]_0 = 100 \text{ M}, [x]_{90 \text{ min}} = 100 - 90 = 10 \text{ M}$$
$$k = 0.009 \text{ min}^{-1}$$
$$t = \frac{2.303}{k} \log \frac{x_0}{x} = \frac{2.303}{0.009} \log \frac{100}{10}$$
$$= 255.8 \log 10 = 255.8 \text{ min}$$

OR
© 444 sec

30. (a) linkage 1 4
(b) solvate1
(c) Coordination isomerism - This isomerism occurs in compounds containing complex anionic and cationic parts and can be thought of as occurring by interchange of some ligands from the cationic part to the anionic part

OR

(c) NO2 or SCN group containing complexes are ambidentate 2

SECTION-E

31 Attempt either option A or B. 5

(i) More efficient and no pollution

(ii)

$$m = \frac{108}{96500} \times 0.5 \times 2 \times 60 \times 60$$

$$= \frac{108 \times 5}{965 \times 10} \times 2 \times 6 \times 6 = 4.03g$$

$$4.03g = V \times d$$

$$4.03\ g = V \times 10.5\ g\ cm^{-3}$$

$$V = \text{Area} \times \text{thickness}$$

$$v = 4.03$$

$$= 900\ cm^2 \times \text{thickness}$$

$$\text{Thickness} = \frac{4.03}{10.5}$$

$$\frac{0.338 cm^3}{900 cm^2} = 4.26 \times 10^{-4} cm$$

OR

B. (i)

WIKIPEDIA

Molar conductivity

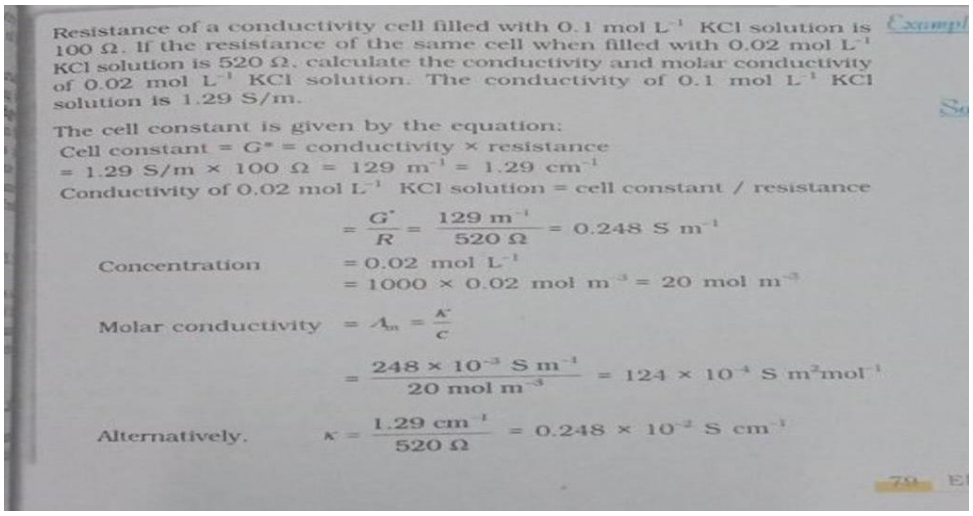
The **molar conductivity** of an electrolyte solution is defined as its conductivity divided by its molar concentration.[1][2]

$$\Lambda_m = \frac{\kappa}{c},$$

where:

κ is the measured conductivity (formerly known as specific conductance),[3]

(ii)



Resistance of a conductivity cell filled with 0.1 mol L^{-1} KCl solution is 100 Ω. If the resistance of the same cell when filled with 0.02 mol L^{-1} KCl solution is 520 Ω, calculate the conductivity and molar conductivity of 0.02 mol L^{-1} KCl solution. The conductivity of 0.1 mol L^{-1} KCl solution is 1.29 S/m.

The cell constant is given by the equation:

Cell constant = G^* = conductivity × resistance

= 1.29 S/m × 100 Ω = 129 m^{-1} = 1.29 cm^{-1}

Conductivity of 0.02 mol L^{-1} KCl solution = cell constant / resistance

$$= \frac{G^*}{R} = \frac{129\ m^{-1}}{520\ \Omega} = 0.248\ S\ m^{-1}$$

Concentration $= 0.02\ mol\ L^{-1}$

$= 1000 \times 0.02\ mol\ m^{-3} = 20\ mol\ m^{-3}$

Molar conductivity $= \Lambda_m = \frac{\kappa}{c}$

$$= \frac{248 \times 10^{-3}\ S\ m^{-1}}{20\ mol\ m^{-3}} = 124 \times 10^{-4}\ S\ m^2 mol^{-1}$$

Alternatively, $\kappa = \frac{1.29\ cm^{-1}}{520\ \Omega} = 0.248 \times 10^{-2}\ S\ cm^{-1}$

32. 5

$$4FeCr_2O_4 + 8Na_2CO_3 + 7O_2 \longrightarrow 8Na_2CrO_4 + 2Fe_2O_3 + 8CO_2$$
(A) (B)

$$2NaCrO_4 + 2H^+ \longrightarrow Na_2Cr_2O_7 + 2Na^+ + H_2O$$

$$Na_2Cr_2O_7 + 2KCl \longrightarrow K_2Cr_2O_7 + 2NaCl$$
(C) (D)

.

OR

Complete & balance the following reactions: -

(a) Fe3+

(b) CO2 $^{2-}$

Heat

(c) K2MnO4

(d) I2

(e) Sn4+

33. Explain the following reaction 5

(i) Swarts reaction
(ii) Finkelstin reaction
(iii) Sandmayer reaction
(iv) Wurtz reaction
(v) Friedal craft reaction

OR

(a) Haloalkanes react with KCN to form alkyl cyanides as the main product while AgCN forms isocyanides as the product. Explain. 2+3

(b) How will you bring about the following conversions?

(i) Chloro methane to Iodo Methane
(ii) Propene to 1 -Bromo Propane
(iii) Benzene to Biphenyl

**********ALL THE BEST**********